Motor Vehicle Manufacturers in Europe:

Ergonomic Findings

Final report

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1. Acknowledgements

We would like to express our deep gratitude to the production line workers, who kindly agreed to be observed by us, to take the time to answer our questions and to participate in focus groups that allowed the collection of data for this study.

This work is dedicated to them.

We are grateful to the management of the companies involved in the study, who granted us access to their factories and who have worked hard to make our project possible. Thus, we are indebted to the following companies: Fiat, PSA, Renault and Volkswagen.

Many colleagues in the organisations affiliated to industriAll Europe, and previously to the European Metalworkers' Federation (EMF), have supported us in the development and implementation of the project.

We hope that we will be able to continue to rely on their support once we have identified a way to put in place the next phase of this project.

Finally, we would especially like to thank the ergonomists of the various trade unions who helped us to conduct the study and its follow-up: Francesco Tuccino, Heiko Spieker, Raymond Buchholzer, Maria Luisa Hervias, Alberto Cipriani, Fabien Gâche, Serge Journoud, Jean-Michel Miller and Martin Kuhlmann.

2. Preface

Musculoskeletal disorders are the dominant pathology in the metalworking industry. There have been many high-level debates on their economic impact, the associated costs incurred by the companies and the impact that they have on work productivity.

All this, of course, says nothing about the suffering of the victims of these occupational illnesses.

Ergonomics, since the introduction of Taylorism, has developed a good understanding of the mechanisms at work when a lesion occurs, and is able to prescribe ways of arranging jobs in order to avoid their occurrence.

But if we listen to our colleagues in the automotive industry, this knowledge can be a double-edged sword. Of course, we can use it to avoid the physical effects of repetitive work. But it can also be used to "improve" the performance of work whilst avoiding reaching the repetition rate that triggers the damage.

At the initiative of our Italian affiliate, the IMF-CGIL, colleagues from seven European countries have witnessed the reality of work on production lines in four major European car manufacturers.

Ergonomists observed and analysed workstations. Interviews with workers, their representatives and company management have provided data on how work is organised.

At some sites, our colleagues have benefitted from this project to conduct field work that extends this research through trade union action. Again, this was an investment opportunity that was planned for and encouraged in the design phase of the project. Overall the feedback received was very encouraging.

This project, the final report of which is in your hands, is based on the observation that the occupational health and work organisation cannot be separated entirely from one another. However, to understand the mechanisms involved in the development of workstations, it is necessary to consider the interaction of trade unions with company management teams, which, together, negotiate these arrangements.

In the following document, we report on the results of this empirical work.

A second phase should follow, with the aim of translating these findings into trade union action through the development of a trade union training program for trade unionists in production facilities. The goal would be to improve their understanding of the issues at stake and to enter into discussions with the company management teams, thereby enabling them to contribute to the improvement of working conditions. Part of this will be an effort to exchange knowledge and best practice amongst some of our affiliate organisations, but another part will also be dedicated to technical training on risk analysis.

This project demonstrates the importance of a participatory approach, integrating workers and company management teams in order to improve working conditions and reduce health risks. Unfortunately, the current crisis draws attention to other aspects of production, and we should redouble our efforts to invest in this most paramount area of our trade union action.

I look forward to seeing the results of this initiative.

Ulrich Eckelmann,
Secretary General of industriAll European Trade Union

Brussels, April 2013

A Voyage "inside" the Automobile World

Ergonomics and the Organisation of Work in the Automotive Sector in Europe

By Francesco Tuccino

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Abbreviations:

APE: Arbeit Plan Ergonomie [Ergonomic Work Plan]
CR: rest coefficient [Rest Coefficient]
FSSE: Simplified Sheet for Safety and Ergonomics Assessment
LP: Lean Production
MTM: Methods-Time Measurement.
METEO: Méthode d'Evaluation du Travail et de l'Organisation [Work and Organisation Assessment Method]
NVAA: Non-Value Added Activities
ODL: organizzazione del lavoro [Organisation of Work]
PTS: Predetermined Time Standards
QDP: qualità dei prodotti [Product Quality]
QDL: qualità della vita di lavoro [Quality of Working Life]
UTE: unità tecnologica elementare [Elementary Technological Unit]
VAA: Value-Added Activities
WCM: World Class Manufacturing

1. Introduction: Assumptions, objectives and methodology of the research study

This research study is intended as a sort of voyage to the assembly lines in 10 car-making plants in Europe.

A voyage to see what lies beyond the cars that we use every day; to discover the living conditions of millions of people who carry out repetitive, incessant movements with their hands and arms eight hours a day to assemble the constituent parts of cars.

