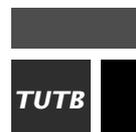


Musculoskeletal Disorders and Work Organisation in the European Clothing Industry

**Jeremy Hague
Lynn Oxborrow
Lynn McAtamney**

*European Trade Union
Technical Bureau
for Health and Safety*



The Trade Union Technical Bureau for Health and Safety was founded by the European Trade Union Confederation to promote high standards of health and safety in European workplaces.

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E-mail : tutb@etuc.org

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**Jeremy Hague,
Lynn Oxborrow,
Lynn McAtamney,**
Centre for Work and Technology,
The Nottingham Trent University

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TUTB, 2001

© European Trade Union Technical Bureau
for Health and Safety
Bd du Roi Albert II, 5 bte 5
B - 1210 Brussels

Tel. : +32-(0)2-224 05 60
Fax: +32-(0)2-224 05 61
E-mail : tutb@etuc.org

www.etuc.org/tutb

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Preface

In May 2001, the Luxembourg Advisory Committee for Safety, Hygiene and Health Protection at Work adopted an opinion on Musculoskeletal Disorders (MSD) calling on the European Commission to take initiatives on MSD prevention. It wants regulatory and non-regulatory action to expand primary prevention of MSD at workplaces in Europe.

The call crowns European trade unions' long-standing efforts to bring MSD into the European debate.

The ETUC and TUTB mounted a European campaign on Musculoskeletal Disorders¹ in 1997 to put the prevention of MSD at the top of the European workplace health and safety policy agenda and contribute to the actions of its affiliated national trade unions and European industry federations. The campaign was run at both European and national level to get a two-way result, with European activities giving momentum to national steps, and national initiatives delivering invaluable input to European actions. It was also waged on three fronts: information (to raise awareness), political (to put MSD on the European agenda and achieve practical aims) and bargaining (through local agendas framed at industry and workplace level).

In these circumstances, an industry-based survey was felt the best way to get insights into specific MSD problems, current scientific knowledge and solutions. The clothing industry offers an object lesson in repetitive work and MSD risk factors with pay systems traditionally linked to work pace. The industry has been forced into wholesale restructuring in recent decades by fierce global market competition. The resulting intensification of work has led to worse working conditions and a higher incidence of MSD. The 2nd European Survey on working conditions carried out by the European Foundation for the Improvement of Living and Working Conditions in 1996 put manufacturing - including the clothing industry - among the sectors most exposed to MSD risk factors. The recent findings of the 3rd European survey² (2000) confirmed the rising prevalence of risk factors and the increase in reported health problems involving musculoskeletal disorders. A national survey in The Netherlands³ reveals a high annual incidence of MSD symptoms (47%) in the clothing industry where preventive measures are thin on the ground.

Elsewhere, the U.S Bureau of Labor Statistics Annual Survey of Occupational Injuries and Illnesses⁴ puts clothing industry sewing machine operators top of the list for disabling Upper Limb Disorders.

Women are also heavily concentrated in the garment sector, which is a textbook example of highly visible gender segregation issues and increased exposure to MSD risk factors.

1. Marc Sapir, Theoni Koukoulaki, Europe under strain: A European Trade Union campaign on prevention of Musculoskeletal Disorders at workplaces, *European Trade Union Yearbook 2000*, European Trade Union Institute - ETUI, Brussels.
2. P. Paoli, D. Merli , Ten years of working conditions in the European Union, *TUTB Newsletter*, No. 15-16, February 2001, pp. 23-28.
3. Blatter and Bongers, *Work related neck and upper limb symptoms (RSI): High risk occupations and risk factors in the Dutch working population*, TNO Work and employment, Netherlands, 1999.
4. U.S Bureau of Labor Statistics Annual Survey of Occupational Injuries and Illnesses, *Number and percentage of disabling injuries and illnesses resulting from repetitive motion*, 1995, June 1997.



This report comes out of a joint project with the European Trade Union Federation: Textiles, Clothing and Leather (ETUF-TCL), and offers a comprehensive review of existing scientific knowledge related to MSD in the textile and clothing industry. It also examines organizational changes in the sector, considering established and emerging health and safety issues. At the same time, it presents practical examples of how trade union mobilization and participatory approaches have addressed MSD problems in different workplaces across Europe.

As well as an overall prevention strategy for musculoskeletal disorders, this report outlines the need to develop industry-based approaches. The TUTB will continue working with European Industry Federations to produce surveys on MSD and work organization in other sectors.

Marc Sapir
Director of the TUTB
May 2001



Contents

3 Preface

7 Introduction

Section 1

11 The European Textiles and Clothing Sector

- 11 Introduction
- 11 Industry structure
- 13 International trade
- 15 Trade policy
- 17 Consumption and distribution
- 19 Technology and innovation
- 20 Human resource issues
- 22 Summary

Section 2

23 A Dangerous Industry to Work in ?

- 23 Introduction
- 26 Mechanisms of injury
- 27 Assessing the task demands and operator capacity
- 29 Gaps in the macro ergonomic management model
- 29 Implementing change
- 30 Summary of recent literature

Section 3

41 Towards New Forms of Work Organisation in the Clothing Industry : Issues and Concepts

- 41 Introduction
- 42 Scientific Management - The dominant method of work organisation in the 20th century
- 45 Achieving flexibility - Craft, skill and technology
- 48 Are new forms of work a change for the better ?
- 51 The principles of Job Redesign
- 52 Differences in approach
- 53 Traditional manufacturing approaches in the clothing sector
- 55 Labour market challenges
- 55 Modular manufacturing in the clothing sector
- 58 Other work organisation issues to consider in the development of new working practices
- 62 Work organisation as a means of improving health and safety
- 63 Can teamworking in the garment industry improve health and safety ?
- 65 Does teamworking really work ?
- 68 Summary

Section 4

69 Change in Practice

- 69 Managing Change - Learning from and listening to others
- 69 Case study 1 - Raising awareness of MSD at Lovable, Bergamo, Italy
- 71 Case study 2 - CGIL Mantova-led research on the organisational effects of job stress on female workers at Cornelianani
- 72 Case study 3 - H.D. Lee, Spain
- 73 Case study 4 - The Danish Action Plan to reduce MSD
- 75 Case study 5 - A study on working conditions in the textiles and clothing sector undertaken by FIA-UGT, Spain
- 78 Case study 6 - The UK Teamwork Users' Group and the DTI Programme : Benchmarking Team-Based Production in the Textiles and Clothing Industry
- 79 Case study 7 - The use of Forum Theatre to promote democratic dialogue

Section 5

81 Conclusions and Recommendations

- 85 References
- 91 List of Tables and Figures



Introduction

The background and aims of the research

New ways of working are transforming the working lives of European employees. As traditional work organisation approaches are increasingly regarded as redundant in meeting the challenges of flexibility, responsiveness and differentiated products and services, a new lexicon of business terminology is emerging. We are being downsized, multi-skilled, empowered, made contingent and turned into 'team players'. But what is the impact of these changes? Do they pose new threats to security of employment, workplace stress and industrial injury - or do they provide a real opportunity to break with the isolation, monotony, and repetitive tasks that have characterised traditional working practices?

At the same time, research evidence claims an increase in the pace of work and incidences of industrial injuries. The survey on European working conditions, undertaken by the European Foundation (Paoli, 1997) also reported that 45% of workers described their jobs as monotonous and 37% said that they had repetitive tasks. Other findings revealed that 30% of workers in the EU reported problems with back pain, 28% stress and 17% muscular pains.

In 1997, the European Trade Union Confederation (ETUC) launched a campaign to raise awareness of the impact of musculoskeletal disorders (MSDs). Within this programme, the Trade Union Technical Bureau of the ETUC (TUTB) sought to learn from the experiences of the European industry federations. The European Trade Union Federation: Textiles, Clothing and Leather (ETUF-TCL), which represents 1,800,800 textile, clothing and leather workers in the European Union, had also been concerned about the incidences of MSDs being reported in a sector in which many occupations are characterised by short-cycle times, repetitive work and piecework payment methods. The ETUF-TCL therefore proposed that, as part of the European campaign, a study should be undertaken on the factors that cause MSDs in the clothing industry, which would address the urgent need to gather information and gain greater understanding of the problem.

A joint project was proposed by the TUTB and the ETUF-TCL which had three main aims. Firstly, the work would collate and analyse research already undertaken on the clothing sector, which would identify the specific occupational health problems of garment workers and point to gaps in the research literature. Secondly, the research aimed to raise awareness of the factors causing MSDs, amongst trade unions, many of whom had been active in commissioning research and stimulating local initiatives. A third component of the research was to learn from these experiences and therefore a number of 'good practice' case studies were proposed.



As work organisation is an important agenda in industrial policy - particularly since the publication of the European Commission's Green Paper *Partnerships for a New Organization of Work* in 1997, and the establishment of the European Work Organisation Network (EWON) - the report aims to examine MSDs in the context of changing working practices. It was noted that while useful ergonomic studies had been undertaken on issues such as workstation design, a broader, more holistic perspective was needed which connected the ergonomics literature with issues on work organisation and industrial restructuring.

Why study the clothing sector ?

Occupations in the clothing sector have been noted by a number of commentators to be at high risk of musculoskeletal injury (Brisson, Vinet, & Vezina, 1989a). Many of the tasks, and sewing in particular, are highly fragmented. Messing (1999), studied clothing operatives in Quebec and demonstrated that the daily work for a sewing machinist may involve repeating a work cycle 1500 times a day and lifting 400 kg. of fabric.

While line working in the sector has been recognised for many years, there have been additional pressures. During the 1990s, globalisation, changing consumer demands and the development of new technologies put the clothing sector under enormous strain. While it would be wrong to dismiss the clothing sector as being a 'sunset industry', as some commentators did in the 1970s, the clothing industry has suffered significant restructuring, company closures and redundancies. The fact that the sector does not rely on the transfer of technology, machinery or other equipment, has meant that there has been a growing trend to transfer production to low-wage economies.

While some European clothing manufacturers have attempted to compete within the global economy by a radical reappraisal of product markets, job design and organisational practice, others still base their competitive advantage upon price alone. This has resulted in a worsening of health and safety conditions in the workplace through the intensification of work, increased pace and the uncontrolled growth of new risks. Consequently, illnesses like MSDs have grown significantly in the clothing sector. This is also compounded by other factors. The combined textile and garment sector represents 8% of manufacturing employment within Europe; but the industry is very fragmented, with approximately 56,000 clothing enterprises. As a result, most of the production is concentrated in small and micro business. This fragmentation provides a fertile field for exploitation, as employers can exert direct pressures upon their workers. It is also known that smaller enterprises devote fewer resources to training or to organisational development issues.

The research methodology and acknowledgements

In the first part of the research, an extensive literature review was undertaken. This draws upon academic sources published in the English language. As anticipated before the start of this study, literature relating specifically to the clothing



industry is relatively sparse. However, there are many useful lessons and research findings and their collation and analysis within this volume represents the most comprehensive literature review undertaken in the field.

The report also highlights current discussions on work organisation and draws upon previous theoretical discussions. Particular attention is paid to issues surrounding the implementation of teamworking, or modular manufacturing as it is sometimes referred to. While this approach has been adopted by many larger clothing manufacturers to provide flexibility and responsiveness, can teamworking also provide a way of reducing the risk of MSDs?

The final section of the report draws upon the experiences of trade union campaigns and social partnership in Italy, Spain and Denmark. These case studies illustrate how trade unions are making an important contribution to the awareness and promotion of healthier workplaces. The authors are particularly indebted to the enthusiasm of the trade union officials, partner organisations, employer representatives and most particularly the trade union members who so willingly shared their experiences and gave their time to the study.

Italy¹

- These were kindly organised in Italy by Marcello Guardianelli of FILTA CISL, Giovanni Rossi of FILTEA CGIL & Rita Brambilla of FILTA CISL.
- Many people contributed to the discussion meetings at FILTA CISL Bergamo and FILTEA CGIL Mantova including Fulvio Bolis of FILTEA CGIL, Michele Libraro and Maria Rosa Bertoli of the ASL Bergamo.
- The survey undertaken at the Corneliani factory in Mantova was conducted under the guidance of Umberto Fiorentino - FILTEA CGIL Mantova. The research is also indebted to the workers and shop stewards at the Lovable and Corneliani factories who organised stimulating discussion opportunities. We would also like to thank Mr. Corneliani and Dr. Capelli and Mrs. Capelli of Lovable.
- We are also grateful for the hospitality shown to us at CEMOC, Milan and in particular to Dr. Enrico Occhipinti and Dr. Daniela Colombini and other trade union representatives who attended.

Spain²

- The study visit to Madrid was arranged by Fiona Murie of the CC.OO. Many thanks are due to the trade union representatives of the Inducyco and H.D. Lee factories.
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Denmark³

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 - Johan Hvid Andersen and Ole Nørby Hansen of the Department of Occupational Medicine, Herning;
 - The Occupational Health Service, Central Jutland;

1. 1st - 3rd March 1999.
2. 22nd & 23rd March 1999.
3. 19th & 20th May 1999.



- Steen Mejlby & Thora Brendstrup of SID;
- Anders Kabel, the Occupational Health Service.

Finally, the authors would like to thank Patrick Itschert and Silvana Cappuccio who steered the research and co-ordinated the study visits on behalf of the ETUF-TCL. The project management was also shared by Marc Sapir and Giulio Andrea Tozzi of the TUTB who provided invaluable advice and support during the writing of this report.



Section 1

The European Textiles and Clothing Sector

Introduction

Textiles and clothing remains a major industry within the EU, although its structure and performance varies considerably between regions. Some of the influences on the sector include historical traditions, economic development patterns, new technologies, changing market conditions and the impact of globalisation. The effect of these changes has been to shift the geographical distribution of production both within and outside the EU and to change the nature of the industry in some regions. The present characteristics of the sector and the future impact of these developments are outlined below.

Industry structure

Within the 15 member states of the EU, textiles and clothing employs a total of 2.22 million workers (1997), representing 8% of manufacturing employment. There are approximately 62,000 enterprises manufacturing textiles within the EU and a further 56,000 working within the clothing sector. Small firms are especially significant in clothing. Approximately 80% of enterprises employ fewer than 20 workers.

Employment

The majority of jobs (1.2 million) are accounted for by the textiles sector (including spinning, weaving, knitting, carpet production, textile finishing and assembly of made-up articles except apparel). Clothing manufacture employs the remaining 1.0 million workers. Employment fell by 4.2% between 1995 and 1996 (the biggest decrease was in the labour-intensive clothing sector) and by 1.2% between 1996/7 (see Table 1).

Table 1 : **Employment decline in the textiles and clothing sectors**

Employment change	1992/3	1993/4	1994/5	1995/6	1996/7
Textiles	-7%	-3.6%	-2.0%	-3.7%	-1.1%
Clothing	-8.3%	-4%	-3.7%	-4.7%	-1.4%
Textiles and clothing				-4.2%	-1.2%

Data from EU12 to 1996, EU15 from 1996/7.

Source : L'Observatoire Européen du Textile et de l'Habillement, 1998.



Table 2 : Textiles and clothing employment in EU Member States		
	<i>Textiles employment (% of EU total)</i>	<i>Clothing employment (% of EU total)</i>
Italy	28.3	21.3
UK	12.3	20.6
Portugal	11.9	13.6
France	10.7	12.5
Germany	12.4	11.7
Spain	11.3	11.5
Greece	3.5	2.6
Belgium	3.8	1.6
Austria	1.8	1.2
Ireland	0.8	0.8
Finland	0.6	0.8
Netherlands	1.2	0.8
Denmark	1	0.7
Sweden	1	0.3
EU15	1.2 m	1.02 m

Source : OETH, Eurostat, GEIE, Euratex, cited in OETH 1998.

In both textiles and clothing, Italy has the largest share of employment (28.5% and 21.5% respectively). A full profile of employment by country is shown in Table 2. The most significant declines in employment (1996/7) were evident in Denmark (12%), Germany and Austria (10%), Belgium (6%) and France (4.5%). In 1996/7 some countries including the UK and Spain apparently gained jobs within the sector (OETH, 1998).

Production

EU production of textiles and clothing was valued at 140 billion ECU in 1997⁴, and represented 4% of manufacturing added value. Variation between Member States is again apparent. The major producers of textiles (by value) are Italy, Germany, France and the UK. Clothing production is concentrated in Italy, Germany, France and Spain.

The value of textiles production increased between 1996/7 following a period of decline. In clothing, production is consistently declining. By 1992 the EU production index had slumped to 79.8% of the 1973 level (International Institute for Labour Studies, 1997). During this period, clothing production in developing economies, especially Asia, grew significantly, and has stimulated the development of a local textile supply base in some regions.

4. From companies employing more than 20 workers.



Output per head

Across the EU, there are significant variations in the relative value of output per head, depending on specialisation of product, quality and market value, and traditions of industry structure. As Table 3 illustrates, output per head is relatively low in Greece, Spain, Portugal and the UK, indicating a propensity to supply relatively low-value commodity markets, maintain labour-intensive production methods, retain domestic labour rather than outward processing to third countries, and supply relatively little added-value (OETH, 1998).

	<i>Textiles</i>	<i>Clothing</i>
Ireland	1.13	2.00
Italy	1.02	1.63
Denmark	1.10	1.57
Germany	1.44	1.48
Netherlands	2.00	1.38
France	1.34	1.21
Finland	1.00	1.13
Austria	1.61	1.08
Spain	0.66	0.93
Belgium	1.53	0.88
Greece	0.40	0.58
UK	0.93	0.42
Sweden	0.70	0.33
Portugal	0.36	0.32

Calculated as a ratio between share of EU production and share of EU employment for each Member State. Adapted from figures from OETH, Eurostat, GEIE, Euratex. Production figures do not include data from companies with less than 20 employees.

International trade

Imports

The EU collectively imported textiles worth 3.1 billion ECU and 30.6 billion ECU of clothing products in 1996. This is partly seen as a response to the increased demand experienced by some Member States during the late 1990s. However, the unit value of imports has decreased due to both consumers' unwillingness to pay increased prices and the availability of supply from increasingly low cost countries such as India, China and Bangladesh.

Exports

Although significant, exports of apparel from the EU amount to only 40% of the value of imports. In textiles, however, the EU has a positive balance of trade in terms of value, although by volume, imports are more significant. This is a characteristic of the high value of European-produced textile products, compared to those that are imported.

Almost half of all textiles exports to countries both within and outside the EU are accounted for by the activities of Germany (24.5% of total) and Italy (22.2% of



total). However, 40% of Germany's exports are for outward processing of labour-intensive production stages and the re-import of finished goods. Outward processing accounts for only 8% of Italian textile exports. In total, exports of textiles from Italy have grown by 80% since 1990.

Germany and Italy are also the EU's largest exporters of apparel, 32.3% and 14.8% respectively, followed by France and the UK (OETH, 1998).

Outward Processing Trade

No discussion of EU foreign trade would be complete without some consideration of outward processing (OPT). The export of raw materials or cut pieces for assembly in lower labour cost countries helps to avoid some of the costs associated with labour-intensive production methods in high labour cost countries. Because apparel production is particularly labour-intensive and the production process not significantly bulk-increasing, the sector has embraced OPT as a means of reducing costs. Import duties on outward processed goods are only payable on the value added during assembly, provided that EU fabrics have been used. From countries where preferential trade agreements exist with the EU, no tariffs are charged. This has enabled some suppliers in high cost countries to maintain design and marketing functions in the EU, purchase EU fabrics for export and re-import finished products at low cost. In effect, these companies, many of which previously owned production capacity, have become service companies (Scheffer, 1994). The value of outward processing from the EU has doubled between 1990 and 1996 and accounts for 20% of apparel imports (L'Observatoire Européen du Textile et de l'Habillement, 1997b).

Because of the structure of the industry and relatively high cost of labour, German companies have embraced outward processing most wholeheartedly. Germany accounts for almost 60% of outward processing imports to the EU, with trading partners in Central and Eastern Europe, Turkey and Morocco. France also has relatively high rates of outward processing. However, the most significant growth in this form of trade is notable in Italy and the UK, which account for 11% and 5% of outward processed imports respectively. Table 4 illustrates the relative value of clothing OPT trade.

Country	OPT value 1990 ('000 ECU)	% clothing imports	OPT value 1996 ('000 ECU)	% clothing imports
Germany	1819.7	21.5%	3628	30%
France	346.5	12.1%	309.1	7.3%
Italy	20.9	2.3%	669.9	27.7%
UK	35.0	1.2%	324.6	6.9%
EU 15	n/a		6051.9	19.8%

Source: OETH, data from OETH and Eurostat.
Some OPT is under reported because of the freedom of trade and absence of reporting restrictions associated with preferential foreign trade agreements.

The growth of OPT has contributed to the decline in jobs in developed countries and created increased price competition for EU subcontracting companies and smaller manufacturers in particular. The sector's defence has been to stimulate



demand for quick response fashion, reduced lead times and shorter selling seasons (Walker, 1995). Although offering flexibility and facilitating the development of knowledge-based service companies in the EU, the impact on the manufacturing sector has been a fall in standards. Faced with unrealistically low prices and an industry based on labour-intensive methods, subcontractors have few options for cost-cutting. In response, many minimise wage costs, delay essential investment and adopt informal practices. These trends are evident in the EU but are exacerbated in OPT-supplying third countries where distance prohibits close monitoring, even where codes of conduct exist (ITG & LWF, 1998). In addition, the absence of direct investment in production capacity enables sourcing companies to seek OPT in an increasing range of low labour cost countries, and the migration of demand has particularly affected the sector in Greece and Portugal where to date, the industry's development has been dependent on low added-value OPT manufacture.

Trade policy

The EU has one of the most open markets in the world, particularly in relation to textiles and clothing. However, in line with the GATT agreement, the EU is in the process of creating an even more accessible market place for clothing imports. In return, it is anticipated that non-European markets will be opened up to EU exports, although the propensity for third countries to comply with these requirements is variable and subject to delay. The principal changes that are taking place within the EU administration include:

- changes to the multi-fibre agreement (MFA), to integrate textiles trade into the wider GATT agreement;
- relaxation of trade regulations with Turkey and other Mediterranean Countries;
- opening up of markets with Central European countries;
- changes in OPT regulations.

The WTO Agreement on Textiles and Clothing (ATC)

Since 1995, MFA quota restrictions on textile products have been subject to a three-stage phase-out in order to integrate textiles trade into the GATT 1994 rules. The first phase (1995) opened up markets for products that were not covered by active quota restrictions. The second phase (1998) relaxed quotas relating to 17% of EU textiles imports. Products such as swimwear, hosiery, woollen fibre and cloth, knitted and woven accessories, corsets, camping goods and non-woven fabrics (such as those used for wadding) were all subject to relaxation of quota. The final round of MFA phase-out, to be completed by 2005, will see quotas lifted from all products currently subject to restriction, many of which will be more susceptible to import growth. Concurrently with this process, a programme to liberalise existing restrictions will see quotas being enlarged at an accelerated rate prior to integration into GATT.

However, much of the EU's foreign trade is not currently subject to the MFA agreements, but is instead based on bilateral arrangements by country. China, one of the EU's major suppliers, falls into this category. In this instance, trade is expected to



fall into line with the ATC over the 10-year integration period. There is, however, provision for a special transitional safeguard mechanism to protect manufacturing countries from damaging surges of imports and to overcome circumvention of the quotas through convoluted export routes and false documentation (World Trade Organisation, 1999).

Relaxation of trade with Mediterranean countries

Since 1996, there have been no trade restrictions or duty payable for any EU trade with Turkey, a major supplier of textiles and clothing. Other Mediterranean countries, such as Morocco, and the states of the former Yugoslavia are or will be subject to similarly relaxed trading conditions. This has facilitated the growth of OPT trade with these countries, which, considering their proximity and close cultural relations with some EU communities, has provided an opportunity for relatively fast response and uncomplicated import relations. The main brunt of these changes has been felt by companies in Portugal and Greece that have significantly lost business to these countries. However, firms of all sizes in the UK are entering OPT relations with suppliers in lower labour cost countries to replace all or some of their internal production or domestic subcontracting business.

CEEC

Since 1998 trade with the countries of Central and Eastern Europe - Poland, Romania, Bulgaria, Czech Republic, Hungary and the Slovak Republic - has been quota- and duty-free. This gives CEEC companies greater flexibility to supply direct, rather than through OPT arrangements, bringing them into more direct competition with EU suppliers. Proximity and skilled labour are among the strengths that these companies can offer, within the framework of low labour costs. CEEC markets will open to duty-free EU exports between 1999 and 2001.

The Commission anticipates that as a result of the proposed expansion of the EU to include the CEEC countries, all Member States with the exception of Portugal can expect to experience an increase in GDP (L'Observatoire Européen du Textile et de l'Habillement, 1997a). This situation is a direct result of the Portuguese economy's high dependence on textiles and clothing. It therefore follows that, as a sector, textiles and clothing within existing member states will be hard hit by EU expansion. Companies supplying German markets, in particular, have already been affected, as the long-standing trading arrangements between former East Germany and the CEEC countries has facilitated growth in OPT trade prior to liberalisation. However, the competitive advantage that German companies have secured by reducing the cost of their supply base cannot be overlooked.

Changes in OPT regulations

At present, OPT is subject to quota with many trading partners, and is only available to companies whose main business is manufacture. In future, as quotas are increased and restrictions are lifted, the volume of OPT trade can be expected to increase. However, a further development could affect manufacturers. OPT will become available to retailers directly. Since significant imports of textiles and clothing have historically been sourced directly by retailers, a revival of this practice could put further pressure on EU suppliers. A trend is already apparent for



flexible retailers to source directly from subcontractors. Significant cost advantages can be achieved if local subcontractors are replaced by flexible OPT suppliers based in low labour cost countries that have some degree of geographical proximity. This equation ignores costs that are implicit in quality and delivery problems, delays, transport and storage.

Relaxed OPT restrictions also enable duty-free trade where textiles sourced in the European Free Trade Area are used in production. To date, the need to use EU materials has been a significant marketing advantage for the EU textiles sector.

Even prior to these changes, the proportion of trade in textiles and clothing that is conducted on a global scale has increased dramatically. By the mid-1990s, global trade was increasing at a rate of 15% in textiles and 13% for clothing (Neundorfer, 1997).

Consumption and distribution

Although by far the dominant market for textiles and textiles products in the EU is for household purchases of apparel, the overall market is diverse. Other significant market segments include the consumption of household furnishings and floor coverings (11% of end product consumption) and textile products destined for uses in the corporate and service sectors. In total, corporate uniforms account for 6% of consumption, while specialised textile products for use in other industries (such as the medical sector, automotive and transport equipment manufacture, construction and logistics) account for a further 6%. Corporate furnishings and household-type textiles for use in the service, transport, leisure and healthcare sectors account for 5% of end products consumed. Corporate and service sector floor coverings make up the remainder of consumption (see Figure 1).



Adapted from Aspinall, 1998, data from IFM, CTCOE, OETH.

Because of the maturity of the market for clothing consumption in most EU Member States, growth projections in domestic markets are relatively pessimistic. The OETH predicts growth of just 1.2% p.a. in domestic clothing consumption and 1.1% p.a. in domestic consumption of household goods between 1996 and 2005. Growth in

industrial and service sector consumption is predicted to rise by approximately 2.4% and 2.5% p.a. respectively (Aspinall, 1998). If the EU manufacturing sector is to grow according to its market sectors, significant changes in the structure of the sector could emerge. Successful companies within the sector are already beginning to diversify into non-apparel markets, and it is probable that in the future, manufacturing capacity will increasingly be utilised flexibly according to inherent or available skills and technology, rather than for the manufacture of specific products based on historical patterns of production.

Distribution

Retail distribution varies considerably across the EU, although the general trend is for increased retail concentration and growth of large store groups. Since 1988, the market share of independent retailers across the EU has fallen from 48%. Distribution channels that have grown include specialised chains (+4%), supermarkets and hypermarkets (+2%), and mail order (+2%). In qualitative terms, the phenomenon is evident through the spread across Europe of companies such as Zara, Carrefour, Benetton and entry into the market of US-owned Walmart, Gap, and La Senza.

The consequences for the textiles and clothing sector are significant. The traditional markets for many SMEs are being slowly eroded. Branded goods are also traditionally sold through independent stores, and brand-orientated companies see their markets changing as an increasing proportion of EU store groups focus on retail own brands.

Concentrated retail markets favour standardised products, retail power in supply chain relations, and economies of scale. However, in some of the most concentrated retail markets (for example, in the UK), changing consumer patterns are increasingly favouring greater variety of product, greater responsiveness to changes in fashion and short-term climate variations, emphasis on image, design and good value.

Table 5 : EU clothing retailing, breakdown by distribution channel (1996)

Outlet type	Market Share : EU average
Independent retail	41%
Specialised chains	22%
Department and variety chains	12%
Supermarkets and hypermarkets	7%
Mail order	9%
Other	9%

Source : IFM, CTCOE, Moda Industria, OETH, cited in (Aspinall, 1998).

Supply chain structures

Whereas concentrated retail systems have traditionally favoured conventional mass production methods and the bulk import of goods from overseas, retailers seeking to develop greater flexibility to market demand are changing their supply chain structures. Emerging forms of supply chain include:



- closed vertical supplier relations and partnerships based on long-term collaboration, forward planning, information exchange and added-value services, exemplified by Marks and Spencer (Bower & Matthews, 1994);
- complex inter-company networks based on flexible subcontracting, quick response, short production runs, such as those employed by Benetton and Zara (Belussi, 1991; Drapers Record, 1999).

In turn, the decline of independent retailers has impacted upon wholesalers and distributors, as an increasing number of retailers and suppliers focus on *made to order* manufacture, rather than *speculative* manufacture for stock (Doeringer, Courault, Oxborrow, Parat, & Watson, 1998).

As the bulk of products are destined for consumer markets, it seems inevitable that a discussion of the textiles value chain should concentrate on retail distribution. However, other industrial sectors are end users of textiles and illustrate dynamic changes in the structure and practice of their supply chain relations. These include adaptations for just-in-time supply (as in the automotive industry, for example), and longer term supply contracts like those found in some public sector supply chains. Other aspects, such as competitive tendering, joint product development and product patenting and licensing are also further developed in non-retail market sectors supplied by textiles and apparel manufacturers.

Technology and innovation

The EU textiles sector invested significantly in new technology during the 1980s. New developments range from automated production, pre-production and handling equipment that speed manufacture and minimise labour input to sophisticated environmental protection innovations that minimise waste and environmental impact. Key innovations include automated preparation for spinning and weaving; knitting technology that shapes garments and minimises the need to cut and sew; flexible and environmentally-conscious dyeing and finishing technology and sophisticated quality systems that identify faults and inconsistencies.

The clothing sector, on the other hand, has suffered from an inability to automate production. What new technologies have been introduced are focused on repetitive production stages (for example, patch pockets) and standardised garments (jeans and shirts), pre-production such as marker making and cutting, handling systems and information technology.

While there is scope for improved uptake of new technology, it appears that fewer new innovations are being made available to the sector. In 1992, only 2.8% of world-wide patent registrations were within the textiles, clothing and footwear sectors, a drop of 3% from the previous decade. Over half (54%) of patent registrations are for textile machinery, while only 7% are for clothing developments and clothing machinery.

Of new patent registrations, 40% are from within the EU (principally from Germany), Japan and the USA account for 20% each and EFTA countries 9%, mainly Switzerland, (OETH, 1996). Regional specialisations exist: the US and Germany lead with cutting technology, CAD developments are spear-headed by the US, while Japan leads innovation in sewing technology. Lack of integration



between technologies produced by the various suppliers and used at different stages in the production channel is a major factor in restricting uptake levels.

Most technological innovations have been aimed at large-scale production, and for reasons of cost and scale are inaccessible to small companies and less applicable to small-scale flexible production runs. Diffusion of new technology is, therefore, hampered by the small size of EU firms. Generally low returns on investment also restrict individual firms' capacity to invest in new technologies.

Developments in the globalisation of production that have seen large-scale production move to low labour cost countries therefore favour technological investment by producers in developing countries. The OETH predicts that levels of automation will intensify in the countries of Southern Europe and developing countries that supply EU and US distributors with volume production. Within the EU, producers of smaller volumes and flexible production will be more likely to invest in technologies such as CAD that support niche production and flexibility. One outcome will be to increase the cost variables between relatively automated production in low-wage countries and the most labour-intensive production which will remain in high wage countries.

One other scenario reported anecdotally sees unwanted equipment shipped to developing countries once it becomes redundant in high labour cost producers. This scenario is especially pertinent where large corporations move production capacity to owned facilities overseas, and where smaller manufacturers in the EU close production capacity to become service companies, investing in overseas subcontracting plant to take advantage of OPT. The counter-argument sees set-up costs and incentives in developing countries that enable large producers to replace outdated equipment in the EU with state of the art technology in developing countries.

Human resource issues

Employment

The clothing sector is associated with high levels of female employment except in some regions of Southern Europe and ethnic minority industry concentrations, such as that in East London (Oxborrow, 1996). The employment of female workers is associated with the labour-intensive nature of the sector: women are mostly employed in low-skilled roles and those requiring dexterity. Male employment is higher in pre-production (cutting), pressing and mechanic/engineering functions or where technology has become more advanced (IFM, 1995).

In some regions (for example, the UK) employment in the sector is ageing, with few young workers entering the sector and retention levels low. Factors include the poor working conditions associated with the sector (see below), the high proportion of female workers (enhancing turnover rates due to child-rearing) and the lack of part-time opportunities that attract working mothers. In the UK, turnover of young workers is as high as 50% (IFM, 1995).



Training

The clothing sector has one of the lowest levels of education of any industrial sector. Training within the sector rarely compensates: the majority of training is carried out on the shop floor by experienced workers or supervisors, too few of whom are themselves trained instructors. Most training is related to immediate production requirements (such as a new style or to replace for an absent worker) rather than with any consideration of individuals' development or capabilities. Opportunities for career development are limited, especially in small firms that are characterised by flat organisational structures.

Changes in the sector are impacting on training needs within the industry. In large companies and service-orientated suppliers the migration of labour-intensive and low-skilled jobs to overseas locations has focused training needs on management development, quality enhancement, multi-skilling and adaptation to new technology. However, in newly-emerging producing countries and in the small subcontracting units that have emerged in the EU to supply low-cost flexible production, cost remains the major competitive factor, and investment in training is minimal.

Training within the textile sector is more structured and increasingly aimed at adapting to new technologies, problem solving and increasing flexibility, rather than traditional production skills. However, UK textiles companies report difficulty in recruiting trainees to technical apprenticeships, and within an ageing workforce this poses a threat to the sector (Oxborrow, 1998).

Within the sector as a whole, training is led by large companies. Small firms, lacking in-house training specialists, often rely on large firms to supply a pool of trained labour. Increased uptake of Quality Management Systems (and in the UK Investors in People) is encouraging firms to consider training within their business strategies. However, obstacles created by fluctuations in production, cost and time constraints, awareness, productivity-related payments and the threat of losing trained staff to other companies or industries hinder the implementation of training strategies. Changes in the structure of the industry indicate that training must increasingly consider:

- core, transferable skills (to facilitate new forms of work organisation and to prevent the sector's low skill levels being transferred to other industries following restructuring);
- management skills (strategy development, marketing, production and technical management);
- IT and technical skills.

However, the lack of a clear training strategy at micro and macro levels is an obstacle to the industry's ability to adapt to these changing needs (L'Observatoire Européen du Textile et de l'Habillement, 1996).

Working conditions and the image of the sector

Physical conditions within the sector are traditionally poor, although these have generally improved in developed countries. However, a range of psychological pressures associated with the image of the sector are harder to compensate for. Problems include the lack of career opportunities, low wages, lack of respect for shop-floor workers, payment linked to high output targets and the threat of redundancy or



short-term lay-off (IFM, 1995). As a result of the poor image of the sector, absenteeism is high, averaging 10%, but higher in Spain (15%), Germany (12%) and Portugal (12%). In other countries, particularly the UK, recruitment difficulties are reported and retention rates are low. This factor is even apparent where redundancies are occurring because of restructuring in the sector (IFM, 1995). Lack of staff mobility and job insecurity are among the factors. Between-country variations in absenteeism and retention rates are affected by different provision for sickness and unemployment benefits.

Restructuring within the sector will increase the image gap between the traditional manufacturing sector and the emerging “service-based” industry in the EU. Service companies with skills in design, marketing and IT communications are able to offer the most attractive roles within the industry. However, remaining subcontractors and niche market manufacturers, while requiring higher levels of flexibility and (in some cases) rewarding by quality rather than volume of output, face the image problems endemic within the sector. In addition, the conditions that created the sector’s poor image will migrate with the movement of production capacity to low-wage economies. Evidence suggests that, without the constraints of legislative controls, conditions have deteriorated and exploitation is not uncommon (ITGLWF, 1996).

Summary

In summary it can be concluded that the restructuring of the sector, stimulated by increased globalisation and the availability of new sources of supply has impacted upon all aspects of the industry. Increasingly, the future of the EU sector focuses on overseas sourcing and the manufacture of small batch, flexible production to support quick response and changing fashion trends. Opportunities for the increased supply of high value-added goods to emerging markets will also benefit suppliers of niche products. The most obvious impact is in the decline of employment, although it is clear that the nature of the remaining jobs is also changing. In turn, the sector is challenged to overcome its tradition of poor training standards, poor working conditions, and unreasonable pressure on individuals seeking to achieve a reasonable wage.

At best, the increasing focus of the sector on service functions and added value will depend on increased skill levels and improved conditions. At worst, changes in the market demand a core of subcontracting units and small, price-orientated manufacturers capable of flexible, quick response but lacking the opportunity to invest in new technology, training and improved conditions. Indeed, many technological innovations are only accessible to large firms, and bulk producers. In turn, the migration of bulk production to low labour cost countries and outward investment by the EU’s major producers will intensify global competition as these multi-nationals are increasingly able to benefit from increased automation and low labour costs. In addition, working conditions that were considered poor in the EU are potentially open to greater abuse in developing countries, in spite of the introduction of voluntary codes of conduct by retailers and distributors.



Section 2

A Dangerous Industry to Work in ?

Introduction

In the garment-making industry, the demands of manufacturing competitively-priced, marketable items is dependent upon the ideas and activities of staff working within an efficient and productive system. Raising the quality of working life so that people working in this industry do not develop occupationally-related musculoskeletal disorders whilst meeting these production demands has commonly not been recognised for its importance by management, or perhaps simply not considered. Yet underpinning the success of the clothing and textile companies are those people who make up the organisation and who statistically are at risk of developing musculoskeletal symptoms (European Foundation for the Improvement of Living and Working Conditions, 1997). The cost to them and to the industry when musculoskeletal disorders occur is high in terms of discomfort, dysfunction and increased production costs (Anderson & Gaardboe, 1993a).

The issues surrounding these disorders are reviewed and discussed in this section. The literature on musculoskeletal problems offers a number of practical solutions, some of which have been proven to reduce operator risk and production costs. These are discussed along with areas for further investigation.

Prevalence

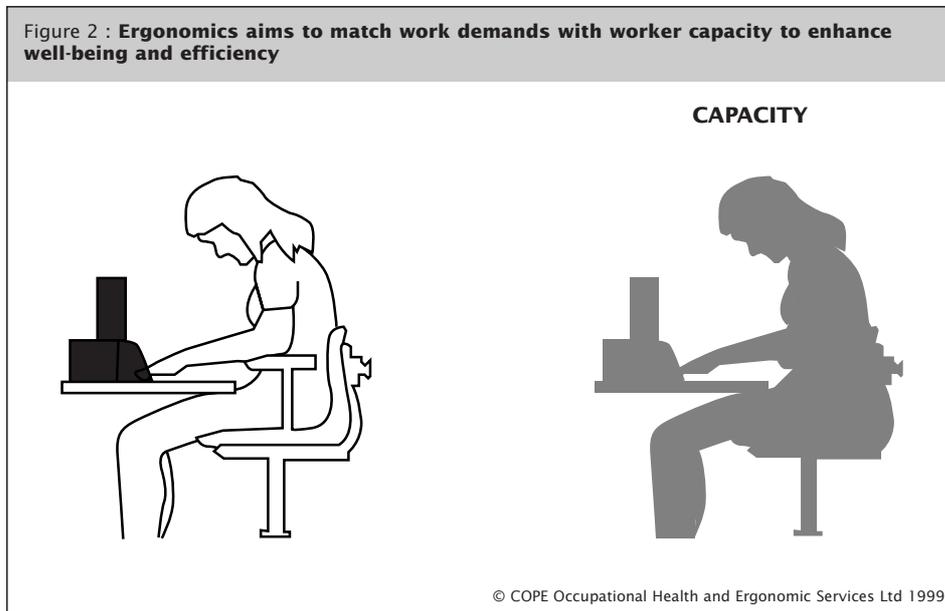
Studies consistently point to a high prevalence of work-related musculoskeletal symptoms in the clothing and textile industry (Anderson & Gaardboe, 1993b; Behrens, Seligman, Cameron, Toby Mathias, & Fine, 1994; Montreuil, Laflamme, & Tellier, 1996). Symptoms especially occur in the regions of the neck, shoulder, hand, middle (thoracic) and lower (lumbar) back (Nag, Desai, & Nag, 1992). An ergonomics model is used to consider the current knowledge regarding these musculoskeletal problems, the associated risks and measures to control them.

Using an ergonomics model to examine musculoskeletal issues

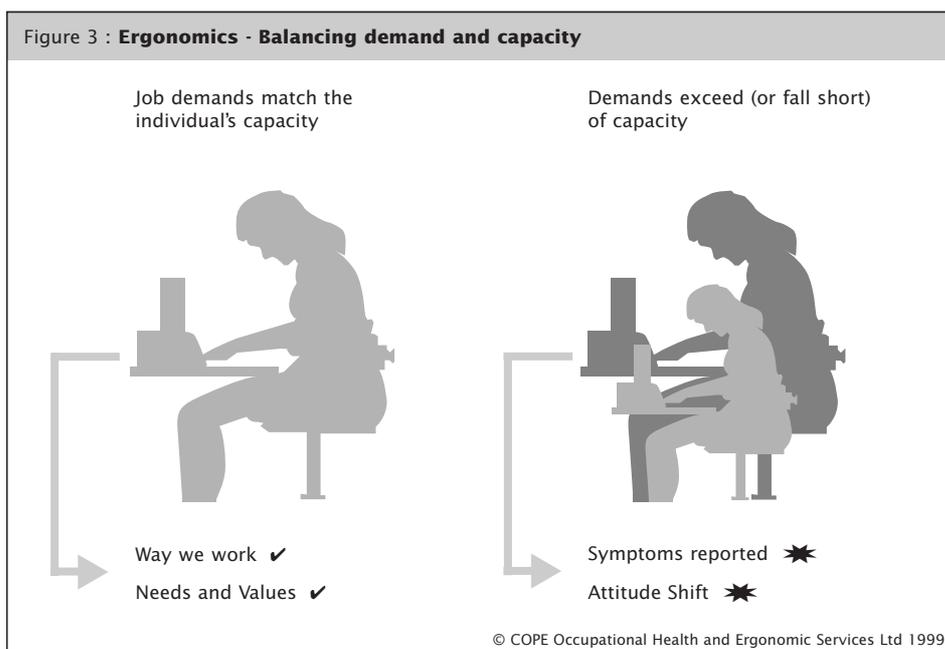
Ergonomics is a multi-disciplinary approach to fitting operations, tasks, equipment and the way work is organised to people rather than the other way around. In the simplest form, ergonomics measures demands placed on the operator relating to workplace and task design and the organisation of work and defines what limits people's capacity to perform an activity. By applying ergonomics in designing tools, workplaces and systems, the capacity of people to undertake their work efficiently and healthily is matched to or greater than the work demands as shown



in Figure 2. If a balance is maintained between the operator's capacity and task demands then he or she is able to undertake the work in a healthy, comfortable and efficient manner.