The report is based on the statistical premise that musculoskeletal disorders represent more than 50% of all work-related disorders and bear an enormous price tag for the workers and for the social and economic system.

The primary objective of the research study is therefore to identify the fundamental causes of said pathologies and how they are related to the way labour is organised in companies.

The report focuses on the methodologies and procedures used in companies to gauge work performance (work metrics) and to assess the ergonomic risk, trade union action on these issues, and the effects of these organisational models and procedures on workers.

It is an action-research project based on two fundamental assumptions, namely that:

a. There is a great deal of potential for action by shop stewards on the issue of "Ergonomics and the organisation of work;"

b. There is a relevant difference in companies between the skills and resources of "corporate" managers and of shop stewards.

This report is therefore geared chiefly to shop stewards and officials and is intended to provide elements of knowledge to enhance their capacity for action in companies. For this reason, I have endeavoured to reduce technical and scientific aspects to a minimum, and to set out information that is more useful for trade union action in a simple and systematic manner.

I wish nonetheless to specify that the collected data are qualitatively and quantitatively adequate to provide more in-depth knowledge from the technical and scientific perspective on "ergonomics and the organisation of work."

I wish moreover to stress that this is an "action research study" which accordingly constitutes the first phase of a project intended to develop a trade union training course on these issues and, by way of ultimate objective, to coordinate the efforts of shop stewards who, precisely because of their knowledge concerning "ergonomics and the organisation of work," are in a position to act more efficiently in order to improve the quality of working life and to protect the health of workers in the "automotive" sector in Europe.

1.1 Assumptions and questions that the research study is intended to address

The research study is intended to provide elements of knowledge to address a series of key assumptions and questions:

A. There is an emerging trend in companies in the automotive sector to define the organisation of work also by using ergonomic methodologies.

Do companies consider ergonomics as a strategic factor for improving product quality by improving the quality of working life? Or is ergonomics used solely as an "image" factor when, in fact, companies are focusing primarily on boosting productivity and reducing labour costs?

B. Companies in the automotive sector in Europe have in the last decade implemented the organisation of work methodologies of what is known as "lean production." Has this work organisation model increased the level of participation and the quality of working life of the workers? Or are companies endeavouring to boost productivity and product quality through an increase in the pace of work and control, carried out also through IT instruments, on the work performance?

C. What are the effects of this work organisation model on the physical and mental health of the workers?

D. What is the level of knowledge of shop stewards on "ergonomics and the organisation of work?" What is their capacity to take action to prevent musculoskeletal disorders and to improve the quality of working life?

E. What are the costs of the strategies adopted by companies to deal with the crisis of the automotive sector in Europe at the individual and the social level? Is the increase of physical and mental wear and tear of workers in order to boost the competitiveness of companies on the market acceptable?

To answer these and other questions, I have planned an "ergonomic and sociological" type of research study. To the classic tools of sociology (interviews and focus groups with all corporate players) I have in fact added the technical tools of ergonomic analysis: filming workers on the assembly line to assess the ergonomic risks, detailed empirical observation of technical approaches to organising workstations on the assembly lines, technical analysis of the methodologies used by companies to gauge the "methods-time" work performance and to assess the musculoskeletal risks.

To answer the "questions" raised, the report addresses the following thematic areas:

- The methods-time measurement and the organisation of work on the assembly lines
- The procedures used to assess the ergonomic risk
- Trade union training and action on ergonomics and the organisation of work
- The effects of the organisation of work on the health and quality of working life of workers
- Trade union strategy assumptions.

Before broaching the topics in the chapter on work metrics, I think that a description of the methodology used for the research study and a brief presentation of some "quantitative" data (breaks, cycle time, etc.) relating to the individual production sites of the companies would prove useful.

1.2 Methodology and sample of the report

A. As I already mentioned, this is a "technical and scientific" research study on the ergonomics and sociology of work; Ergonomic and sociological methodologies were consequently used to collect data.
The data collection methodologies used at the individual production sites are as follows:
Semi-structured interview (ca. 2 hours with audio recording) on issues broached by the report with the following people:

   - methods-time managers
   - Ergonomists
   - Shop stewards (from all the organisations present at the production site)

B. Empirical observation on the assembly lines and analyses of the documentation provided by the company (on work metrics and the assessment of ergonomic risks)
This phase, which lasts about 4 hours, provides for:

- a tour in the company to analyse all the posts on the assembly line through empirical observation;
- An in-depth analysis, where possible with film footage, of the same work phase (assembly of parts of the internal upholstering of the vehicle's ceiling) at the different production sites.
- An analysis of the company documentation, including an analysis of the manuals on the methodologies used to measure the work performance and to assess the ergonomic risks, plus concrete examples of the methodologies being applied.