The way staff work, the needs and values of the company are balanced with those of the staff. In the right box the demands of the task are shown exceeding those of the person which can lead to an imbalance that results in reporting of symptoms and/or changes in attitude towards work. Boredom can be as problematic as work overload in creating an imbalance.



The balancing of task demands and individual capacity is shown in the left box.



Demands relating to garment making tasks

While work in the textiles and garment making industry have been classified as “light work” (Vezina, Tierney, & Messing, 1992) there are considerable static loads placed upon the body and frequent requirements to manually handle large, awkward loads. Static loading occurs when fixed postures are adopted, often in awkward positions and the muscles remain contracted for extended periods. Such muscle work is significantly less efficient than if the body is moving, changing positions and the muscles have an opportunity to unload (Putz-Anderson, 1988).

Other risk factors associated with working posture, task demands and the individual's ability to adjust to work demands that contribute to musculoskeletal disorders are:

1. *Need to adopt awkward or fixed working postures* due to the workplace layout, equipment design or height of work surfaces causing increased amounts of static loading, joint loading or muscle fatigue on the body (Chaffin, 1973; Punnet & Keyserling, 1987; Wicker, 1989). Sewing and cutting operators tend to work in a forward bent posture, defined by the requirement for a good angle of vision, geometry of the workstation and, if seated, the poor design of the seating for the workstation design. Postural loading on the neck and back in these postures may increase by the length of time adopted, and the combination of forward bending more than 20° and twisting.
2. *Poor task content and variety* creating jobs which are ill-fitted for maintaining interest, concentration, changes in mental demands and utilisation of skills (Dhondt, 1997; Leclerc *et al.*, 1998; Lundberg, Melin, Evans, & Homberg, 1993).
3. *High task pacing* causing an external factor to control work rate which may be less or more than the natural working rate of the user (Aberdeen, 1961; Sundelin & Hagberg, 1992).
4. *Psychosocial factors* including lack of job autonomy and decision-making, respect for knowledge, communication methods and job satisfaction (Bongers & de Winter, 1992).
5. *High repetition rates* of the garment making industry have been a commonly reported risk factor in the development of ULD. Silverstein (1985) attempted to define repetitiveness using a cycle time of less than 30 seconds or more than 50% of the task time being of a repetitive nature. Using this definition a strong association with ULD was established.
6. *Exposure to the task and inadequate recovery phases.* Cumulative and permanent musculoskeletal effects were reported as significantly associated with 8 years or more work as machine operators (Andersen, Lind, Gaardboe-Poulson, & Stockholm, 1994; Anderson & Gaardboe, 1993b).
7. *Inadequate level of training* in the tasks, correct working postures or specific training of working styles.
8. *High amount of forceful and/or twisting actions* required in performing the task (Punnet & Keyserling, 1987; Putz-Anderson, 1988).
9. *Work chair being inadequate* for the requirements of the task affecting the working posture, especially the position of the spine and upper arms (Nag *et*



al., 1992; Occhipinti, Colombini, Frigo, Pedotti, & Grieco, 1985). The effects of standing for long periods may increase leg or back discomfort (Hansen, Winkel, & Jorgensen, 1998; Redfern & Chaffin, 1988; Sturt-Buttle, Marras, & Kim, 1993).

10. *Personal factors* such as training, age, task fitness, experience, handedness, techniques (Sadeque, Ahasan, Khaleque, & Uddin). Poor selection can simply mean that operators are recruited to fit a particular task or machine instead of assessing them to establish which task they have the greatest aptitude for.
11. *Environmental factors*. The association between ULD and vibration is well established (Radwin 1986 in Chatterjee, 1987). Extremes of temperature, draughts (Sundelin & Hagberg, 1992) and poor lighting are also associated with the development of ULD (Armstrong, 1986).
12. *Manual handling*. The physical demands of manually handling bundles or boxes over long distances, whilst stooping or twisting, and particularly when seated, are all associated with an increased level of risk to the structures of the back (TUTB, 1997).

Musculoskeletal profile of garment-making operators

The prevalence of musculoskeletal problems in garment-making operators is higher than for other sedentary, female-dominated occupations (Brisson *et al.*, 1989a).

Approximately half of workers typically report discomfort in one or more of the upper back, neck, shoulder, right hand, lower back. Discomfort typically increases throughout the working day, and severity of symptoms is related to length of time at work (Anderson & Gaardboe, 1993b; Blader *et al.*, 1991; Montreuil *et al.*, 1996). Musculoskeletal symptoms were correlated with age and working 30 hours/week or more (Behrens *et al.*, 1994; Chavalitsakulchai & Shahnava, 1993). Back pain was reported with relation to poor seating and in particular the lack of lumbar support (Nag *et al.*, 1992).

Some patterning of symptoms for different tasks was reported. Ironing was associated with more elbow symptoms, machining with neck, shoulder and wrist symptoms (including carpal tunnel syndrome), cutting with shoulder and back symptoms, and hand-sewing having a high prevalence of upper limb problems (Chavalitsakulchai, 1993).

Mechanisms of injury

By far the most frequently reported mechanism of injury associated with upper limb musculoskeletal disorders involved muscles and related structures. However, the involvement of nerve structures has more frequently been considered as a mechanism of pain in ULDs when damaged (McAtamney, 1994).

Mechanisms of shoulder and neck disorders

The position and function of the head, neck, shoulders and arms determine the loading on the supporting structures of the neck and shoulders for the hands cannot function without the elbows and shoulders being stabilised, Aarås (1987).



Fatigue of these structures under static loading conditions of very low levels of contraction (less than 2% of maximum voluntary contraction) were sufficient to cause musculoskeletal disorders. Sustained contraction of the neck muscles caused by emotional tension (Goldstein, 1972) or time pressures (Brisson, Vinet, Vezina, & Gingras, 1989b) for extended periods can also cause pain and tissue tenderness. Finally, disc degeneration has also been associated with symptoms of the neck, usually occurring through long exposure to asymmetrical loading.

Mechanisms of forearm and hand disorders

In contrast to the static muscle loading of the neck and shoulders, the mechanisms of disorders to the forearm, wrist and hand have been largely associated with the external loads. These include repetitive and/or forceful actions, which are worsened by the need for constrained or awkward postures (Malchaire, Cock, Piette, Dutra Leao, & Amaral, 1997; Putz-Anderson, 1988). When recovery of the small muscles and soft tissue of the forearm, wrist and fingers can occur through changes in activity or rest then the risk of disorders developing is reduced (Putz-Anderson, 1988).

Upper Limb Disorders (ULDs)

ULD has been used as a collective and descriptive term for conditions of pain, ache, discomfort or dysfunction in the soft tissue structures of the neck and upper limb regions where physical signs may or may not be present. Work-related ULD (WRULD) has been adopted by the Health and Safety Executive (1990) to further define these groups of conditions where a work demand has contributed to or caused the disorder. WRULDs are usually caused by more than one factor and may be exacerbated by other work or leisure activities. As a group of conditions they have diverse symptoms, structures involved and causal factors, so it is not surprising that they are considered to be not well understood (Health Policy Division, 1994). While physical risks such as repetition rate, force and awkward postures have been identified as principal causes of these disorders, research has now indicated that interaction of risks such as external pacing or low job satisfaction (Andersen *et al.*, 1994) can be as important in their contribution to symptoms (McAtamney, 1994).

Assessing the task demands and operator capacity

A number of studies have shown the benefits of using participatory processes in defining problems and exploring production solutions in organisations which have taken steps to review their manufacturing systems and move away from the traditional Tayloristic methods. The results have been impressive.

- Halpern and Dawson (1997) reported an 85% reduction in reported musculoskeletal symptoms over a 2-year period through using participatory ergonomics to assess and improve tasks and production systems.
- Anderson (no date) found that of four departments investigated one had noticeably fewer reports of neck and shoulder symptoms. No particular differences in



ergonomic exposures was found; however, on evaluation of psychosocial issues it was reported that this group considered their work control, social support and job satisfaction to be substantially higher than the other departments. Strong staff-management relationships, membership of a work group and recognition were all attributed to the success of this group.

- Kelly (1992) reported substantially reduced complaints of musculoskeletal discomfort through the application of ergonomics redesign, correct seating and training in low-risk methods.
- Axellson (1997) used an ergonomic risk evaluation tool called RULA to identify tasks where musculoskeletal risks were high as part of a macro-ergonomic management programme in a manual assembly factory. There was a significant correlation between the level of risk scored by RULA and the level of quality deficiencies occurring at that task. Fifteen of the 17 tasks assessed were improved following problem-solving by team members. This resulted in a 39% drop of quality deficiencies and represented a saving of \$25,000 per year on this line.

Other studies have reported on the benefits of introducing ergonomic assessment and redesign that will have used some participatory processes to achieve their recommendations.

- Luttmann and Jäger (1992) found that ergonomic redesign of a creeling task (drawing hundreds of warp threads together) resulted in considerable time savings and less damage to threads.
- Wick and Drury (1986) reported productivity or postural stress or both benefited from ergonomic modifications.
- McCarthy (1986) established a rehabilitation programme to assist in return-to-work of operators with WRULD; however, this does not ensure that re-infection due to inadequate design is eliminated. This is particularly important for preventing further injury when the operator's capacity is reduced.
- Chi-Yuang Yu and Keyserling (1989) reported the ergonomic benefits of using a sit-stand set with a correctly adjusted work surface height. Delleman and Dul (1990) had similar findings from modifications to the work surface and pedal position.

The lack of rest periods during repetitive work has been studied by Leclerc *et al.* (1998). They identified work organisation changes as the main avenue for limiting the cumulative demands of adopting fixed working postures and repetitive movements. While positive benefits were accrued from operators having an improved level of job control, higher pressures, for example from JIT production could cause a lack of rest periods and decisions to over-ride the fatigue for the sake of maintaining production.

Similarly, when on piece-work, operators have tended to adapt their pace when they experience pain or fatigue rather than pausing so as to not jeopardise their pay-rate (Brisson *et al.*, 1989b; Vezina *et al.*, 1992). This can have long-term adverse health effects.



Gaps in the macro-ergonomic management model

Studies suggest that the application of ergonomic principles have benefits for operators and production levels. Ergonomic guidelines for the reduction of musculoskeletal disorders are summarised in a Consensus Document produced by the International Ergonomics Association Technical Group for WRMSD.

While there are a number of evaluation methods used by ergonomists, there is no one recognised, systematic methodology to measure and define the problems and stimulate solutions. This has been identified as desirable (Anderson & Gaardboe, 1993b; Ghosal, 1991; Punnet & Keyserling, 1987; Punnett, 1996). Anderson and Gaardboe (1993a) have said that “future studies have to address more precise measures of ergonomic factors and certainly also of psychological factors that may be important confounders or effect modifiers”.

Such a method has to be practical, robust and designed for use by those who do not necessarily have ergonomics training, although that would be beneficial.

The factors that may be included as being associated with these disorders have been identified. For example, Chavalitsakulchai *et al.* (1993) using observational and questionnaire methods identified five factors associated with musculoskeletal disorders. They were:

1. Poor selection and training.
2. Poor ergonomic design of work organisation, workplace and task.
3. Poor working postures.
4. Lack of task variation.
5. Insufficient breaks.

Industries such as those involved in motor vehicle assembly have developed a standardised set of assessment tools for safety or production managers to use in evaluating the location and level of ergonomic inefficiency. The tools are simple to use but provide a score of the inefficiencies related to physical, cognitive and production aspects of each job. These are particularly useful in prioritising and focusing on the areas for change while providing an objective measure of the change in risk through the modifications made. The development of such a system could well be most beneficial to the garment manufacturing industry.

Implementing change

EU legislation requires employers to “adapt the work to the individual, especially as regards the design of work places, the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health” (Directive 89/391/EEC, Article 6.2.d).

Implementing ergonomic changes needs to be carefully planned and systematically introduced, monitored and evaluated. Benefits from reducing task demands and increasing operator’s capacity are both important contributions to a successful musculoskeletal risk management programme. An effective comprehensive method to facilitate a participatory ergonomics programme, with multi-disciplinary

involvement, is one approach by which a company can weave together its manufacturing objectives of quality, flexibility, responsiveness to the market, safety and cost containment while reducing work-related musculoskeletal disorders (Halpern and Dawson, 1997).

The process of change can be undertaken in a systematic manner to enable both management and staff to feel they are in control of the change processes. The process of identifying issues and risks, then assessing them in detail, is important groundwork before exploring effective solutions. Such solutions may be simple, such as changing the height of workbenches or eliminating double-handling of loads. Others may require more complex solutions or investment of resources, and such changes are most effective when the operators and supervisors have participated in the development of the solutions (e.g., changing the production system, using different seating or workstation layouts).

Finally, it is critical to include as part of management's processes a review system to check the effectiveness of the changes introduced. In this way any problems may be identified early and the ongoing adaptations can be made in response to system requirements and customer demands.

Summary of recent literature

The following table presents a summary of the articles relating to musculoskeletal disorders in the garment-making industry. In the table, the findings are presented along with notes on the issues and recommendations made by the author.



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Anderson and Gaardboe, 1993.	Textile sewers, neck and upper limb injuries, exposure-response relationship.	<ul style="list-style-type: none"> ▪ This questionnaire and clinically based investigation compared sewing machine operators with similarly age-stratified nurses and home-helpers. Sound epidemiological arguments were used in this study adding weight to the findings. ▪ There was a strong statistical association between years as a sewing machine operator and the development of neck-shoulder disorders (subjective and objective measures used). Adjustments for confounding factors were included. 	<p>High prevalence of localised, diagnosed disorders was found (48% with cervicobrachial fibromyalgia, 22% with rotator cuff syndrome and 17% with cervical problems).</p> <p>Being a sewing machine operator for more than 8 years had a cumulative, permanent and deleterious effect.</p> <p>Causative mechanisms are uncertain. Clinical tests to diagnose musculoskeletal conditions of the neck, shoulder, thoracic region lack definition and classification.</p> <p>“Future studies have to address more precise measures of ergonomic factors and certainly also of psychological factors that may be important confounders or effect modifiers.”</p>
Anderson et al. (no date). Title: Distribution of some psychosocial risk factors in 4 departments of a textile plant performing the same kind of sewing machine work.	Psychosocial risk factors, sewing machine work.	<ul style="list-style-type: none"> ▪ 233 sewing machine operators who worked in one of four departments had been found on investigation for ergonomic exposures to reveal no differences. However reporting of neck and shoulder symptoms was significantly lower in one department. On evaluation of psychosocial issues it was found that this group considered their work control, social support and job satisfaction to be substantially higher than the other departments. Strong staff-management relationships, membership of a work group and recognition were all associated with this group. 	<p>Preliminary results from this first one-year follow up report indicate that empowerment of work groups and high competence of supervisors has a preventative effect on the reporting of neck-shoulder symptoms.</p> <p>This reporting of symptoms reflects the literature in that physical discomfort can be influenced by non-physical factors such as job satisfaction.</p>
Axellson, 1997.	RULA in action: enhancing participation and continuous improvements.	<ul style="list-style-type: none"> ▪ As part of a macro-ergonomic management system, problem-solving groups were used to identify and improve production in a manual assembly line. ▪ RULA was used in this participatory process and a significant association was identified between RULA level and the quality deficiency rate. 	<p>15 of the 17 tasks assessed were improved following problem solving by team members. This resulted in a 39% drop of quality deficiencies and represented a saving of \$25,000 per year on this line.</p>



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Blader <i>et al.</i> , 1991.	Sewing machine operators, neck-shoulder complaints.	<ul style="list-style-type: none"> ▪ From a questionnaire study of 224 operators in four textile factories, a high prevalence of neck and shoulder complaints was found (75% in last year and 51% in last 7 days). Clinical examination of cases was made and tension neck syndrome was the most frequent diagnosis. 	<p>The musculoskeletal profile of neck and shoulder problems in sewing-machine operators is consistent with other studies.</p> <p>Symptoms were positively correlated with age, length of employment (2 years or more) and working more than 30 hours per week.</p> <p>A questionnaire study of this type is, as acknowledged by the authors, an estimate of the problem due to limitations of respondents (71%) and the questionnaire specificity.</p> <p>The contribution of psychosocial and work environment factors is discussed as additional to the effects of the fixed postures and discussion is given to the importance of exposure time correlated to the seriousness of problems. This is an important issue in understanding the effects of muscle fatigue from constrained work and the optimum periods of work to maintain maximum capacity and comfort.</p>
Behrens <i>et al.</i> , 1994.	Prevalence of back and hand pain.	<ul style="list-style-type: none"> ▪ This study in the U.S. by the National Institute for Occupational Safety and Health (NIOSH) collected data on 30,074 people using a self-administered questionnaire. ▪ Operators of machines that process textiles or leather reported the third highest prevalence of work and non-work-related hand discomfort from 40 different occupational groups. 	Shoulder and neck pain was not included in this data collection.



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Brisson et al. , 1989.	Chronic disease, psychological stress, textile industry.	<ul style="list-style-type: none"> ▪ The purpose of this study was to determine whether duration of employment in piecework was associated with the prevalence of severe disability within the cohort of garment workers. 533 female sewing-machine operators were used from the population described in the previous study. ▪ Duration of employment in piecework was specifically associated with prevalence of disability (greater than 5 years). 	<p>Biomechanical stressors, constrained posture, flexed work position and repetitive task are compatible with the musculoskeletal disorders reported.</p> <p>The combined effect of biomechanical stressors and time pressure is suggested as a mechanism of musculoskeletal injury but requires further research.</p>
Chavalitsa-kulchai and Shahnava, 1993.	Musculoskeletal discomfort, female, pharmaceutical and textile workers operating weaving machines.	<p>Using OWAS, anthropometry and the Standardized Nordic Questionnaire they identified 5 factors associated with musculoskeletal disorders:</p> <ol style="list-style-type: none"> 1. poor selection and training 2. poor ergonomic design of work organisation, workplace and task 3. poor working postures 4. lack of task variation 5. insufficient breaks 	<p>This paper defines a number of general ergonomic parameters for improving working postures, health at work and breaks.</p> <p>Discussion of such information raises the issue of how such changes can be implemented, how the costs will be justified and how the outcomes can be measured. Undoubtedly these will be major issues for an organisation which is not yet into change management.</p>
Chavalitsa-kulchai and Shahnava, 1993.	Musculoskeletal discomfort, female, five different industries, developing countries.	<ul style="list-style-type: none"> ▪ Shoulder, lower back and hip/thigh discomfort was reported in garment workers (cutting and sewing machines). ▪ Prolonged and constrained working postures were identified as workplace issues. 	<p>Introducing garment manufacturing into developing countries is attractive due to the apparent control of production and readily available workforce.</p> <p>The basic issues of using poor working practices, lack of appropriate work organisation and poor regard for ergonomics of imported equipment fitting the workforce dimensions, along with inadequate training, are specific characteristics of an industrially developing country.</p> <p>The industry is seeking a low-cost method of making improvements to the work organisation, equipment and tasks.</p>
Cilingir and Bendak, (no date).	Visual performance and fatigue, female workers, garment industry.	<ul style="list-style-type: none"> ▪ This study investigated the effects of sewing and quality control operations on visual functions using a subjective and objective measure. 	<p>No long-term visual damage was found although visual discomfort does deteriorate over the working day.</p>



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Gale and Edwards, 1983.	Psychophysiology and individual differences.	<ul style="list-style-type: none"> ▪ This theoretical paper examines the assumptions regarding the interpretation of individual responses to situations based on psychophysiological responses. 	<p>The sensitivity of procedures to measure human behaviour is lacking for many reasons. The authors advocate systematic observation based on a process and context for assessing the personality and individual differences in people. The inference is that if these are understood then positive adaptations can be achieved to maximise working capacity and health.</p>
Ghosal, 1991.	New technology, optimising the operator/machine interface.	<ul style="list-style-type: none"> ▪ Two case studies and an excellent introduction which illustrate the issues of incorporating new technology and systems into developing countries. 	<p>The issues raised for developing countries hold valuable reminders for how the application of simple ergonomics to design of the operator-machine interface can reduce the development of musculoskeletal problems.</p>
Kelly <i>et al.</i> , 1992.	Apparel manufacturing, musculoskeletal discomfort, ergonomics.	<p>This study in three trouser factories found the following:</p> <ul style="list-style-type: none"> ▪ anthropometric data for the sample of 132 cutting and sewing staff showed a taller and heavier group than the population norm; ▪ cross-sectional study of musculoskeletal discomfort found typically high areas of upper back (52%), neck (49%) and right hand (48%); ▪ the working posture was stooped and static and defined using video analysis; ▪ lighting levels were considered low by 36% of operators, causing them to lean forward to see; ▪ workstation design and seating were defined and criticised for being poorly fitting; ▪ repetitive tasks were identified and on certain high-manipulation tasks 100% operators reported symptoms of upper limb disorders. 	<p>The application of ergonomics redesign, correct seating, training in low-risk working methods and postures substantially reduced complaints of musculoskeletal discomfort.</p> <p>When ergonomic improvements were made to seating and postural awareness, significant reduction in discomfort frequency and a statistically significant increase in production were reported.</p> <p>The problems of manually moving material were assessed and automation introduced. Partial automation for reducing repetitive tasks is considered.</p> <p>Modular manufacturing systems for replacing progressive bundle assembly-line process were described and the issues that must be addressed if transition is to be successful are raised.</p>



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Halpern and Dawson, 1996.	Participatory ergonomics, musculoskeletal disorders, sewing.	<ul style="list-style-type: none"> An 87% reduction in musculoskeletal injury losses was achieved over a 2-year period. The programme addressed issues relating to: sitting versus standing to work, modular working practices, workstation design, sewing treadle operation, holding fixtures to reduce forceful pinching and awkward wrist postures, scissor design, exercise and stretching and design integration. 	Participatory ergonomics is a process where ergonomic ideas, methods and assessment tools are used to facilitate improvement to working systems, tasks and tools using the knowledge, skills and co-operation of management and workers.
Luttmann and Jäger, 1992.	Muscular strain, work design, weaving mill.	<ul style="list-style-type: none"> This paper reports on the assessment of muscle fatigue during “creeling” work (drawing together hundreds of warp threads from bobbins) using electromyography, and the re-evaluation one year after ergonomic modifications were made. 	The re-design eliminated reaches and movements that could damage the thread. The timesaving from these changes was cited as considerable.
Lourijsen et al. , 1991.	Ergonomic sewing machine table.	<ul style="list-style-type: none"> A table with adjustable work surface height, pedal position and orientation of the machine. 	The most important issue discussed was the need to educate the operator in using adjustable equipment correctly for his or her own fit and functions.
Malchaire et al. , 1997.	Musculoskeletal wrist disorders, constrained postures.	<ul style="list-style-type: none"> Force exerted by the wrist and hand was the highest risk of musculoskeletal disorders, followed by the velocity of movement in flexion-extension and repetitiveness. 	Muscular activity below 15% of maximum voluntary capacity for finger flexors is desirable. Focus on wrist angle or velocity proved inconclusive, adding weight to the argument of multifactorial causes.
Nag et al. , 1992.	Musculoskeletal problems, work posture and fatigue, sewing machine tasks.	<ul style="list-style-type: none"> Back pain was reported in higher proportions than other studies and considered to be associated with the need to sit forward on the chair, therefore not having lumbar support. 	



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Chi-Yuang Yu and Keyserling, 1989.	Seating, posture, industrial sewing.	<ul style="list-style-type: none"> Three studies were used to evaluate seating design for sewing tasks. A new chair design is specified based on providing a lumbar support to maintain the lumbar curve and a downward tilting seat pan enabling improved posture when working forward. 	<p>The use of a sit-stand design chair improves the working posture and reduces the musculoskeletal loading created by the fixed postures necessary when using conventionally-designed sewing machines.</p> <p>Adjustment to the workbench height can be required for the full benefits of change in posture.</p>
Colombini, et al. , 1998. IEA Technical Group for WMSD.	Model and definitions for work-related musculoskeletal disorders.	<ul style="list-style-type: none"> Extensive definitions summarising the ergonomic literature with respect to organisational analysis, risk factors and exposure levels for work. 	This is a useful basis for a tool to evaluate the risk factors as they apply specifically to the garment industry.
Delleman and Dul, 1990.	Ergonomic guidelines, adjustment and redesign, sewing machine workplaces.	<p>Design criteria are specified and include the need for:</p> <ol style="list-style-type: none"> an adjustable slope of the work surface pedal positioned in a free position ample leg space 	The findings reinforce redesign criteria to reduce musculoskeletal loading relating to workplace design.
Dhont , 1997. Time constraints and autonomy at work in the EU.	European Union, work intensity, autonomy at work, passive or active jobs, low or high strain jobs.	<ul style="list-style-type: none"> Work intensity is increasing in all member states, as operators work faster and to tighter deadlines. Autonomy at work is also increasing but not sufficiently to compensate for increased intensity of work. High-strain jobs to be found where high work demand is combined with low job control - leading to higher numbers of health complaints. 	Time constraints (pacing and deadlines) and job autonomy indicators can help identify high strain jobs.
Drury , C. and Wick, J., 1984.	"Ergonomic application in the shoe industry".	<ul style="list-style-type: none"> To reduce injury costs in the shoe industry, an ergonomics programme is described to evaluate risks before and after ergonomic modifications. 	Combining ergonomics methodology and practical solutions either postural stress or improved productivity (or both) were achieved.



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Hansen, L., Winkel, J. and Jorgensen, K., 1998.	Significance of mat and shoe softness during prolonged work in upright position.	<ul style="list-style-type: none"> ▪ Eight women (mean age 24) tested four conditions (soft-shoes, clogs, soft mat and concrete) each for a 2-hour period. ▪ Results were based on measurements of low back muscle EMG, foot volume changes, discomfort and ground force reactions. ▪ Constrained standing work during 2 hours causes EMG signs of muscle fatigue and pronounced discomfort in the lower back as well as oedema formation in the feet. ▪ Using soft shoes rather than clogs during standing/walking work halved the oedema formation while a soft mat has negligible effects. 	<p>The shoe and mat effects on the investigated response parameters are marginal compared to the time-dependent effects.</p> <p>For both standing and standing/walking work the largest oedema-preventing effect occurs with the combination of soft shoes and hard floor.</p>
McAtamney and Corlett, 1994.	RULA - a survey method for the investigation of work-related upper limb disorders.	<ul style="list-style-type: none"> ▪ This paper describes and presents a methodology for the assessment of risk from posture, muscle use and forces exerted. An action level score is generated from the assessment. The tool has been validated and undergone reliability studies. 	The RULA tool has been validated on sewing machine operators. It is a pen and paper tool that gives a rating of risk from a task and work position. It is useful in justifying modifications based on change in risk level.
Sturt-Buttle, C., Marras, W.S. and Kim, J.K., 1993.	The influence of anti-fatigue mats on back and leg fatigue.	<ul style="list-style-type: none"> ▪ Two types of matting compared to the concrete floor using two males and three females (age range 21-25). Test period was two hours. ▪ EMG of back and leg muscles were measured and shift in median frequency calculated (this is a recognised measure of physiological muscle fatigue). 	Significant localised muscle fatigue in the leg muscles due to prolonged standing was measured. The leg muscles did not benefit from the matting; however, the back muscles did benefit from the more compressible of the two mattings tested (8mm thick, 6.9% compression). It is hypothesised this may be due to postural sway triggering an increased blood flow (this was not found by Hansen <i>et al.</i>).
Redfern, M.S. and Chaffin, D. B., 1995.	Influence of flooring on standing fatigue.	<ul style="list-style-type: none"> ▪ Questionnaire survey rating of tiredness, fatigue and discomfort when working on vinyl, concrete and three different matting surfaces or using shoe inserts. The subjects were 8 men and 6 women (mean age 38). Two week trial of each condition. ▪ There were significant effects on perception of tiredness with the softer matting materials being rated more highly (except for the softest mat which was rated poorly). 	The shoe insert condition showed low tiredness ratings as compared with most floors (including the one made from the same material).



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Punnett and Keyserling, 1987.	Exposure to ergonomic stressors in the garment industry.	<ul style="list-style-type: none"> ▪ Analysis of postural demands, repetition rate and forces was made using a video method. ▪ There was a lack of correlation between prevalence of pain and posture demands apart from high exposures to non-neutral wrist and hand postures. 	The authors call for the development of a more efficient work analysis technique.
Punnett et al. , 1985.	Soft tissue disorders in the upper limbs of female garment workers.	<ul style="list-style-type: none"> ▪ A cross-sectional study of 188 female garment workers found that the prevalence of persistent shoulder, wrist and hand pain were significantly greater among garment workers. ▪ Hand sewing and trimming tasks were associated with the highest level of upper limb symptoms. ▪ Ironing related to elbow pain. 	A better understanding of biomechanical loading on the upper limbs may be applied to reduce the risk and prevalence of symptoms.
Sadeque et al.	Psychosocial problems of female workers in garment factories.	<ul style="list-style-type: none"> ▪ Different individual profiles of work ability and reaction to the working environment were found. These were discussed in relation to cultural issues in Bangladesh. 	Participation is cited as a method for involving women in the working society.
Sokas et al. , 1989.	Self-reported musculoskeletal complaints among garment workers.	<ul style="list-style-type: none"> ▪ 144 sewing machine operators were surveyed and matched to a control for comparison. They had a significantly higher risk of knee swelling and upper back pain. No differences in low back pain were noted. 	Ergonomic redesign of the workstation is suggested to reduce knee and upper back problems.
Vihma et al. , 1982.	Sewing-machine operators' work and musculoskeletal complaints.	<ul style="list-style-type: none"> ▪ Musculoskeletal complaints were more frequent among sewing-machine operators compared to seamstresses. ▪ Sewing machine work requires more static postures. 	A short work cycle diminishes the duration of a working posture requiring forward bending; however, the static work load does not diminish correspondingly as the muscles do not relax between cycles. Mental work associated with short cycle times can increase muscle tension.



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Thorbjörnsson and Kilbom.	Psychosocial risk factors for pain and disorders in the lower back among women and men: a cross-sectional analysis at the endpoint of a follow-up study.	<ul style="list-style-type: none"> ▪ Based on data from the REBUS study, the prevalence of low back pain was slightly higher among women than men. ▪ The differences in risk factors for males and females was found to be based on social support with men reported as having more social risk factors and poorer coping strategies. 	The complex interaction of social, work and non-work factors in the developing and reporting of musculoskeletal problems is apparent from this study.
Montreuil et al. , 1996.	Profile of musculoskeletal pain, tufting workers, age, work, work duration.	<ul style="list-style-type: none"> ▪ 114 creelers and machine operators were surveyed using a self-administered questionnaire. 50% or higher reporting of musculoskeletal symptoms was found in all subgroups of the sample. ▪ Persistent pain over the weekend was used as an indicator of the exposed group with symptoms and the group of workers most affected were between 25-35 years in age. 	Typical prevalences of musculoskeletal problems were reported; however, they were from a younger group of workers.
McCarthy, J. , 1986.	Overuse injury in the clothing and manufacturing industry.	<ul style="list-style-type: none"> ▪ This paper reports on a survey of tasks, workstations and environments in a clothing manufacturing company, identifying the possible musculoskeletal injuries for each task and advising on return-to-work procedures. 	Undertaking a survey for the purposes of setting up a rehabilitation process and advising which jobs are appropriate for staff returning with an upper limb disorder has merit in tackling existing problems. However this must not be assumed to be an effective management of musculoskeletal problems without a more preventative strategy also being put in place.
Tuuli , 1997.	The psychological contract and shop floor workers in one Finnish textile enterprise.	<ul style="list-style-type: none"> ▪ Using a psychological contract set up between the employer and employees the author examines two scenarios. Firstly a contract was based on a belief system that work would be challenging and calls for a high degree of craftsmanship. The second contract deliberated on salary levels for work perceived as routine. 	Interpreting expectations and responses to the contract the author not surprisingly found that some staff do not respond quickly to change. The management had equally internalised behaviour patterns as staff. The Tayloristic approach is held up against the worker's general notion that nothing has changed and nothing is going to change.



First Author and Date	Keywords	Findings	Learning points, undefined areas of importance, recommendations
Vežina et al. , 1992.	When is light work heavy?	<ul style="list-style-type: none"> ▪ Definition and specifications for workplace design to reduce physical workload is provided. 	
Wick and Drury , 1986.	Postural change due to adaptations of a sewing workstation.	<ul style="list-style-type: none"> ▪ A shoe-stitching workstation was evaluated and ergonomic changes introduced. 	A combination of design changes was necessary to get a result.



Section 3

Towards New Forms of Work Organisation in the Clothing Industry: Issues and Concepts

Introduction

In the previous Section, we highlighted the very real health dangers that are posed by many jobs in the clothing sector. Short cycle times, highly repetitive tasks and payment by piecework, which characterise traditional methods of garment manufacturing, have all been shown by published research to be significant contributory factors to industrial injury.

However, as we have outlined in Section 1, the European clothing industry is suffering enormous international competition. Globalisation of the world economy, rapidly changing customer demands and the staggering pace of technological change have forced all industrial sectors to reconsider manufacturing strategies and methods of working. Many of the things we took for granted in our working environments are being challenged: we are being downsized; multi-skilled; made contingent and turned into 'team players'. But do the new working practices emerging in the clothing sector really represent a break with traditional working practices? And do they really offer new opportunities to remedy the dangers inherent in line working, or do they pose additional threats for worker health and safety?

In the following chapter we shall examine, in particular, how some clothing manufacturers are responding to market pressure. The use of modular manufacturing, or teamworking systems will be looked at in particular detail. Teamworking is by no means the only way in which work organisation is changing, but provides a useful focus point on many of the issues that are currently under discussion. The approach, of course, is not new. In this Section we will demonstrate how teamworking, as applied in the clothing sector, has been influenced by very different approaches to manufacturing including Group Technology, the Scandinavian and European Quality of Working Life Programmes and, more recently, Japanese just-in-time strategies.

The debate on new forms of work organisation as a means of improving competitiveness, working conditions for individuals and sustaining European employment is becoming increasingly significant. Previously, there has been a suspicion that improvements in the quality of working life for employees would be at a cost to the company. In fact, it was argued that there was a converse relationship between better working arrangements and productivity and efficiency. While there are some who would still adhere to the logic of this argument, there is an increasing recognition that it is possible to find a convergence between company competitiveness and worker interests. Part of the solution to this lies in a radical reappraisal of the jobs, work roles and responsibilities of employees and traditional methods of organising work.



Scientific management - The dominant method of work organisation in the 20th century

It could be argued that, throughout history, people have organised work by dividing up large tasks into smaller elements and then distributing these tasks among themselves. It is very difficult to imagine that the building of the Pyramids could have occurred by any other means. However, for the majority of craftspeople before the turn of the 20th century, broad skills and know-how were built up over many years.

With the dawn of the industrial revolution and the development of mass markets at the beginning of the 20th century, a number of thinkers proposed a rationalisation of work organisation. Both Henri Fayol (Andreasen, Coriat, & Kaplinsky, 1995; Kristensen, 1990) and the German sociologist Max Weber (1947) examined the role of management and the structure and functions of organisations. Their aim was to provide a universal management model, applicable to any organisation, and both developed a 'top down' perspective in which organisations were shaped and controlled through managerial authority.

The American engineer Frederick Winslow Taylor took a different 'bottom up' perspective and focused attention upon the design of jobs and the work tasks of individual operatives. Of course, Taylor was not the first to consider these issues. Adam Smith had already made a famous observation of the manufacture of pins in *The Wealth of Nations* (Smith, 1776) and the British manufacturers Wedgewood, and Boulton and Watt had devised organisational systems based upon the separation and division of labour in the 18th century.

While Taylor undoubtedly drew upon these experiences, he was the first to develop a systematic and rational method of organising work in this way. In his thesis *The Principles of Scientific Management* (1911), Taylor proposed a management system that aimed to eliminate inefficient variations in work procedures by prescribing the 'one best way' of carrying out individual tasks. As workers became more proficient in their fragmented tasks, it was claimed that both management and operatives would benefit from the increased productivity that the method afforded. Underpinning Taylor's method was his belief in 'economic man'. This philosophy argued that workers were, first and foremost, motivated by pecuniary rewards and therefore overall improvements and efficiency gains in the production system would enable an individual to make more money.

But the division of tasks did not only relate to manual skills. Taylor advocated, as Babbage had done before, that:

All possible brain work should be removed from the shop floor and centred in the planning... department... (Taylor, 1911).

Workers would concentrate on the manual tasks, freeing up managers' capacity for intellectual activities; thus a deep chasm appeared between the conception and planning of work and its manual execution.

This, of course, represents more than an allocation of tasks between operatives and management, and fundamentally questions the control and autonomy that employees are given in their working lives. For many academic commentators the deliberate removal of intellectual and decision-making capacity from workers is



highly problematic (Wood, 1989). To restrict employees to specialised tasks which are planned and prescribed by management has been viewed as 'de-humanising' and equates to a 'theft' of the craft skills once owned and employed by artisan workers (Braverman, 1974).

Job Characteristics under Scientific Management

- Some operatives have few opportunities to learn a range of skills. Clothing workers tend to be defined by the single tasks that they perform. They are often classified as an 'overlocker', 'lockstitcher', 'button-holer' and so on.
- Payment is often by individual incentive systems, 'piecework' for example. These can often be a source of conflict. Disputes between workers arise as there is competition for what is perceived as 'good' and 'bad' work. Piecework can also cause disagreements between management and workers as the system generates mistrust about the allocation and performance of Standard Minute Values.
- Operatives have little discretion over their work which is closely supervised. Work scheduling, operational procedures and quality, for example, are externally controlled and monitored.
- There is little opportunity for workers to contribute from their knowledge and experience, or participate in decision-making.
- Single-skilled operatives are isolated from the manufacturing activity and are frequently unable to see the broader picture of the production process. Some are unaware of how their work contributes to the finished garment, or impacts upon another's operation.
- Operators are isolated from each other. This can be exacerbated by overhead material handling systems and layout of machinery. This prohibits group problem-solving, collective creativity and the pooling of knowledge.
- Specialised work tasks often result in short cycle times, repetitive work and increased risk of musculoskeletal disorders.
- Line working can be stressful due to a sense of powerlessness over the production process, the need to 'earn your money' under the piecework payment system, and lack of variety and opportunity.

Even contemporaries of Taylor had misgivings about Scientific Management. In 1915 the United States Congress argued against the organisational method, fearing that it could cause unrest and lost production in the defence industry. The approach was not widely adopted in Europe until the Marshall Plan advocated Scientific Management as a strategy to aid the rebuilding of Europe's devastated industries after the Second World War (Burnes, 1996).

The criticisms of specialised and divided work tasks are older than those which arose from the implementation of the Scientific Management method. Even before Taylor, commentators argued that the reduction of work into small, short cycle

tasks, the lack of scope for discretion over working arrangements and the limited opportunities for employee involvement were 'dehumanising'. The English artist and social commentator William Morris noted in the 19th century that:

To compel a man to do day after day the same task without any hope of escape or change, means nothing short of turning his life into a prison torment (Morris, 1885).

Instead, Morris argued that factories should allow for the “*hope of pleasure in our daily creative skill*” which could be accomplished if work included task variety and when they could become centres for intellectual activity and learning.

It would be wrong to portray Scientific Management as being a prescriptive method of work organisation, that has been universally applied and undergone little adaptation since Taylor's thesis. The introduction of rest rooms, canteens and entertainment into the factory were introduced by Frank and Lillian Gilbreth through their “better way of work programme”.

Another important contributor to the development of Scientific Management was Henry Lawrence Gantt, who criticised the piece work payment system and replaced it with a protected wage plus productivity bonuses. Gantt was sensitive to the needs of those employed in the workshops and proposed that Scientific Management methods be used to wrest autocratic control from the hands of an unscrupulous management. On one occasion Gantt stated that:

The control over labour given to management by the application of the system which I installed was so far-reaching as compared with other management controls that I refused to install it unless convinced that the management was such that no unfair advantage would be taken of the system to oppress labour (Urwick & Brech, 1951).

Gantt's later interests included 'democracy in industry' which aimed to humanise management science and to ensure that every employee had the opportunity to function at their highest possible capacity and to participate in democratic dialogue built upon respect for sound and scientific fact.

Others later developed Gantt's philosophy, notably Mary Parker Follett (Follett, 1924) and B. Seebomh Rowntree. Rowntree's observations still appear to have relevance, particularly in relation to discussions on national minimum wages. He was adamant that workers needed to be provided with wages that would enable them to raise families in comfort and security.

He was emphatic on this issue - there could be no escape along the path of “my business cannot afford any more”. The application of better management, the adoption of scientific methods of organisation, are the means to efficiency, to economy, to better margins from which to pay more wages. “We must not”, he said to his fellow employers, “let low-paid workers suffer for our mental laziness” (Urwick & Brech, 1951).

Both Rowntree and Follett strongly emphasised the importance of the 'community'; both in the workplace and the connection that employment should have with the wider society. The role of work groups in organisations was also explored by Elton Mayo (1949) and his colleagues, in the experiments at the Hawthorne works of the Western Electric Company. The studies were profoundly influential in suggesting that Taylor's emphasis on individual financial reward was misguided.



Instead the studies, and the Human Relations school that subsequently developed, argued that factors other than money were significant springs of employee motivation (see Herzberg, 1966; Maslow, 1942).

Taylorism has received sustained criticism from organisational theorists over many decades, and this is well documented. As we enter a new century, many of these issues and criticisms are being reviewed as Scientific Management is increasingly seen to be impotent in meeting the considerable challenges faced by manufacturers in mature economies.

Achieving flexibility - Craft, skill and technology

In the latter half of the 20th century, we have witnessed dramatic changes in the world of work. The technological revolution, triggered by advances in the microchip, has impacted upon virtually every area of our lives. Faster and cheaper telecommunications have enabled rapid communications and global trading. In addition, our ease of access to information and sources of knowledge through the global media, and even more recently the Internet, has enabled an exchange of ideas, innovations and fashions at a bewildering pace. These technological advances, combined with the hugely increased opportunities for quick, low-cost, international travel, have created a global market place for manufactured products.

Such globalisation of the world economy has meant for many manufacturers in established industrial countries a reappraisal of product markets, work organisation and the methods and technologies of production. For some organisations, this has meant a transfer of production to low-wage economies, as it has been seen as increasingly futile to attempt to compete with developing countries which command labour costs at a mere fraction of Western nations. For those retaining a manufacturing base in Europe, there is a recognition that competitive advantage cannot be based upon price competition alone. Instead, companies are seeking to 'add value' to their products and services by improved quality, responsiveness and product innovation (see Table 6).

A fundamental element of meeting such criteria is the 'rediscovery of the human factor' and the desire to capitalise upon the knowledge, skills and experience of employees as a means of creating competitive advantage (Coriat, 1995). This may seem rather obvious now, with business jargon scattered with well-established phrases such as 'empowerment', 'human resources' and 'intellectual capital'. However, during the 1970s and 1980s, the introduction of new manufacturing technologies was heralded as having the potential to dispose of 'unreliable and costly labour'.