C. Focus group
Collective interview with a group of shop stewards and/or workers on issues covered by the report.

Sample group of the report and data relating to the individual production sites.

a. PSA Group (Peugeot- Citroen)

- Poissy and Mulhouse sites (France): All the required data were collected (points a-b-c of the methodology).
- Trnava site (Slovakia): All the required data were collected (points a-b-c of the methodology).

b. Renault Group

- Douai Site (France): All the required data were collected (points a-b-c of the methodology).
- Dacia di Pitesti site (Romania): All the required data were collected (points a-b-c of the methodology, with the exception of the film footage).

c. Fiat Group

- Cassino and Omigliano sites (Italy) and Tychy site (Poland): Only the data required in points a-c of the methodology were collected (only interviews with the shop stewards and focus group with workers).

d. Volkswagen Group

- Site in Germany: Hannover
Only the data required in points a-b of the methodology were collected (No film footage and focus group with workers).
- Seat site in Barcelona (Spain): Only the data required in points a-c of the methodology were collected (interviews with the shop stewards, but with one trade union only, and focus group with workers).

1.3 Quantitative data (breaks, number of vehicles produced, etc.)

The research methodology provides for a detailed data sheet for the collection of a series of quantitative data (working hours, shifts, breaks etc.) which companies would have to complete. Because it was not possible to collect all the required data in a uniform manner, I will summarise, first with a table and then with brief comments, only the data mainly connected to the topics of the research study.

Table N°1: Some quantitative data of the companies

	Breaks in min.	**Net working time/shift in min.**	**Cycle time in sec.**	**Production: Number of vehicles per hour**
A.1 PSA site in Poyssi (France)	21 (13+8)	420	69	52 (vehicle: Peugeot 208)
A.2 PSA site in Mulhouse (France)	31 (10+ canteen 21)	409	80	45 (vehicle: Peugeot 208)
A.3 Trnava site (Slovakia)	30 non remunerated (10+ 20 canteen)	450	63	57 (vehicle: Peugeot 208)
B.1 Renault Site in Douai (France)	30 (3 of 5+15 canteen)	420	60	60 (Scénic, Grand Scénic et Mégane Cabriolet)
B.2 Renault Site in Dacia di Pitesti (Romania)	40 (10+10+20 canteen)	440	55	65 (vehicle: Logan Sandero)
C.1 Fiat site in Cassino (Italy)	60 (3 of 10 +30 canteen)	420	60	60 (vehicle: Giulietta, Bravo, Delta)
C.2 Fiat Site in Pomigliano (Italy)	60 (3 of 10 +30 canteen)	420	69	52 (vehicle: Panda)
C.3 Fiat Site in Tychy (Poland)	55 min (10+15+30 canteen)	425	75	48 (vehicle: Cinquecento, Ford Ka)
D.1 Volkswagen Site in Hannover (Germany)	71min [20+21 (not remunerated) + 30canteen]	409	5.3min (pickup Amarock) 84sec (multivan T5)	11 (Amarock pickup) 43 (T5 multivan)
D.2 Volkswagen Seat site in Barcelona (Spain)	40 min (10+10+20 canteen)	440	88	41 (vehicle:Ibiza)

Brief comments on the quantitative data in the table.

A. Breaks and net working time in the shift:

There is a slight difference between the number and length of the breaks between the sites of different companies (for example the breaks in Volkswagen and Fiat are longer than in PSA and Renault), than between sites of the same company in different countries (for example between Volkswagen Germany and Seat in Spain).

Apart from the length of the breaks, however, one important element concerns the net working time in a shift. The net working time is almost homogeneous (420 minutes) between the production sites in Western countries, whilst it is longer, by 20-30 more minutes, in sites in Eastern countries, even for the same company.

B. Cycle time (pace) and hourly production:

The cycle time will hover around a minute in nearly all companies, between 55 seconds for Dacia and 88 seconds for Seat: the cycle time for Volkswagen Amarock is an exception, but it should be pointed out, as we shall see in greater detail in Chapter 2, that this is a new, more upmarket vehicle, whose assembly lines are still in an optimisation phase.

Considered separately, the cycle time parameter is not necessarily an indicator of the work pace; the key point, in fact, is the quantity of operations, or workload, that a worker was to perform in a cycle time. But the workload allocated to the individual posts is in turn derived from the number of posts present on the entire assembly line and the type of vehicle; at the Renault site in France, for example, the cycle time is longer than that at the Dacia site in Romania, but the number of operators on the lines in Romania is higher than that at the French site.