One of the most notorious examples was the proposed development of unmanned factories in the FIAT group. Despite considerable capital investment, production targets were not met and the system was found to be highly inflexible. The management of FIAT disbanded this strategy in the mid 1980s and placed greater emphasis on achieving flexibility through the craft skills of a knowledgeable workforce (Sisson, 1997).



Table 6 : **Changing patterns of competitive advantage**

Mass Production	Competitiveness in the 1990s
Competitiveness based principally upon cost advantage	Competitive advantage based upon responsiveness to market trends
Future of industry seen to lie with larger, vertically integrated firms	Future of industry lies with smaller, highly versatile units, either small to medium-sized enterprises, or loosely attached to parents
Competition principally from developing countries	Competition principally between developed countries
Dependence on a limited number of retail customers; few exports	Large number of niche customers in an international market
Low design content; design initiated by the customer	High design content; design innovation led by the manufacturer
Long production runs and infrequent product changes	Short runs and frequent product changes
Operatives deskilled and opportunities for discretion minimised	Multi-skilled operatives provide the competitive edge through problem solving and innovative abilities
Minimal training and opportunities for progression limited	Continual vocational education and training for all employees

Source : Totterdill, P(1997). *Culture Change Benchmarking: Inventing the Factory of the Future*. Teamworking Review: An edited collection of articles. Nottingham: Centre for Work and Technology, The Nottingham Trent University.

Similar observations were made in a study of the implementation of new production technology within the clothing industry. Banke and Binder note (Banke & Binder, 1992) that:

Importantly, it seems that the investment [in new production technology] has not bought the companies what they would appear to need most: a genuine renewal of the relationship between technology, work organisation and skill.

Within clothing manufacturing research, attempts at automating the manufacturing process (and reducing expensive labour) have, on the whole, failed. The main problem has been the limp nature of fabric which has proved so difficult to manipulate mechanically. Although there have been considerable developments in semi-automatic machinery, research into a fully automated production process has been abandoned due to the capital intensity and inflexibility of automatics (Zeitlin & Totterdill, 1989). Another reason for the lack of technical advance in this sector has also been put forward by Lloyd (Lloyd, 1989) who states that this might be:

...partly due the availability of a cheap pool of female labour, that keeps sewing costs to a minimum, rather than the fact that there has been no technological advancement (Lloyd, 1989, p. 104).

Taylorism had already limited the opportunities of employees to gain craft skills, and some commentators argued that the advent of new technologies provided further opportunities for management to 'deskill' the workforce (Braverman, 1974). For others, however, the development of new technologies has the potential to 'upskill' workers and re-establish the development of craft skills (Piore & Sabel, 1984) in an era they term "the second industrial divide". If the industrial revolution signified the first industrial divide, which alienated workers from their craft skills, it is argued that with the demise of mass markets we are witnessing the emergence of a new 'craft' worker employed in small and highly versatile enterprises capable of meeting the needs of niche markets.



It is therefore tempting to sum the observations of engineers and ethnographers to the conclusion that technology has ended the dominion of specialized machines over un- and semi-skilled workers, and redirected progress down the path of craft production (Piore and Sabel, 1984, p. 261).

Other academic commentators have also suggested that we are moving towards 'new production concepts' (Badham & Mathews, 1989). A widely-quoted study of the skill needs in German manufacturing industry also analyses changes in work organisation. Kern and Schuman (Kern & Schumann, 1987) argue that 'craftsmanship' is a problematic and rather romantic notion - especially if craft skills are defined by the primary materials used, for example 'wood workers', 'metal workers', 'textile workers' and so on. Instead, they argue that we must challenge former concepts of craftsmanship and promote broader and more general skills. Skills such as having the ability to communicate effectively, the ability to solve problems and to work in a team. It is these skills, they claim, that will provide organisations with the true flexibility they require to compete in changing environments. While Kern and Schumann's observations have received some criticism for lacking clarity in their empirical work (Wood, 1989), their research has promoted a significant discussion on the skill needs of European organisations.

In Kern and Schumann's analysis, flexibility was argued to be a key component of competitive advantage. Atkinson and Meagar's (1986) influential research analysed the way in which organisations were trying to achieve flexibility. The authors illustrate that *functional flexibility* was achieved by flattening hierarchies, promoting multi-skilling and breaking down job demarcations. They also observed that companies achieve a *numerical flexibility* through the retention of a permanent 'core' staff and recruiting temporary and limited contract workers for 'peripheral' occupations. Not surprisingly, such strategies have met with resistance from employees, trade unions and industrial commentators. Indeed, the management goal of flexibility has often been regarded as a means of reducing employment, intensifying labour and disregarding union agreements on job boundaries and demarcation (Parker & Slaughter, 1988), particularly in regard to the adoption of new forms of work organisation.

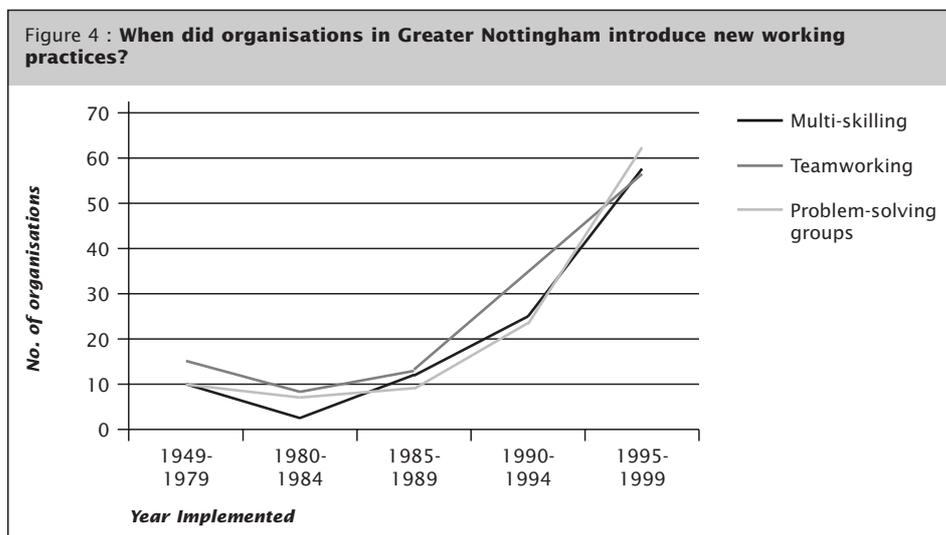
In summary, it seems that there are two ways of viewing new practices. On the one hand, new forms of work appear to offer new scope for employee participation, access to new skills and less monotonous tasks and a safer working environment. This has been termed the 'high road to innovation' (European Work and Technology Consortium, 1997).

However, some organisations take the 'low road' where innovation is limited. In these instances there is little mutual trust and some suspicion that new forms of work are merely different ways of exerting managerial control, intensifying operations and as a mechanism for reducing employment.

Are new forms of work a change for the better ?

If Taylorism has been the most widely used method of work organisation in the 20th century, there is increasing evidence that new forms of work organisation are emerging across Europe. Organisations have responded with a huge array of initiatives which have developed a new lexicon of business language. Organisations are being downsized, made flatter and leaner. Workers are being multi-skilled, empowered, made contingent, encouraged to be team players. Manufacturing strategies include BPR, JIT, and TQM, and we have a host of management 'gurus' guiding organisations to the next fad and fashion of organisational thinking. For some, however, the rhetoric of empowered workers, better working lives and improved company performance needs closer examination. Marchington (1995) in particular, has severe reservations and suggests that guru conference presentations on worker involvement and new employment 'fads and fashions' can provide a 'feelgood' factor at the time, but later attempts at implementation can be very difficult to achieve in practice. The author also questions whether New Employment Practices (he cites employee involvement, Total Quality Management, teamworking, empowerment and Human Resource Management under this heading) really do represent a break from Tayloristic or Fordist models.

A number of recent studies have questioned how widespread the new forms of working practices are, and have attempted to determine whether new methods of working actually do enhance employee participation and responsibility (Hague, 1999; NUTEK, 1996; Osterman, 1998). A survey of 200 organisations in Greater Nottingham, demonstrated that organisations are implementing a range of initiatives, from teamworking to multi-skilling, with employees being asked to participate in problem-solving groups - quality circles for example (Hague, 1999).



Source : Hague, J., & Aubrey, R. (1999). Time for a Change? A survey of new forms of work organisation in Greater Nottingham. Nottingham: The Observatory, The Nottingham Trent University.

The EPOC Study (Employee Participation in Organisational Change) undertaken by the European Foundation for the Improvement of Living and Working Conditions (1997) surveyed nearly 6000 companies. The research attempted to



map the diffusion of organisational change in Europe and to analyse how new forms of work impact upon company performance, security of employment and employee work roles and responsibilities. The survey importantly recognised that systems commonly labelled as new working practices are not the same and vary in scope and practice of employee involvement. Teamworking, in particular, is a very misunderstood term, and while there have been many debates upon what characterises effective teamworking (Buchanan, 1997), it is important to recognise that a number of very different manufacturing strategies have contributed to what is universally designated 'teamworking' today. These are discussed in the following sections.

Group Technology

Group Technology is essentially a manufacturing systems solution to the difficulties of 'short run' or batch production. To eliminate the difficulties of routing products through structured production lines, the approach proposes that dedicated cells are formed which specialise in the production of specific components or products. To take a clothing example, you might have one cell concentrating on the manufacture of trousers, while blouses would be made within another area. It should be noted that while the system was principally developed for ease of management control over the production function, it soon became apparent that workers could benefit by playing a more participatory role than in line production.

Group Technology aims to achieve the following (Hyer & Wemmerlov, 1982) :

- Shorter lead times.
- Reduced work-in-progress and finished goods inventories.
- Less materials handling.
- Simplified planning and control.

Japanese manufacturing strategies

One of the most significant influences upon European work organisation has come from the Japanese car industry (Womack, Jones, & Roos, 1990). While Taylorism represented a continuous refinement of the production process to achieve the best 'scientific' solution to production efficiency, Japanese car makers - Toyota, in particular - focus more attention on the reduction of throughput times and work-in-progress. Advocates of the 'lean production' approach, and the associated just-in-time (JIT) system, argue that work-in-progress represents a major cost to manufacturers, which needs to be eliminated. In addition, a large amount of inventory conceals poor planning and optimum utilisation of labour, plant and capital. The Japanese philosophy breaks with the traditional Fordist strategy of predicting and, more importantly, stimulating demand for mass-market products. This Fordist approach is referred to as the 'push system' of manufacturing control. Lean Production aims to produce for real demand, and this demand pulls needed products throughout the supply chain and diminishes unnecessary buffers of work-in-progress. However, for some commentators, this preoccupation with the reduction of work-in-progress can result in intensified work tasks and loss of worker autonomy (Turnbull, 1988). The implementation of team production structures in the Japanese approach has also been the subject of much criticism. The replacement of supervisory staff by team leaders has been viewed by some as a management tool to exert authority in a different form, with direct supervision



merely replaced by peer group pressure. These observations have led some commentators to ask whether such 'lean' management is also 'mean' management (Thompson & Wallace, 1995).

The 'Scandinavian approach' : Job Redesign and humanisation of work

The work of the Tavistock Institute for Human Relations in London during the 1950s promoted much debate on the need to analyse organisations as 'socio-technical' systems. A principal task in designing effective organisations was to achieve a 'joint optimisation' between the social and technological systems. While 'sub-optimisation' could occur at the departmental level, the approach suggested that the important unit of analysis was the whole organisation and how it was able to adapt to the pressures and instabilities caused by its external environment. The studies of poor working conditions and group collaboration in the Indian textiles industry (Rice, 1958) and the Durham coal fields (Trist & Bamforth, 1951) were extremely influential and are important because they provided the foundations for 'an eager and enduring embrace' by organisational theorists of the definition, development and dissemination of teamworking (Buchanan, 1997). They also provide an account of how innovations in work organisation emerged through experimentation at the local level.

While many have opposed the principal tenets of Taylor's thesis, Scientific Management provided a systematic and, what some regarded as an objective, tool for organisational design. A difficulty for those advocating either a Human Relations, or more critical perspective, was that despite intensive research, outcomes for the practitioner were rather vague. Was it possible to present an alternative to Scientific Management that provided compelling evidence of improved productivity and organisational efficiency while providing a better quality of working life for employees? The Tavistock Institute and subsequent 'socio-technical' theorists in many respects adopted this role, and ongoing work in this vein still has many adherents and much influence in Europe and North America. For the past thirty years, hundreds of experiments in organisational redesign have been carried out, very often supervised by socio-technical researchers and consultants (Brown, 1992). Under a number of headings including 'the humanisation of work', 'Job Redesign' and 'Quality of Working Life' programmes, European organisations have attempted to find alternatives to the Tayloristic method.

Initiatives to support increased direct employee participation in decision making have been undertaken over many decades. In Germany, for example, the participation of employees had been at the level of works councils (Heller, Pusic, Strauss, & Wilpert, 1998). However, it was the quality of working life movement that really promoted the active role that employees could (and should) have within the workplace. It is generally recognised that the QWL movement began with the work undertaken by the Oslo Work Research unit within the Norwegian Industrial Democracy Programme. Following this, a number of programmes were developed in Northern Europe to improve worker participation, not merely at boardroom level but through all levels of the enterprise. The Norwegian activities and subsequent QWL initiatives were very much influenced by open systems thinking, and the development of the *socio-technical* approach, pioneered by researchers at the Tavistock Institute in London.



The principles of Job Redesign

The Socio-Technical Approach argued that increased worker satisfaction would lead to better productivity and company efficiency. This 'win-win' situation could be achieved if fragmented and short-cycle jobs were 'redesigned' to offer work that is less stressful, with fewer risks of occupational hazards - such as musculoskeletal injury - and is also more interesting and fulfilling.

There are three principal strategies in Job Redesign. These are:

- 1. Job Enlargement.** This aimed to increase the variety of work by horizontally combining fragmented tasks. Where jobs have very short cycle times - button-holing in the clothing industry might be an example - these tasks are combined with other short cycle tasks: button sewing, bar tacking and so on. This would allow for movement between work stations and, when carefully designed, provide greater task variety and reduce the risks of upper limb disorders associated with operating at a single work station.
- 2. Job Rotation.** This is really a means of enlarging jobs, where the number of tasks an operator might do in a day would be increased by rotating between work stations. This might be dictated by the demands of the production system, prescribed by management at certain periods in the day, or negotiated between workers.
- 3. Job Enrichment.** One of the problems with the two Job Enlargement strategies mentioned above, is that there is no guarantee that enlarged jobs are any more fulfilling. An operator might now be doing four boring jobs instead of one boring job! Job enrichment aims to offer workers greater autonomy and discretion over their working arrangements by giving them responsibility for some indirect tasks, often undertaken by management. Example of Job Enrichment might include having some responsibility for monitoring quality, planning and scheduling work, and liaising directly with customers.

The Job Redesign approach has been a significant influence in providing an alternative to Taylorism. However, despite extensive efforts and expenditure on 'Quality of Working Life' and 'Humanisation of Work' programmes, the widespread adoption of working practices which focus on worker satisfaction, as the EPOC survey reveals, remains surprisingly limited. While many experiments reported good results and enthusiasm in the initial stages, workplace innovations were sometimes short-lived and failed to become the mechanisms for organisational development and industrial democracy that had been originally anticipated.

One of the most famous examples of the 'Swedish' or 'Scandinavian' model of work organisation was developed by social scientists and engineers at the Volvo Kalmar and Uddevalla plants. However, when these production systems were dismantled, a number of commentators began to question the effectiveness of the Scandinavian approach. While simplistic accounts suggested that the demise of these 'icons' of new forms of work organisation illustrated a failure of the QWL movement, others pointed to contextual factors which were far more influential in the closure of the plants than the work method itself (Cressey, 1993; Sandberg, 1994).

The QWL experiments were important as they provided an alternative to the Tayloristic method. Since the 1990s, there has been a renewed interest in this work as a means of creating competitive advantage in a globalised economy. This



is substantially different in focus to QWL in the 1970s, which concentrated upon problems of absenteeism, labour turnover and problem operative functions, and takes a more holistic view of organisational communication between levels and functions, to enable greater use of new technologies, create flexibility and responsiveness and stimulate a climate of creativity and innovation (Buchanan & Huczynski, 1997).

Differences in approach

One of the difficulties in the debates on new forms of work organisation is that, as the preceding paragraphs have illustrated, there have been many competing ideologies and approaches which have contributed to the development of new working practices today. For some, teamworking, for example, is synonymous with the Japanese approach. However as Wood (1989) notes:

The Japanese management model should not be lumped together with the Swedish model of semi-autonomous working groups.

Before undertaking a survey on *Employee Participation in Organisational Change*, members of the EPOC research team attempted to define the differences between the Scandinavian and Japanese approaches to work organisation. In Table 7, the researchers have examined dimensions of both methods.

Table 7 : The Scandinavian and Japanese approaches to teamwork		
<i>Dimensions</i>	<i>Scandinavian</i>	<i>Toyota or Lean Production</i>
membership	voluntary	mandatory
selection of group members	by the group	by management
selection of group leader	by the group	by management
qualifications	mixed	generalists
reward	skill dependent	uniform (seniority)
task	complex	simple
technology	independent of pace	dependent on pace
autonomy	large	narrow
internal division of labour	voluntary	largely prescribed

Source : European Foundation. (1997). *New Forms of Work Organisation - Can Europe Realise its Potential?* Luxembourg: Office for Official Publications of the European Community.

While these two models provide a useful conceptual framework between the Scandinavian 'Post-Tayloristic' model and the 'Neo-Taylorism' of the Japanese approach, it should be noted that these represent 'ideal' types and in actuality most approaches to new forms of work organisation fall between these two poles.

The EPOC Survey (undertaken by the European Foundation for the Improvement of Living and Working Conditions, 1997) aimed to examine what really characterised new working practices in Europe. Using survey data received from nearly 6000 companies, the research attempted to map the diffusion of organisational change in Europe and to analyse how new forms of work impact upon company performance, security of employment and employee work roles and responsibilities.



The results revealed that while there was widespread evidence of direct employee participation, there were more incidences of individual consultation than of participation through processes of group delegation. In addition, the survey suggested that there was little evidence in the data for the adoption of the 'Scandinavian' model of group working. While the majority of companies surveyed combined elements of both the Toyotist and Scandinavian approaches, the majority of new working practices had characteristics closer to the 'Toyota' model. Other survey data from Europe and America seem to agree with these findings (see Hague, 1999; NUTEK, 1996; Osterman, 1998).

The publication of the EPOC survey results were timely in that they coincided with the publication of the European Commission's Green Paper *Partnership for a New Organisation of Work* (European Commission, 1997). The Green Paper sought to re-visit the issue of work organisation as a means of improving European competitiveness, sustaining employment and enhancing the quality of working life for European employees. In recent years there has been a general "rediscovery of the human factor" (Coriat, 1995) and much discussion around the means of improving competitiveness through the utilisation of workers' knowledge, experience and creative capabilities, which are recognised as vital components in creating competitive advantage (Hamel & Prahalad, 1996; Porter, 1985).

Both the classical approaches and alternative approaches to work organisation were developed in different contexts and for varied purposes. At the beginning of a new century, work organisation is again being appraised for effectiveness in a changing society - research evidence has suggested that experimentation is widespread but also indicates how schemes can be limited in scope and fail to meet the expectations of both managerial and non-managerial employees. The old adage says 'if it ain't broke, don't fix it'; however, it appears that many are recognising the weaknesses of traditional forms of work organisation, and are attempting 'patch up' the fundamental flaws in their organisations with a perplexing array of short-term solutions. But can these organisational forms provide the climate for sustained creativity and innovation - and create healthier workplaces? In the following sections, we shall examine how work organisation is being adapted in the clothing industry and explore how these techniques might reduce the risks of musculoskeletal disorders associated with Tayloristic practices.

Traditional manufacturing approaches in the clothing sector

No single 'traditional' method of work organisation has been employed in the garment making industry. Highly-skilled practices such as the 'make-through' method used to be common in old clothing centres such as London, Leeds and New York, but have become rarities today. As the skills of the make-through operator diminished, other approaches developed which relied upon a more highly specialised division of labour where work is performed on only a small section of the garment. The 'conventional bundle' and 'straight line' systems (for a fuller description of these methods see Carr, 1976; Hiba, 1998), are the most common approaches to work organisation and often referred to as the 'line system' or 'progressive bundle' system.



In these methods of working, cut pieces are bundled and distributed to workers to perform predominantly short-cycle tasks. Having completed their tasks, operators would re-bundle these pieces and then pass them onto other operators to complete another short-cycle task. In some instances the bundles would be transferred to other machinists along moving belts or by overhead conveyors such as the isolating Eton system (which effectively draws a 'curtain' of work-in-progress around individual operatives).

Despite the longevity of the progressive bundle system, these approaches are increasingly being brought into question in such a rapidly changing market place. In Section 2, the need for companies to compete by being flexible and responsive to market demands was highlighted. In addition, managers are placing greater emphasis on the 'human capital' within their organisations as companies seek to add value through customer service, high quality and product innovation.

It has been recognised that for many years the line method of working can be extremely difficult to manage, even in relatively stable environments, and has a number of disadvantages:

- Large amounts of work-in-progress is expensive and throughput-time can be lengthy. This may mean that manufacturers cannot respond quickly to customer demands.
- Quality problems are often overlooked until the final inspection stage, which can result in costly rework.
- The system relies heavily on supervision. Indirect costs are incurred by materials handling, quality inspection and line balancing functions.
- As workers have specialist skills, there may be problems in managing style changes and absenteeism. Organisations, are therefore, inflexible and are unable to adapt quickly to style changes demanded by retailers.
- The piecework payment system which is a characteristic of the traditional line approach can be a major source of conflict.

With the demise of long-run production for many European manufacturers, the situation has become in some cases even more chaotic. The accurate measurement of Standard Minute Values is often neglected due the rapid pace of work and the increased number of styles. Poorly estimated timings can create severe difficulties for capacity planning and production scheduling, resulting in fines for late delivery and workplace stress. Also, many manufacturers fail to account for the time it takes their employees on piecework to 'get up to speed' on new styles. It is not uncommon that before workers have been able to achieve Standard Performance on small orders, they have already moved on to a new style. For managers, this can mean that the quoted price and delivery dates prove problematic. For employees, failure to reach production targets can be stressful, de-motivating and they risk injury as they try to work to unrealistic timings.



Labour market challenges

Trying to compete in a global marketplace is not the only challenge encountered by the clothing industry. Our society is witnessing enormous demographic change, an increased desire to pursue leisure activities, and many are challenging the Tayloristic premise that we only go to work 'for the money'. This does not deny that realistic financial reward is unimportant, but as Giddens (1998) notes:

Self-expression and the desire for meaningful work are replacing the maximising of economic rewards.

Clothing companies, in some areas, are struggling to recruit and retain labour. The image of the clothing industry popularised by 'sweatshops', the dramatic decline of the sector in some European regions, and the poor level of pay have all contributed to problems the sector faces in trying to attract people to careers in the industry. It is important to note that while some clothing manufacturers claim that they are unable to recruit employees, a closer examination often reveals that the real problem resides in being unable to *retain* newly recruited workers. Inadequate induction and training programmes, poor pay (often linked to unrealistic Standard Minute Values), and a substandard working environment can result in high labour turnover figures for new recruits.

This extract from an article in a local paper in the East Midlands of England is not untypical. The area in which the company was located had a local unemployment level of forty per cent.

... the company in Glaisdale Drive East needs to double its workforce to deal with orders. But they have not been able to fill vacancies despite advertising in the press, job centres and posting leaflets through doors... "Where are they if they are so desperate for work? We understood that there were vast numbers of unemployed here and it would be fine. We thought they would be queuing up. We are turning down hundreds of thousands of pounds worth of orders and I honestly don't know where to go. This week we have put 150 more leaflets through people's doors and we have had no response whatsoever" - (Nottingham Evening Post, 1995).

While the very poor levels of pay in the industry cannot be dismissed as being a primary factor in dissuading entrants to the clothing sector, it has also been suggested that the changes in worker aspirations for more engaging employment may also be another contributory factor.

Modular manufacturing in the clothing sector

Since the late 1980s and throughout the 1990s, clothing manufacturers have been experimenting with 'modular manufacturing' or 'teamworking', as it is often referred to. In this system, multi-skilled teams of operators work collectively to produce sections of a product, or an entire garment. While research evidence from forty teamworking companies in the clothing sector suggests that each system and situation is different (McLellan, 1997a), it is generally considered that there are two generic types of teamworking 'model' which companies choose to implement and adapt



for their own purposes. The Toyota Sewing System and the Kanban Approach are discussed in the next sections.

The Toyota Sewing System (TSS)

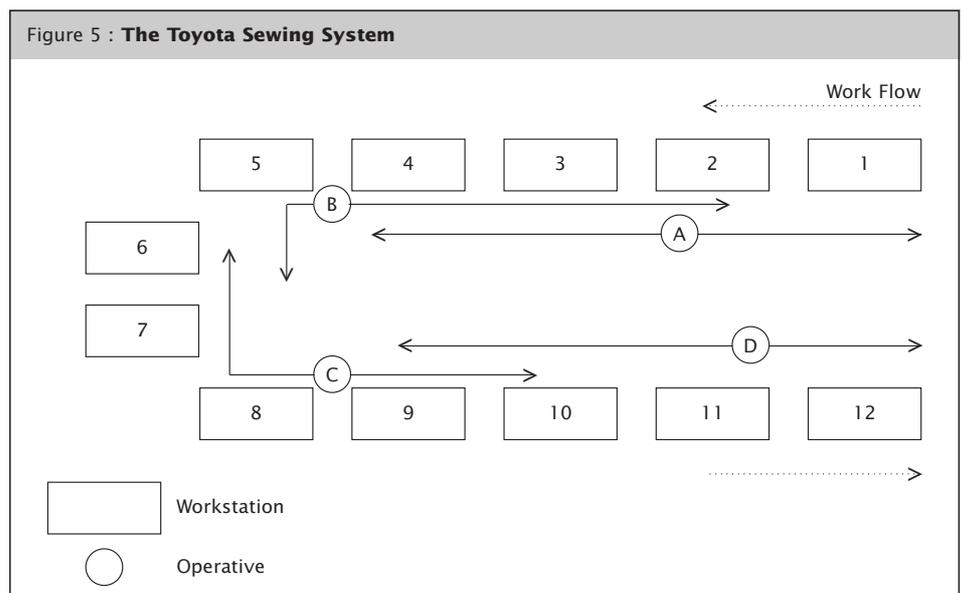
The Toyota Sewing System was first introduced in 1978 and draws heavily upon manufacturing strategies developed in the Japanese car industry. The approach has probably been the most frequently adopted method of modular manufacturing. Like other Japanese manufacturing strategies, the system - in its purest form - aims to reduce work-in-progress to a minimum. There are no buffers between work stations and operatives work on single garments. This philosophy does not only apply to garment construction activities, but seeks to improve all the functions within a company - from the supply of fabrics, cutting, sewing, pressing and delivery and so on (Toyota Apparel Equipment, 1993). The operatives are multi-skilled and work in a U-shaped module, and the work content is divided equally between each employee.

Characteristics of the T.S.S. (adapted from McLellan, Wigfield, & Wilkes, 1996) :

- Operatives stand to allow easy movement between work stations. Ideally, an operative should not stay standing in the same position as they will move between work stations.
- The module is usually U-shaped. This aids communication between operatives.
- Operators work on single garments.
- Each operator performs approximately 2-4 operations, depending on the product.
- Work flow is sequential.
- Operators' skills overlap.

The Toyota Sewing System has been subject to some criticism. In particular, it has been questioned whether the emphasis upon the reduction of work-in-progress to a single garment per worker is really necessary. While the reduction of throughput time to two days might be advantageous, can the intensification of work tasks in the TSS be justified to produce completed garments within two hours which may sit in a warehouse gathering dust (NEDO, 1991)?

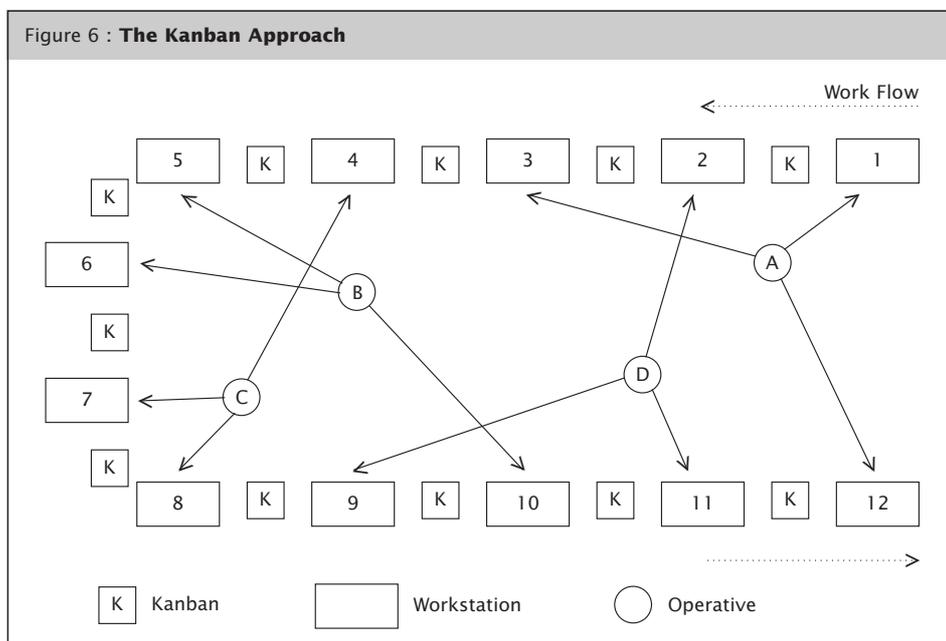
The regimented style of working between adjacent workstations (1, 2, 3... 1, 2, 3 and so on. See Figure 5) has also been criticised. Each operative must work at the same speed and the pressure to conform to the pace of the team can be stressful and tiring. While the system does offer the opportunity for limited Job Enlargement, it has been questioned whether the TSS restricts further



possibilities of employee involvement (Hague, 1997b). This is particularly the case where the TSS has been bought as an 'off-the-shelf' solution and has been made to fit in with existing, rigid organisational cultures. In many cases it has been observed that the TSS is adapted at the local level and is implemented as part of a broader programme of organisational development which recognises that team training, communication skills and new opportunities for joint problem-solving are an important part of the implementation process (Hallows, 1989).

The Kanban approach

The Kanban System is another Japanese-inspired production strategy which is well known in the manufacturing sector. Again aimed at the reduction of work-in-progress, the approach relies upon restricting the build-up of WIP by the use of 'Kanbans' - which is the Japanese word for 'card' or 'ticket'. Once the required level of components has been completed, as indicated on the Kanban, the work is passed on for another operation.



In the clothing sector, the Kanban approach has been modified to prevent the build up of work-in-progress within a manufacturing module and thus avoid bottlenecks or for the team to become unbalanced (see Figure 6). Tables or containers of work-in-progress between workstations are, therefore, often referred to as 'Kanbans'. For example, a team might decide that, at any one time, no more than twelve garments should be stored between workstations.

Characteristics of the Kanban Model :

- Operators are generally seated, as the higher levels of work-in-progress require less movement between workstations.

- Work-station layout is usually U-shaped.
- Operators work from bundles of cut work.
- Movement between workstations can occur at anytime. However, once a Kanban has become full, the operative must either move to the adjacent workstation to carry out the next process or move to another workstation within the cell. Similarly, an empty Kanban can signal to other workers that tasks need completing at a particular workstation. In this way, the module becomes self-balancing.
- Work flow is less sequential and workers have greater choice over which operations to perform.

This approach has a number of benefits over the TSS in that it allows workers to have far more discretion over the operations that they undertake. The small build up of work-in-progress that the system allows for also enables contingent problems, such as thread breaks, repairs, or machine breakdowns to be less disruptive.

As the system is less prescriptive than the TSS it allows workers to decide for themselves how to help each other out in dealing with such problems (also see Hiba (1998) who suggests that buffers of work can be beneficial).

The question of the amount of work-in-progress allowed in a system is a crucial one, as the pace of machining, the opportunities to work on a different tasks and to take a break from certain operations could all contribute to safer working practices. All too often, important decisions are lost in discussions over whether it is preferable to sit or stand to sew.

Of course, there are many adaptations of the two models presented here. In the section below, other work organisation issues will be highlighted which play a part in developing new working practices and the development of safer working environments.

Other work organisation issues to consider in the development of new working practices

Payment systems

The piecework payment method has been the most widely-used form of remuneration in the clothing sector for many decades. The system rewards the individual operative for his or her level of output. While these have been heavily criticised since their inception (see *Scientific management...*, p. 42), they have been more recently criticised in a sector now characterised by short-run manufacturing.

Why is piecework unfair ?

1. The measurement of Standard Minute Values, on which piecework payment is calculated, is partly based upon a subjective measurement of 'observed ratings'.
2. Piecework payments discriminate against the disabled, some older workers, or those incapable of performing at sustained high speeds.
3. The piecework payment system can be difficult to calculate and understand, especially if there are 'off-standard' payments for problems encountered by waiting for work, or machine breakdowns, for example.
4. With the increasing number of styles a company will manufacture each year, little attention can be paid to the accurate measurement of Standard Minute Values. It is often the case that these are crudely estimated.
5. With retailers' demands for shorter runs and more frequent style changes, workers are often unable to achieve performance targets before a new style is introduced, which can be de-motivating.
6. The piecework system fails to reward for other contributions, such as participation in problem-solving groups and suggestion schemes or the acquisition of new skills.
7. Piecework can be a major source of conflict:
 - between workers who perceive that some styles may be easier to manufacture than others;



- between management and workers due to arguments over accurate work measurement and production targets.
8. Skilled workers can be penalised as they are asked to undertake the more difficult tasks, on which it is harder to achieve high working performances.
 9. Piecework is rarely used to reward indirect staff, such as those in administration and clerical functions, and therefore the method discriminates against those involved in direct production activities.
 10. Increasing research evidence suggests that piecework can be a major factor in the development of workplace stress and industrial injuries, such as musculoskeletal disorders.

The dangers of the piecework payment system for occupational health and safety have been previously discussed in Section 2. So what is the way forward? If management truly want to achieve flexible, responsive and safer organisations they should dispose of this outdated reward system. It may be possible to alter some elements of the production function - towards modular manufacturing, for example - however, proliferation of an individual incentive payment system will only be seen to be incompatible with such new working practices.

So how should team members be paid? This question is asked by the authors of the NEDO report into modular manufacturing in the garment industries (NEDO, 1991). The report makes two points:

Firstly, care should be taken in making the *transition* to new payment methods. One option is to pay new team members an average of previous earnings, for example during the previous six months. Another is to increase the overall average wage by 5-10%, funded through the productivity gains, improved quality and flexibility that teamworking often provides (see Table 8). It should be noted, though, that for some very quick workers, the move to a group payment system can actually mean a drop in wages, while lower performers have their wages raised. Research within the Centre for Work and Technology suggests that, on the whole, changes in the payment system are favourably received - especially if the new system flattens out the fluctuations that characterise piecework payments and enables financial budgeting.

Secondly, a payment system needs to be designed when the team has been established. Very often, companies implement a group payment system which retains some type of additional incentive bonus. These are often based upon acquisition of skills, quality, high productivity and attendance. Bonus systems, even for group systems, can be problematic as many of the difficulties of piecework still remain,

Table 8 : **Company improvements due to teamworking**

	<i>Line System</i>	<i>Teamworking</i>
Work-in-progress	8180 dozen	5310 dozen
Costs of seconds	£70,000	£13,000
Repairs	10%	3.5%
Other improvements:		
Productivity increased by 17%		
Earnings increased by 15%		

Source : Centre for Work and Technology Case Study.



with competition for 'good' work between teams and disputes over who or what is to blame for poor quality. Similarly, rewards for the acquisition of new skills tend to be focused solely on machining skills and fail to account for other skills gained, such as the ability to plan work, monitor quality and contribute to problem-solving activities; however, some companies have offered additional payments for employees' 'willingness to learn'. A survey undertaken by the Centre for Work and Technology, examined some of the issues around 'skills-based pay' (McLellan, 1997b). Of sixty-four companies employing teamworking interviewed, only seven used a payment method which included some reward for the attainment of skills. In some cases this was linked to vocational qualifications such as the National Vocational Qualification (NVQ) or its Scottish equivalent, the SVQ. A principal difficulty was that operators were being trained in new skills so that their wages could be upgraded. In many cases, however, these were not required by the companies, which was felt to be a waste of training resources by the company and could produce frustration in the operatives who could not put their newly acquired skills into practice. Table 9 provides an example of a payment system which is based upon skills. (Please note that the wage levels would no longer be representative; however, this provides a useful illustration of a skills-based payment system.)

The UK Teamwork User's Group is a learning network of garment manufacturers employing team-based systems, and was established in 1994 (see Case study 5, p. 75). Evidence from the forum suggests that while companies may move to some form of incentive scheme in the short- to medium-term, the most progressive companies eventually aim for a salaried payment for all employees.

Table 9 : **An example of skills-based pay**

Control garment manufacturer, England

Grade 1	New Recruits	£111.10 (a week)
Grade 2	2 units of NVQ	£120.20
Grade 3	All units of NVQ	£130.30
Grade 4	All 4 main machine types + 80%	£139.20
Grade 5	Floater/mobile	£168.00 (paid at an hourly rate)

There is an additional bonus of £26.26 for reaching target at the required 75% performance. An additional bonus is awarded for performance over 90% for every dozen over target. Most machinists have received a pay rise. For those who have had a pay reduction, this was done over a period of time, starting with their average and then being reduced by £10 per week. When operatives first go onto a team, they are paid their average until they are graded. A problem with the payment system is that once they have reached their target, they want to know what they can gain by producing more.

Source : McLellan, J. (1997). Teamworking in the Textiles and Clothing Industry: The State of the Art. Nottingham: Centre for Work and Technology, The Nottingham Trent University.

Training

It is widely recognised that the record for training in the clothing sector is poor. Even where some training is provided by employers, most of this tends to be unsystematic and 'on-the-job'. Some operatives can work in the sector for most of their working lives without receiving any formal training (Hague, 1997a). For many clothing industry employees who have worked in isolation on lines and have rarely been asked their opinion, the option of team-based work appears attractive. For others, the transition from line working to teams who share joint



responsibility can be a stressful process. Often this is not as a result of a reluctance to work alongside others but of a fear of 'letting the side down'. There can be an anxiety that they will not be able to learn new skills. Many also lack the confidence or skills to be able to contribute to group discussions with the fear that their contribution might not be so valid.

While most companies will offer some initial multi-skill training during the introduction of teams, other training for the so-called 'soft-skills' of problem-solving, communication and conflict resolution are often overlooked. Another problem for workers who have joined teams to learn new skills is that, once a team is primarily established, continuous team development is neglected and the initial enthusiasm and excitement of new team members evaporates with the belief that management have not kept up their 'side of the bargain'.

It should be noted that new forms of working require training across all levels of an organisation. One of the principal reasons for the failure of teamworking is the inability of management to plan and to ensure the supply of materials and trims for small batch production. This often requires greater co-ordination between departments, and management also need to reassess traditional methods of working and functional demarcations. 'Outward bound' management training might have some uses; however, new methods need to be sought which open up new channels of dialogue between management and the workforce and provide 'team-building' training that is company-wide. And, of course, trade unions can play an important part in that process (also see Case study 7, p. 79 for an innovative example of whole company training).

There are several helpful documents on training for team development. In the English language there are two useful publications that specifically relate to teamworking in the garment sector (see Centre for Work and Technology, 1997, and Kingscourt Consultancies, 1994).

In addition, the International Labour Office provide some very useful and pragmatic examples of how to improve health and working conditions through the development of new forms of work organisation (ILO, 1996).

Changing roles of the supervisor

When implementing new working practices, many job roles require reappraising - and this can meet with some resistance. It is hardly surprising that being told a job you have done for many years needs to change can result in opposition and bewilderment. The supervisor's role is particularly vulnerable as pressure to manage the change process is felt from both the management and operative levels. Sometimes this burden can result in drastic action. On one occasion, action researchers within the Centre for Work and Technology observed that a sewing room supervisor had been sabotaging the machines in a newly-installed team as the new system was felt to threaten her status and demand new supervisory skills.

As teams take on the responsibility for many of the indirect tasks formerly undertaken by supervisors, such as line balancing, materials handling and solving individual problems, some companies use teamworking as a means of making staff reductions. However, teamworking requires new roles and releases more resources to deal with other organisational issues such as planning, training, and



Source : McLellan, J. and J. Hague (1998).
 Competitiveness and Management Organisation in
 Textiles and Clothing SMEs: a guide to change.
 Nottingham: Department of Trade and
 Industry/The Nottingham Trent University.

Table 10 : The changing roles of supervisors	
<i>The supervisor in the traditional system</i>	<i>The teamworking supervisor</i>
Instructs people what to do next	Helps people to develop initiative
Spends a lot of time solving others' problems	Helps people to solve their own problems
Has a lot of responsibility but follows the instructions of the manager	Responsibility is shared and contributes with others in decision making

health and safety. Table 10 illustrates the changing job roles of a supervisor making the transition from traditional line systems to a team-based organisation (also see Case study 6, p. 78 which explores these issues).

Work organisation as a means of improving health and safety

In April 1997, the European Commission published its Green Paper *Partnership for a New Organisation of Work*. The paper aimed to stimulate widespread debate on the ability of new forms of work to improve employment and competitiveness. The Green Paper focused on three questions (*Bulletin of the European Union*, Supplement 4/97, p.5) :

- Why do we need new forms of work organisation and how should they be designed and implemented?
- What are the policy challenges of new forms of work organisation?
- Is it possible to establish new partnerships for more productive, participative and learning organisations?

While the Green Paper went part way to achieving its objectives, there has been some criticism of its failure to more fully integrate health and safety issues and policy implications. Results from the EPOC Survey clearly show that new working practices can result in reduced absenteeism through sickness. In workplaces with a higher level of direct participation, 49% of managers directly attribute a 45% decrease in sickness rate to the changes in working practices (European Foundation, 1997). However, despite increasing evidence that innovations in work organisation can result in improvements in employees' health (and the costs associated with absenteeism) the whole area of health and safety is tersely dismissed in two paragraphs in the Green Paper. While the Green Paper did highlight the significant contribution that the Commission has made to the promotion of better working conditions through legislation and practical advice, the potential convergence between European health and safety programmes and initiatives intended to support competitiveness and innovation - Framework Programme V, for example - is insufficiently explored.

Another dimension missing in the Green Paper debate was the possible effects that new working practices have for *worsening* working conditions and employee well-being. In the edited responses to the Green Paper, published by the Commission, EUROCADRES argues that the use of 'reduced absenteeism' as a primary indicator of the impact of new forms of work upon health and safety is problematic



as there is evidence (and quotes the work of the UK Health and Safety Executive in this area) that some professional and managerial staff are pressured to attend work, even when they have a genuine illness. In modular manufacturing, or teamworking, it has also been highlighted that peer pressure amongst work teams can result in team members being reluctant to take adequate sick leave for fear of 'letting the side down'.

The intensification of work, through multi-skilling strategies and extended employee autonomy, can also have negative effects and result in increased stress. While the focus of this study is upon musculoskeletal disorders a number of studies are linking incidences of stress which lead to other injuries. Unpublished research by Cenni, P., Barberieri and Germani, G., supported by CGIL Mantova, suggests that the pain experienced through musculoskeletal injury is increased when employees are under stress (see Case study 2, p. 71).

Can teamworking in the garment industry improve health and safety?

In previous sections it has been suggested that teamworking, when started in a climate of participation, organisational development and collaborative experimentation, can provide benefits for both management and the workforce. But can teamworking really provide tangible benefits for employee well-being? Could it even reduce the incidences of musculoskeletal disorder? Or does teamworking pose new threats for workers' health and safety?

The columns below demonstrate some characteristics of traditional line working and the opportunities within a teamworking system.

Line working :	Teamworking :
Piecework payment	Flat wages

The proliferation of piecework payments in the clothing sector in some countries of the EU has been shown to be a contributory factor in the development of MSDs. The link between piecework and industrial illness has been made by the ILO, which states that:

In the specific area of occupational diseases, one of the trade unions' major concerns is the stress caused by assembly line work and piece-work pay systems. This may lead to premature ageing and physical and psychosomatic illnesses... The introduction of new pay systems in teamworking should help resolve some of these problems... (ILO, 1995).

Discussions in Denmark with members of the Department of Occupational Medicine, Herning Hospital, revealed that the removal of pieceworking was considered the *first* step to be taken in creating a safer working environment. During an action research project to reduce MSDs through the implementation of teamworking within two clothing companies, lengthy discussions were undertaken between management and employees to provide a fairer method of payment.



Line working :	Teamworking :
Short cycle times	Combined work tasks through job enrichment

Teamworking can provide opportunities to reduce the risks associated with short-cycle tasks by combining operations. However, each situation should be individually assessed. Sometimes, the shared allocation of work within a team can mean that individuals still remain predominantly at one work station; particularly where the Standard Minute Values for that operation are above average values for the rest of the team. Also, it may be the case that tasks are only marginally enlarged, providing manufacturing flexibility but little variation for the operative.

Line working :	Teamworking :
Little discretion and repetitive work	More autonomy and varied work

On traditional lines, operatives rarely have the opportunity to choose which tasks they are to perform. This makes the work repetitious and hazardous. Where operatives have been trained on many, if not all, the tasks involved in the construction of a garment, there is increased scope for job variety in some teamworking approaches (the Kanban method, in particular, allows for greater worker discretion). This can help reduce the risks associated with repetitive actions.

Line working :	Teamworking :
Few indirect tasks	Increased indirect tasks through job enrichment

As has already been noted, some view the 'empowerment' of workers to be a managerial attempt to reduce employment and retain hegemony by a new means. But the sharing of indirect tasks - such as monitoring productivity, planning, quality control and liaising with customers - can provide important respite from arduous and repetitive tasks. This was particularly highlighted in the research of Occhipinti *et al.* who suggest that more frequent rest periods are crucial to the reduction of MSDs. During a study visit hosted by FILTA FILTEA UILTA to CEMOC Milan, it was noted that some companies had proposed an extension to the working day to accommodate more regular breaks. This had been rejected by local trade union officials. However, it was disappointing that any company should view such pauses in the working day as being unproductive. The failure to see the potential of capitalising upon their employees' knowledge and experience during such downtime is discouraging.

Line working :	Teamworking :
Seated for sewing operations	Teamworking can sometimes involve standing to sew

There is no 'golden rule' which prescribes that sewing is performed seated when using the Kanban approach and that single garment systems, like the TSS require standing operatives. There has been much debate around whether standing to sew is detrimental or beneficial (see GMB, 1997; Kelly *et al.*, 1992; McLellan *et al.*,



1996). While this study did not reveal any systematic research on standing to sew, the UK General Workers' Union, GMB, reported these research findings:

There have been several spin-offs reported from areas that have been on team-working for some time. It is pleasing to note that the majority are favourable, for instance:

The problems with upper limb disorders appear to decrease. This could be as a result of regular movement between machines, and there is thus a reduction in short-cycle repetitive movements. Job satisfaction increases significantly and this, in turn, reduces absenteeism.

Stand-up sewing, which occurs in some teamwork situations, is being closely watched but we have had surprisingly favourable reports from operators in such systems. Initially and understandably, they reported tiredness in the first few weeks, but they say they soon become accustomed to the new working method. Others have said that there is a reduction in back problems, brought about by not having to sit for lengthy periods in one position.

We must ensure, however, that consideration is given to pregnant operators who may prefer to sit during pregnancy. We must ensure that the welfare and earnings of operators are assured at all times. We must also accept that stand-up sewing is not suitable for all operators, particularly those suffering from leg or foot ailments (GMB, 1997).

Does teamworking really work?

A question frequently asked during the course of this study was: does teamworking actually work? The debate about the effectiveness of modular manufacturing to create competitive organisations became very prominent in the clothing trade press following an article published in the *Wall Street Journal* in May 1998 (King Jr, 1998) following the decision of Levi Strauss in the US to revert to line working and the piecework payment system. The company claimed that unit costs had risen dramatically and that productivity was worse than when operatives were previously paid by piecework. However, this has been forcefully disputed by a number of commentators who have risen to the defence of modular manufacturing. Abend (1999) argues that Levi-Strauss had developed a modular system that bore very little resemblance to the approach as it is commonly known. He notes that the company's teams numbered as many as 40 people, and not the 8 to 10 that is often considered the optimum size. The author suggests that the failure of teamworking is often because:

1. The ideal modular methodology of small teams was not adopted.
2. Companies did not lay adequate groundwork for a culture change from an individual piecework, progressive bundle system to a cross-trained, multiple-job, co-operative environment.
3. The production runs and the types of garment being produced in the modules could not withstand the pressures of the market place.



Abend also quotes an 'industry insider', who said that:

"I wouldn't say that Levi failed at modular. I'd say that they didn't get modular".

A similar argument was also made by Gilbert (1998) who states that there are numerous examples of successful modular manufacturing companies who, he believes, would probably not exist as domestic manufacturers (in the US) without using the team approach. A number of successful case studies are given including *The New Maryland Clothing Company*, which had installed teamworking on a tailored coat which include 120 operations. Table 11 illustrates the benefits to the company.

Table 11 : Teamworking at the New Maryland Clothing Company		
	Before	After
Throughput time total	18.5 days	8.5 days
Throughput time sew only	12.7 days	5.5 days
Labour turnover annualised	35.3%	15.2%
Absenteeism	6.3%	2.6%

Source : Gilbert, C. (1998). *Did Modules Fail Levi's or Did Levi's Fail Modules?* Apparel Industry Magazine, September 1998, 88-92.

The Levi's case is interesting, and a closer examination reveals that the 'failure' of modular manufacturing, as reported by the *Wall Street Journal* is not as clear-cut as the article would lead readers to believe. Much of the problem with modular manufacturing had centred around the six plants in El Paso, next to the Mexican border. However, in other parts of the group, other manufacturing facilities have had considerable success with teamworking, and following the publication of the *Wall Street Journal* article, it has been agreed that teamworking should be continued in some plants and for particular kinds of production.

It is argued that the team-based approach can work and is a proven strategy in retaining clothing production in higher-wage economies. There is no doubt that the implementation of teamworking can be problematic and there are few studies which really examine the levers and impediments to successful change.

There is... a general absence of systematic research on the process and outcome of adopting cellular manufacturing (Dawson, 1994).

However, research evidence undertaken in the UK does reveal that teamworking can have significant benefits for the company and its employees. Companies can usually expect the following benefits (Totterdill, 1997b):

- Enhanced ability to respond to market demand.
- Improved quality.
- Reduced work-in-progress.
- Fewer recruitment, retention and absenteeism problems.
- Teamworking can provide the motor for change and improvement throughout the company.

For machinists, the following benefits should be expected:

- Expansion of technical and social skills.
- Job enrichment through greater autonomy, team co-operation and the reduction of demarcations.



- A fairer payment system.
- Reduction of musculoskeletal disorders and occupational stress.
- Increased access to continuing vocational education and training.
- Improved career prospects.

But this does not happen serendipitously. When companies are disappointed in the benefits they expect from teamworking, it is because they have failed to consider the wider cultural issues which need to be addressed. Training can be limited and often does not include instruction in the so called 'soft skills' such as team-building, advice on holding effective team meetings, resolving conflicts and so on. Similarly, many managers lack the skills and discipline to forward-plan production activities, fail to ensure that components are provided on time, machines are well-maintained, and training for new styles is anticipated.

Europe has an unsurpassed record of workplace innovation and experimentation going back several decades. Unfortunately, we have failed to capitalise on the many lessons we have learnt through this process, particularly that there is no 'quick fix' solution and that workplace innovation is an on-going process of experimentation, negotiation and organisational learning. Very often, new forms of work organisation like teamworking, for example, are regarded as 'technical' solutions which are made to slot into rigid organisational structures. In addition, the legacy of Taylorism is under-estimated. Histories of restricted training, suppressed co-operation and the stifling of individual and collective creativity all contribute to making the transition process difficult (Andreasen *et al.*, 1995; Kristensen, 1990).

Despite the renewed interest in work organisation at a European level, much of the research focus has been upon 'technology transfer' and the exchange of so-called 'best practice'. Instead, it is argued that we need a far more integrated approach which does not rely on 'catching-up' with exemplary models drawn from the 'world's leading companies' but rather by unleashing the knowledge and experience of our workforces; the development of new workplace partnerships, and by opening up new channels of dialogue between member countries and the social partners of the European Union (for a fuller discussion of these issues see European Work and Technology Consortium, 1997).

It therefore appears, that developing an understanding of work organisation at a sectoral or regional level may be the first step. To actually animate organisational change, future work should aim to create the capacity for local innovation by building 'communities of expertise' (Totterdill, 1995). This is a theme which is being rigorously developed by a number of academics, social partners and local intermediaries. Ennals and Gustavsen (1998) provide a valuable insight into the role of local development coalitions emerging all over Europe, which aim to provide the climate for workplace innovation. These, they argue should break free from the rationality of the transfer of 'best practice' models, and stimulate process-driven solutions, based upon dialogue, collaboration and a broadening of the knowledge base available to individual enterprises and change agents.



Summary

In this section, we have briefly examined traditional approaches to work organisation and the subsequent attempts that have been made to create healthier work places. It has also been noted that, even before Taylor's time, academic and industrial commentators have suggested that the management prescription of a limited number of work tasks and the inability for workers to contribute from their knowledge and experience is 'dehumanising' and an inefficient use of people within an enterprise.

While experiments aimed at improving the quality of working life have been undertaken since the 1960s, there is a renewed interest in alternatives to the Tayloristic method as a means of improving flexibility, responsiveness and working conditions. However, it has also been highlighted that while there is widespread evidence of the incidences of new working practices in Europe, there is a tendency by some managers to take the 'low road' of innovation and offer only limited opportunities for employee development. Not surprisingly, this has meant that some workers and trade unions have been suspicious and resistant to new working arrangements. The principal approaches to new working practices in the clothing industry have been illustrated and some evaluation has been given as to how these new forms of working might aid or restrict efforts at reducing occurrences of MSDs in the clothing sector.



Section 4

Change in Practice

Managing change - Learning from and listening to others

The elusive art, or science, of managing change has been the subject of countless management texts in recent years. Managers are faced with a bewildering array of change 'recipes', 'checklists' and 'off-the-shelf' solutions which prescribe in a sequential manner how to transform their businesses. The underlying philosophy of many of these approaches is that change occurs in a rational and incremental manner, and so long as the process has 'commitment from the top', 'strong leadership' and sufficient time and resources, change will be successful!

Unfortunately, much academic research has been devoted to 'expert' and 'proven' change models, which are managerialist and show little understanding of the needs of employees or the social processes which constitute organisational life. However, there is an increasing recognition that case studies of global 'best practice' and change models derived from research in multi-nationals are redundant in meeting the needs of the smaller enterprises which constitute the clothing sector. But other methods of implementing change are emerging: Search Conferences, Forum Theatre, and Learning Networks all recognise the vital contribution that employees can have in aiding organisation change.

In the following section, some of these approaches are illustrated, along with case studies of social partnership where trade unions and employers have sought to develop healthier workplaces.

Case study 1 - Raising awareness of MSD at Lovable, Bergamo, Italy

The *Lovable* company manufactures and packs leisurewear and ladies' underwear. They employ approximately 570 personnel, including 180 in management and administration, and are situated in Bergamo, Northern Italy. Aware of the dangers of musculoskeletal disorders in the clothing industry, *Lovable* invited the local Occupational Health Service (ASL Bergamo) to undertake a study on the risks posed by the operations within the company. The research undertaken with the support of FILTA surveyed 300 production workers, and revealed that many claimed high levels of muscular pain which they attributed to their working practices. Subsequent independent specialist evaluation of these claims bore out many of these findings.



One practical outcome of the survey was the publication of a guide to the prevention of musculoskeletal disorders, sponsored by the company and other agencies. Entitled *Lavoro e Salute nell'industria dell'abbigliamento: La prevenzione dei disturbi dell'apparato locomotore*, this pragmatic and pictorial guide was written by Daniela Colombini and Enrico Occhipinti of CEMOC in collaboration with Giampiero Cassina and Alberto Imberti of SIPATSL.

The guide covers the following areas:

- Anatomical descriptions of the body areas susceptible to injury - the spine, shoulder, elbow and wrist.
- The principal causes of work-related injuries.
- Visual problems.
- Practical advice on different aspects of working for machinists, pressers and cutters.
- Advice on posture and the lifting and carrying of heavy objects.
- How to prevent injuries outside work.
- Some useful exercises on how to ease symptoms of musculoskeletal disorders.

At the time of the study visit, in the Spring of 1999, *Lovable* were considering undertaking a further health and safety survey. It was jointly recognised by the social partners that the manufacturing strategy had changed significantly within the business, which highlighted the need for continuous monitoring and evaluation of workplace health and safety. Since the time of the survey, the number of sewing machinists employed in the company had fallen from 120 to 45, with more personnel allocated to tasks in packing and warehousing. The types of job undertaken in the sewing room had also changed, with machinists rotating between 10 and 12 operations, whereas previous work had meant that most operators concentrated on one or two tasks. While it was recognised that repetitive sewing tasks were potentially hazardous, both unions and management suggested that for some workers there was a 'cultural' resistance to adopting changes in their own working method. For example, in the sewing room at *Lovable*, some workers preferred to remain on one task. While there may be complex reasons beyond this, possibly connected to earning potential, it has been suggested by Dr. Occhipinti⁵ - one of the guide's authors - that workers themselves should be better equipped to understand and evaluate their own working practices. This would entail developing simplified assessment tools to help meet the enormous task of dealing with industrial injuries, which is realistically beyond the means of the national health care system.

A further ergonomic survey is to be carried out in the near future. As operations in the company have radically changed, it was recognised that comparisons with the previous survey might prove difficult. It was also expected that different issues and injuries would be raised with a possible shift from reported cases of carpal tunnel syndrome to back pain.

5. These comments were made at CEMOC in Milan (1st. March, 1999) where Dr. Occhipinti and colleagues discussed with Rita Brambilla (FILTA CISL Bergamo) and several trade union officials the important need to raise awareness and develop strategies which prevented the occurrence of MSDs.



Case study 2 - CGIL Mantova-led research on the organisational effects of job stress on female workers at Cornelianani

The implementation of Italian Act 626/94 specifying measures to ensure worker health and safety triggered the idea of undertaking new research into the welfare of women at work. Under the leadership of Umberto Fioravanti of CGIL, a research team from ENEA (Rome) along with ASL Mantova, designed a survey questionnaire which asked some 170 female workers in the *Cornelianani* suiting factory, their feelings about work. The first phase of the work revealed some interesting findings. Of particular interest to this study is the connection reported between stress, MSDs and the experiences of pain. The research discovered that a significant cause of stress was the pain experienced by workers as a result of workplace injuries - most particularly in the wrists, neck and legs. This was exacerbated by pressures of the piecework payment system. The research also revealed that the higher the stress levels reported by workers, the greater the pain they felt from their workplace injuries. This appeared to be a worrying vicious circle.

A second phase of the research is proposed that will investigate the potential for technological changes and a re-evaluation of the work organisation in order to reduce some of the symptoms that were uncovered in the first part of the research. Following Lombardy Council's decision to invest 58 billion lire in occupational disease prevention, additional strands of activity will involve the analysis of an archive which shows the final diagnosis of many patients, who have reported workplace injuries. This data set will be investigated to see if there is any relationship between the diseases cited and working arrangements.

In a discussion between union representatives and Mr. Cornelianani of the case study company, it was disclosed that *Cornelianani* were also due to enter upon a new investigation into MSDs. Mr. Cornelianani suggested that this was a difficult and contentious area and his initial feelings were that the clothing industry is not especially susceptible to such diseases. He had not encountered many cases of genuinely diagnosed MSDs and therefore felt that at this stage, it was difficult to draw any firm conclusions about the connections between occupations in the clothing industry and MSDs. Due to an interest in modular manufacturing, Mr. Cornelianani would like to know of any research on the effects of standing for sewing operations. The company had recently invested in more ergonomically-designed pressing equipment which they felt would go a long way to reducing the potential for MSDs.

Discussions between the company and the trade unions would continue with an agreement that *Cornelianani* could have access to the full data set compiled by CGIL and ASL. This would be examined by their own specialists and make a significant contribution towards the investigations proposed by the company.

The research carried out at *Cornelianani* was suggested to be pioneering in its analysis of the re-organisation of work and the prevention of musculoskeletal disorders, and could have national significance. Mr. Giovanni Rossi of FILTEA CGIL expressed his hope that this could be the foundation of a broader programme of research throughout Italy.



Case study 3 - H.D. Lee, Spain

H. D. Lee are global producers of jeans and leisurewear. At their Spanish factory, situated near Madrid, they have recently installed modular manufacturing whereby teams of approximately fifteen women assemble an entire product. The modules are U-shaped and the operators stand to sew.

Trade union representatives had become increasingly worried about the claims and risks of musculoskeletal disorders from their members within the H. D. Lee plant. The company-designed risk assessment programme makes no reference to the risks of MSDs, and therefore there is no preventative plan of action. In this context, the CC.OO decided that they would make their own investigations as to the full extent of the problem.

A questionnaire was designed in which 84 employees (72% of the workforce) participated. The results of the survey revealed that a staggering 47.6% of workers questioned said that they had been medically diagnosed with a recognised MSD. A further 90.5% declared one or more symptoms, which clearly shows that the factory contains some major risk factors that are not being effectively reduced.

One interesting outcome was that few variations in research findings were reported between different tasks or areas of work. For example, working conditions within the modular system did not appear to be better than other tasks within the company. Indeed, a discussion held with CC.OO trade union members highlighted that other physical dangers were becoming apparent due to the high levels of stress within the modules. It was reported that, on one occasion, one woman had stabbed another in the back with a pair of scissors as tensions grew between operators.

A visit to see the modular manufacturing system revealed a manufacturing approach that was in reality little different from a traditional flow line. There was little evidence of movement between workstations and operatives appeared to be working on single tasks for most of the time. Discussions with the management revealed that the women, working in close proximity, were jointly responsible for production targets and quality levels, but had not received any team-building training. No formal team meetings were held; and in essence the system was an engineered solution with little reference to the personal development of the people within the modules or promotion of a 'team spirit'. Discussions with the management revealed that they had hoped that standing to sew might alleviate some problems associated with the seated position; however, the principal danger of short-cycle times and repetitive movements still exist.

Although this sounds very critical of the plant management at H. D. Lee, it is important to recognise the context that they are working in. The global market for denim products is in decline, and as part of a large multinational corporation they will probably have to justify their continued existence within a European country. Experimentation has previously been undertaken by VF Lee Europe at Ypres in Belgium. The results of the study between pieceworking, continuous flow production and teamworking were disseminated to other European factories in the group. Following this, the management in Spain decided to develop modular manufacturing in their own company, and this was claimed to be one of the few examples of such practice in the entire country.



The case of H. D. Lee is extremely interesting. A company competing in a difficult market place has developed a new manufacturing system. This was hoped to alleviate some workplace injuries associated with sitting and provide a competitive edge. However, the lack of attention to other ergonomic effects and psychosocial factors appears to be undermining their innovation. In addition, the opportunities to exchange experiences with other manufacturers experimenting with similar processes in Spain is limited, and they have few occasions to benchmark themselves against others' good practices. It was highlighted in the previous chapter that teamworking systems have failed when they have been implemented as 'technical' solutions aiming to achieve flexibility and quick response. It is also difficult to merely 'copy' innovations in other companies without recognising the cultural issues and local contingencies which can restrict team development. As we have previously highlighted, teamworking is most effective when broader organisational issues have been taken into consideration and when the implementation process allows for local negotiation and experimentation to occur.

There appears to be a real opportunity here for trade unions to play a major role in broadening the knowledge base for their members' employers by becoming 'knowledge brokers' on new working practices, facilitating new channels of dialogue and promoting exchanges of experiences locally, nationally and across the European Union.

Case study 4 - The Danish Action Plan to reduce MSD

In the mid-1980s there was an increasing recognition of the dangers of musculoskeletal disorders for employees within the garment industry. This started a process of trade union collaboration with researchers to identify the causes of the problem and to deliver practical solutions to alleviate the dangers. The branding of neck and shoulder injuries as 'sewing machine sickness' was strategically important in raising awareness of these issues.

As knowledge of the potential hazards of being employed within the clothing sector increased, so did public protests on the extent of the problem, not only through a sense of social injustice but also regarding the significant demands that compensation claims would have upon public funds. The issues came to national prominence when the Danish Prime Minister specifically discussed the dangers faced by clothing operatives during a parliamentary session. A challenge was given to the social partners to form an action plan and alleviate the problems.

This spurred the trade unions and employers to develop a national strategy of support to the industry. Labelled the 'Action Plan', this programme was finalised in 1994 with the specific aim of reducing MSDs by the year 2000 and was provided with a budget of 100 million Danish kroner.

As part of this programme, research was carried out by Johan Hvid Andersen and Ole Nørby Hansen of the Department of Occupational Health, Herning. The action research project they undertook involved the implementation of team-based manufacturing at two clothing companies. An initial stage of this research was to enter into negotiations on the replacement of the piecework payment system within the two factories, as this was seen as a primary factor in the development of MSDs



by clothing workers. Indeed, negotiation was considered of paramount importance between the company's management, its joint consultation committee and the safety committee at the start of any change initiative. At the national level, The Federation of Danish Textile and Clothing Industries and the SID agreed to produce a manual illustrating alternative wage systems, which could be used as a resource to support the change processes.

The programmes within the individual enterprises recognised that there was no book of 'golden rules' which would lead to successful change. Neither was there a single 'blueprint' solution which could be applied to every organisation. Initial discussions, therefore, examined how jobs could be redesigned to allow for variation - and alleviate the risks of physical strain.

While it was recognised that there were many options open to companies to change work organisation, it was agreed that the long-term goals of the projects should try to see that:

- Cycle times on single jobs are as long as possible.
- Individual operators have as much discretion as possible to negotiate shifts with other workers.
- The operatives have the opportunity to move between several operations during a working day.
- No operator is employed on the same operation for more than four consecutive hours a day.

Other aspects of the teamworking implementation included:

- Ensuring that a process of dialogue occurred between the unions and employers' associations.
- Open discussions with all sewing machine operators.
- A ballot was held amongst all workers to see if they agreed with the proposed teamworking implementation.
- Machinists volunteered to join the pilot teams.
- Teams of people were selected with mixed skills.
- Each team attended a one-week course which covered areas including personal development, psychological development and production planning.
- The scheduling function was given to the team and they were allocated a quarter of an hour each morning to plan their work.

The outcomes of the two pilot studies were extremely positive. Managers recognised - in common with many other teamworking implementations - that their organisations had become far more flexible, productivity had increased, there were fewer faulty garments and the companies could respond more quickly to customer orders. The researchers also questioned the workers about their job satisfaction, which had increased when they were surveyed a year after the start of teamworking.

In some instances, there were some problems within the teams, but the researchers attributed this to the failure of management to intervene when problems initially arose. One particular problem identified was that patterns were sometime inaccurate, which resulted in production problems.

Researchers within the Department of Occupational Health, Herning, drew some interesting conclusions from their research in relation to the implementation of new forms of work organisation:



- One of the main research findings was that to alleviate industrial injuries, workers had to have the autonomy to take breaks when they needed to.
- The role of the supervisor is crucial in supporting team activities. In the initial stages, teams need a lot of support. Research evidence illustrated that teams became more self-reliant and effective when they had been able to have assistance and training.
- The difference between standing and sitting to sew is largely irrelevant. Far more important is the pace that operatives are expected to work at.
- Even in a teamworking situation, high levels of stress were noted when the work pace was too high; there were infrequent opportunities to rotate tasks and when interpersonal difficulties within the team were not dealt with.

At the time of the publication of this report, there had been no published evidence to demonstrate whether the Action Plan has met its objectives of halving MSDs. However, the Action Plan was described by Hans Dankert of SID (The Danish General Workers Union) to have changed the face of industrial relations in the clothing sector. It was also noted by Steen Mejlby of the SID's Environment Department that the clothing industry has been the best example of partnership in the Action Plan, while according to Anders Kabel of the Occupational Health Service, there is a greater awareness of the issues and increased access to companies than prior to the campaign.

Case study 5 - A study on working conditions in the textile and clothing sector undertaken by FIA-UGT, Spain

For over a century there has been much debate about the health risks associated with working practices. However, the notion of 'risk' is highly problematic and studies which have tried to isolate 'risks' through factorial analysis have also tended to isolate the broader concerns of the very people who are suffering with these concerns. It should also be noted that as the notion of workplace risks and hazards is socially constructed, many studies using such social constructs, therefore, also reflect the values and power relations of society. For example, it was many decades before the medical establishment admitted that silicosis was contracted through hazardous working conditions. It was not until the arguments of workers and their representatives were recognised that progress was made towards classifying silicosis as an industrial disease.

In recent years, a renewed importance has been placed upon working conditions and the research presented here, undertaken by the FIA UGT Spain, illustrates how trade unions are actively supporting this debate.

One of the main characteristics of the Spanish textile and clothing sector is that employment is predominantly in very small enterprises. 72% of all enterprises within the sector have fewer than 5 employees, with a mere 1% of organisations employing more than 100 workers.



Table 12 : The Spanish textiles and clothing sector	
<i>The Spanish textiles and clothing sector</i>	
Companies	20 856
Employment	264 100
Production (in million pesetas)	2 218 100
Apparent consumption (in million pesetas)	2 411 800
Exports (in million pesetas)	515 801
Imports (in million pesetas)	709 516
Foreign trade balance (in million pesetas)	- 193 715

During 1999, four hundred clothing and textile companies were surveyed across Spain. The results of the first analysis presented here is based upon 181 responses which provides a 92.5% level of confidence. In this analysis, 39% of the respondents were from the Valencia region, 38% from Cataluña and 9% from Extremadura.

The survey asked what companies were doing to prevent workplace injuries. The results revealed that only 20% of all respondents stated that their companies' prevention services were adequate - 1% actually replied that they were very good - however, 68% of all those surveyed suggested that prevention activities were poor or non-existent. In addition, not all companies had their own prevention services; while 44% were in-house, 20% of enterprises did not have their own prevention service.

Respondents differentiated general medical services from activities aiming to prevent injuries, and the results indicated that there was a marginally greater satisfaction with these services: 26% of organisations were said to have had sufficient or good medical services, with 58% saying that the medical provision offered was less than appropriate, or not appropriate at all.

The survey revealed that many companies (59%) had undertaken some form of risk analysis, and in 56% of companies this was backed by an action plan to prevent injuries. While these figures may initially appear encouraging, it should be noted that there appeared, in many cases, to be some inertia about ensuring that preventative measures were actually undertaken or understood by employees. Most of the respondents did not know the content of the companies' risk plans and knew little about the specific improvement measures that had been undertaken.

Training was an area which the survey illustrated was badly lacking in many organisations. Only 3% of firms provided any training for their subcontractors and 43% of employees had never received any health and safety training in the previous two years. The lack of training could be certainly a factor in the fact that 90% of workers surveyed said that they know hardly anything - or in some cases nothing at all - about the risks associated with poor working practices.

For many of the respondents, occupations in the textile sector posed health risks: 72% stated the physical activities their work involved posed a "moderate to high risk". Similarly, psychosocial factors were also shown to be a cause of concern for workers, with 64% of respondents stating that they felt that there was a moderate to high risk of suffering because of these factors.



The survey aimed to identify specific ways in which workers felt that their working conditions could be improved. The following complaints were recorded:

- 66% said that they were subjected to intense noise.
- 56% had monotonous and repetitive tasks.
- 52% reported the rotation of working shifts.
- 42% felt that they were in the wrong positions to work.

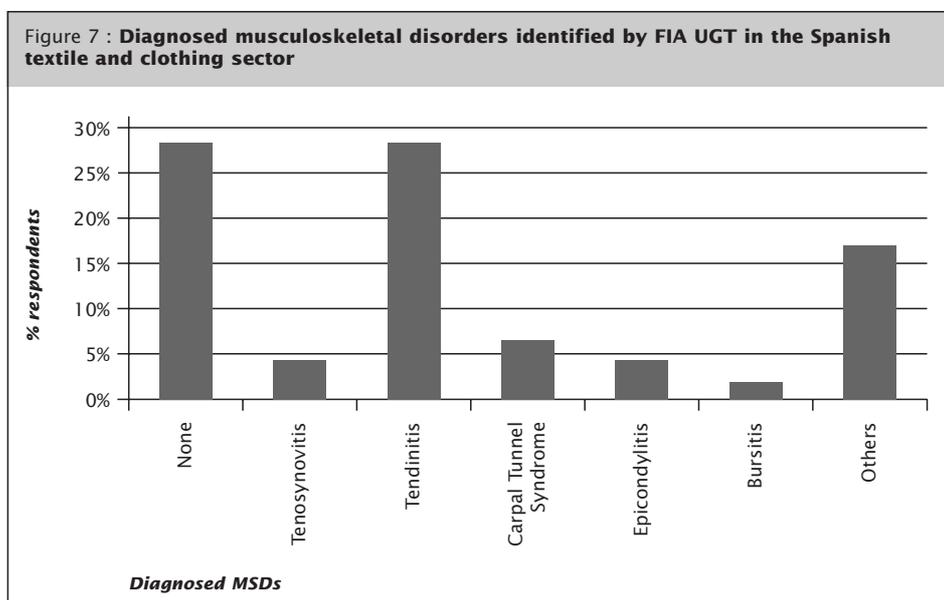
The research also highlighted that while poor working conditions may result in industrial injury, companies also suffer as a result of the absenteeism that may result. 13% of respondents claimed that there was “a lot” of absenteeism due to illness in their companies. In addition, 37% claimed that there was “moderate” absenteeism through illness.

One of the difficulties highlighted by the research is that illnesses that have arisen from poor working conditions are seriously underestimated by companies. Most of the medical advice (77%) is general in nature with only 14% related to actual job characteristics.

The most frequent forms of industrial injury cited by the survey respondents are:

- Muscular fatigue (57%).
- Spinal problems (54%).
- Eye strain (42%).
- Cramps or dizziness (26%).

Musculoskeletal disorders were also identified in the survey, and as can be seen in Figure 7, tendinitis is the most commonly diagnosed complaint.



Case study 6 - The UK Teamwork Users' Group and the DTI Programme: benchmarking team-based production in the textiles and clothing industry

Organised by The Centre for Work and Technology, The Teamwork Users' Group has been in existence since September 1993, involving over 40 textiles and clothing companies throughout the UK. Meetings and exchange visits have provided companies with a unique opportunity to learn more about teamworking, and to exchange ideas and experiences with each other on a regular basis. Meetings held have covered topics including:

- Payment systems.
- Team selection.
- Operator, supervisor and management training.
- Continuous motivation.
- New approaches to measurement.
- Balancing flexibility and productivity.
- Teamworking throughout the business.
- Supply chain management.

This activity has developed into a project supported by the Department of Trade and Industry (DTI). Entitled *Benchmarking Team-Based Production Systems in the Textiles and Clothing Industry*, the project was designed for companies already employing teamworking within their businesses and provided a mechanism for companies to 'benchmark' themselves against similar organisations. A total of 20 companies were involved in the project and each agreed to a one-day audit which involved discussions with people from all levels of the organisation. The audit process attempted to capture company information across a broad range of issues. These included:

- Leadership and strategy development.
- Communication and shared information.
- Redesign of roles, responsibilities and processes.
- Innovation and continuous improvement.
- Training and development.

Each participating company received a full written audit which included recommendations on how teamworking might become more effective. A further benchmarking audit was later undertaken which identified how companies compare against others within the sector. This information was programmed into an interactive CD-ROM about teamworking good practice which was available, free of charge, to all companies on the programme. The benchmarking programme also included six expert seminars on teamworking, combined with factory visits to companies both within and outside the clothing and textile sector.

The programme was very successful and provided an arena where companies could be challenged to improve upon areas of their businesses, which the audit revealed and, perhaps, more importantly when companies were able to observe others' organisational good practices and be challenged into taking action themselves. The CD-ROM is a particularly useful tool and future development could also include the ergonomic assessment material and information about creating healthier workplaces. Many ergonomic programmes have so far failed to incorporate the



wider issues of work organisation and competitive strategy. A re-designed benchmarking programme, combined with new forums for discussion, could be a useful start at integrating issues on health and safety, strategy and new working practices.

Case study 7 - The use of Forum Theatre to promote democratic dialogue

It is widely considered that efficiency and innovation can only be achieved by the close co-operation and participation of all employees throughout their organisations. Collaborative working practices such as 'teamworking' are now commonplace as managers attempt to realise the hitherto hidden potential of employees and to foster an environment that emphasises creativity and innovation at all levels.

However, for some individuals, these changes in working practices have proved to be difficult. The transition to teamworking, and other associated approaches, can be stressful as high expectations are placed upon employees to immediately grasp new collaborative practices.

Conventional approaches to 'team-building' have normally only been associated with management training. These often involved simulating a crisis situation and encouraging the new team to find a collective solution to the problem. Exercises which encourage teams to 'escape from the jungle' or undertake 'survival' weekends in the remote countryside may offer participants some opportunity to analyse their working practices and roles, but do these abstract exercises really offer a wide selection of employees the opportunity to articulate the daily realities of their working lives?

Despite being practised for over twenty years, Forum Theatre has been little utilised in organisational change programmes. The approach differs from role play in that the audience observe a familiar scene of conflict portrayed by the actors and are then asked to help the characters resolve their problems. The audience can question the characters about their motives, advise them as to how they might deal with the situation or, in some cases, they can play a role themselves.

Dacapo Teatret is a relatively new theatre company founded in Denmark in 1995. The company itself is composed of people from both the business world and the professional theatre. Lone Thellesen, one of the company's founders has a background in the occupational health service. Between 1990 and 1995 Lone, along with Lena Bjørn, developed a Forum Theatre company that used amateur actors from the factory that she was employed in at the time. Another project was also developed about this time with staff from the Danish Railways. Due to the intense interest that these projects generated, it was decided to develop something at a professional level, and Dacapo Theatre was formed. To enable the company to establish itself, the equivalent of £150,000 support funding was provided by the Confederation of Danish Trade Unions and the Danish Employers' Confederation to spend three months researching, writing and rehearsing their major work '*Change - the Spice of Life*'. Their work has been immensely successful and has been continuously booked by a broad range of companies, of different sizes and sectors.



During 1997, The European Work and Technology Consortium (comprising action researchers from ten EU member countries) secured funding from Directorate General V of the European Commission to invite Dacapo to the UK to demonstrate their method. Following the *Theatre in Industry Conference*, The Centre for Work and Technology and The Roundabout Theatre Company of Nottingham Playhouse developed a new piece entitled *A Stitch in Time*. This portrayed the difficulties a Nottingham clothing company was having in competing with cheap imports and how they had tried to develop teamworking to make their business more competitive. The play deals with the pressures all levels of the organisation experience in the change process and also raises awareness of the fact that workplace injuries can occur through monotonous working arrangements.

The play has been performed to many businesses throughout the UK and has been seen as an effective means of promoting dialogue on the issues and obstacles to change in an entertaining and relevant way (see Nightingale, 1998).

The work has continued with the formation of the *Partners @ Work Theatre Company*. In September 1999, Enterprising Nottinghamshire of Nottinghamshire County Council - supported by the European Social Fund - and The Nottingham Trent University established the *Partners @ Work Theatre Company* to produce a short play entitled *Guilty or Not Guilty?* The piece, which took the form of a mock trial, put the Managing Director of the fictitious clothing company *Simpkin and Co.* in the dock. Following the collapse of the business, the Manager was charged with failing both his customers and employees. The audience, consisting of people from over forty enterprises, acted as the jury and listened to the testimonies of the characters. Having heard a sorry tale of missed opportunities and stifled potential, the audience were asked if they found the Manager guilty of wilful neglect of his business.

This work, which explores issues including market diversification, planning, and human resources, has now been made into two training videos *The Trials of Barry Simpkin* and *Guilty or Not Guilty? The Trials of Barry Simpkin* video, which was filmed on location in an East Midlands clothing company, takes the form of a 'docusoap' and is aimed stimulating dialogue at learning network meetings and in individual company training programmes.

Forum Theatre offers a new participatory approach in developing safer working practices which is as yet under-explored. The approach has significant potential for raising awareness and collective learning about health and safety issues and was the subject of a recent paper presented at the Triennial Congress of the International Ergonomics Association (see Hagerfors, 1997).



Section 5

Conclusions and Recommendations

This report has highlighted the urgent need to address the dangers that musculoskeletal disorders are posing for employees within the European clothing industry. Included in this document are statistics on the scope of the problem, research findings and examples of social partnership. However, this can never adequately illustrate the very real pain, stress and disillusionment of workers who feel that their companies are doing little to alleviate their suffering. This was vividly portrayed in a meeting at CEMOC in Milan, where a trade union representative described how a woman, who had been engaged in the clothing industry for most of her working life had been so severely injured so that she could no longer comb her hair - having to rely on the daily services of a hairdresser. Other employees within the sector also recounted that their lives had been blighted by chronic pain, stress, fatigue and musculoskeletal injury. Employees frequently reported a reliance upon analgesics, just to enable them to get through the day without excessive pain.

So what does this study represent? This report, for the first time provides a comprehensive literature review of research published in the English language on MSDs and the clothing sector. This illustrates a broad spectrum of inquiry, from studies dealing with single effects or issues like workstation design through to multi-factorial accounts illustrating a complex problem needing a holistic re-appraisal of work organisation.

It has also been recognised within this report that not all innovative practices are recorded in academic publications and therefore accounts of study visits to Denmark, Italy and Spain have also been included.

While this represents a tangible output, there have also been many intangible benefits, which cannot be fully expressed here. The initiative of the ETUF-TCL and the TUTB in promoting this study has started a new and important process of dialogue. Not just at the level of European Works Councils and among academic practitioners, but also among grassroots trade unionists in each partner country. Indeed, this study is greatly indebted to the local trade union officials and shop floor representatives who so enthusiastically contributed to the debate. Not only were they willing to discuss and provide accounts of the problems they and their fellow members were experiencing, but they stressed how important it was to have the opportunity to learn from trade union experiences in other EU member countries. There now exists a real challenge to continue the dialogue started within this research programme. While networks do exist at a national level between trade union health and safety experts, it has been widely expressed that more could be done to promote collaborative research, the exchange of experiences and to foster a pan-European dialogue on these very important issues.



For the first time, this study has also combined detailed theoretical and pragmatic discussion on new forms of work organisation in the clothing sector and health and safety issues. New forms of work organisation do seem to be able to offer a real opportunity to improve working conditions. However, it has been clearly demonstrated that there are different approaches to developing more flexible working arrangements and that the mere implementation of 'off-the-shelf' solutions will fail to provide better working conditions without the full participation of employees at all levels of an organisation. This study also revealed that in some countries access to information and knowledge about new working practices is surprisingly limited. Again, this represents another challenge to raise awareness of innovative approaches - like teamworking, and related practices - and trade unions can play a significant role in doing this.

For some trade unionists, new forms of working are problematic, as they may pose new dangers of intensified work and redundancies, and it is important that these fears should also be included in this debate. It is slightly ironic that the first discussions on Job Redesign in the 1970s under the 'Quality of Working Life' campaigns were trade union-led; however, it is the employers, in many instances, who lead the debate on new forms of work organisation. Trade unionists need to reclaim some of that ground, and ensure that the rhetoric of 'workplace partnership' is truly beneficial to their members.

The debate around new forms of work is a very prominent policy issue at the present time. The Publication of the Green Paper *Partnerships for a New Organisation of Work*, the EPOC Survey revealing the limited nature of new working practices in Europe, and the recent creation of the European Work Organisation Network (EWON) by the European Commission, all point to further possibilities for highlighting the issues raised in this report. In particular, it has been noted that health and safety policies are not as yet fully integrated into the current discussions on sustaining employment and providing competitive advantage. The limited debate on health and safety issues in the Green Paper is evidence of that.

Many companies are reluctant to enter into open debates on reduction of MSDs within their organisations. The fear of some managements is that such frank discussion could expose organisations to criticism, and open the flood gates for compensation claims. Therefore, it can be difficult to market health and safety issues to company managers. Perhaps one way forward would be to embed such debates in broader discussions on company competitiveness and good practice. A case study in Section 4 showed how UK clothing companies are benchmarking themselves against one another's performance. This has been a popular programme and there may be an opportunity to develop a similar initiative across Europe, focusing on work organisation, good practice in ergonomic assessment, and illustrating the convergence between competitiveness and quality of working life.

This report has also highlighted the need for simple, practical tools for use at the local level. Unlike other sectors - the automobile industry being an example - the clothing industry lacks a standardised set of tools and guidelines to promote safer working practices. This should be addressed. The participants in this programme represent considerable expertise and experience in ergonomics and the clothing sector. It should also be noted that the clothing sector is one of the few industries which has had (since 1992) formally recognised social dialogue between the trade union federation and Euratex, the European employers. In 2000, it was agreed that



the modernisation of work organisation should be a key theme in the joint working programme. Therefore, there appears to be a significant opportunity to build upon the discussion so far and establish a European expert group which could continue to inform trade unionists and employers of research in this field and begin to develop and disseminate practical ergonomic assessment tools for the clothing sector.

In conclusion, this report should represent more than an 'outcome', and should be the start of a new process of dialogue, collaborative research and innovatory practice between the social partners of the clothing industry in Europe.



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List of Tables and Figures

Table 1	Employment decline in the textiles and clothing sectors	11
Table 2	Textiles and clothing employment in EU Member States	12
Table 3	Relationship between output value and employment (1996)	13
Table 4	Outward processing trade in selected EU states	14
Table 5	EU clothing retailing, breakdown by distribution channel (1996)	18
Table 6	Changing patterns of competitive advantage	46
Table 7	The Scandinavian and Japanese approaches to teamwork	52
Table 8	Company improvements due to teamworking	59
Table 9	An example of skills-based pay	60
Table 10	The changing roles of supervisors	62
Table 11	Teamworking at the New Maryland Clothing Company	66
Table 12	The Spanish textiles and clothing sector	76
Figure 1	Breakdown of EU textiles consumption by product	17
Figure 2	Ergonomics aims to match work demands with worker capacity to enhance well-being and efficiency	24
Figure 3	Ergonomics – Balancing demand and capacity	24
Figure 4	When did organisations in Greater Nottingham introduce new working practices?	48
Figure 5	The Toyota Sewing System	56
Figure 6	The Kanban Approach	57
Figure 7	Diagnosed musculoskeletal disorders identified by FIA UGT in the Spanish textile and clothing sector	77



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