Unfortunately, it was not possible to determine with precision the number of operators on the assembly line at the production site; the connection between the workload and the potential risks for musculoskeletal disorders in the upper limbs will therefore be analysed on the basis of other parameters (rest coefficient and performance saturation level) in Chapters 2 and 3.

To summarise, therefore, of the data presented, two types are the most interesting with regard to the risks of musculoskeletal disorders: the number and length of breaks and the net working time in a shift.

A comparison between the situation of the production sites in Eastern and Western Europe regarding these two data shows that the sites in the East, with slightly shorter breaks, have a significantly longer net working time in a shift of 20 to 30 minutes.

2. Work performance measurement (work metrics)

To facilitate the reader's comprehension, Chapters 2 and 3 will be structured as follows: a summary description of the reference methodologies (international standards, etc.) will be followed by an analysis of the methodologies and the procedures used in the companies that constitute the sample of the research study.

2.1 Reference methodologies for work metrics

The term work performance measurement or "work metrics" refers to the way in which companies define:

- the quantity of operations that a worker has to carry out in a work phase,
- the procedures he has to use to perform them,
- the time in which he has to perform them (known as the cycle time).

The model used to define the amount of work to be performed in a "cycle time," which is similar in all companies, is based on the following phases:

A. "Product engineering" phase: to define the characteristics and reduce the time needed for assembly to a minimum;

B. Definition of the product assembly procedures: in this phase, the manager of a group of workers (elementary technological unit) transposes the information from the previous phase in a sequence of elementary operations needed for the assembly of the product (in what is known as the "work analysis sheet"); The head of the elementary technological unit usually carries out an initial calculation of the times with a chronometer;

C. Definition of the workload and times: the "methods-time" engineers use the tables of "predetermined time" systems and any measurements with a chronometer, to calculate the time needed to perform the individual operations on the "work analysis sheet" and thus the final time of a cycle.

In this chapter we shall deal only with Phase C

Workloads and times are defined by "methods-time" engineers mainly on the basis of two criteria (jointly or alternately): the measurement may be carried out using a chronometer (chronometric system) or using the "predetermined time systems" (PTS).

To summarise, the entire assembly line of the parts of a vehicle is subdivided into "assembly posts – phases;" the quantity of operations (workload) and the time in which they are to be carried out ("cycle time") are then defined for each of the phases.

In the "chronometric" system, the analyst defines the two parameters "workload" and "cycle time" on the basis of the observation of an adequate number ("sample") with an average level of ability for and knowledge of the work; the two parameters are calculated using a chronometer.

In the predetermined time systems (PTS), on the other hand, the two parameters "workload" and "cycle time" are calculated by comparing the quantity and characteristics of the operations required for the individual work phases (e.g. grab a screw, put it in a hole, screw it, etc.) and the times already "predefined' in the tables of predetermined time systems.

The methods-time measurement (MTM) system

The most widely used PTS on an international level is the MTM, a system where the time tables are based on research carried out mainly in the US in the years 1940-50. According to these research studies, the work times, defined with the MTM table, should enable a "*worker with average ability to work an 8-hour shift without getting tired!"*

The MTM tables describe the majority of movements carried out by a worker during a work phase (e.g. to grab an object, move it, place it, screw it, etc.); a standard execution time is then assigned to each movement on the basis of a series of parameters (weight, distance from the body, level of difficulty in the operations to "grab and place" the object, etc.).

To summarise, a "methods-time" engineer who uses MTM carries out the following operations: breaks a work phase down in its elementary operations, identifies the execution time corresponding to each operation in the MTM table on the basis of the required parameters (weight, distance, etc.), sums up the times of the individual operations and obtains the time needed to carry out the entire work phase.

For example, to define the time required to assemble the light on a vehicle ceiling, the phase is broken down into its elementary operations (I grab a part of the light, place it on the vehicle ceiling, take the screwdriver, screw it, etc.), the required time indicated in the TMT table for each of them is then identified, and the times of the individual operations are added up to obtain the final time of the phase.

Irrespective of the system used (chronometric or predetermined time), the quantity of work to be carried out in a given period of time (cycle time) is defined in three phases:

a. Definition of the "basic time" (usually identified using the MTM tables);
b. Definition of the "basic time increase factor" (or rest coefficient);
c. Definition of the final time of the work phase (or cycle time): the sum of the basic time and the rest coefficient time.

The rest coefficient in a work phase is in turn determined on the basis of 3 factors, i.e. the:

- physiological factor (physiological needs, coffee break, etc);
- ergonomic factor: based on fatigue and physical discomfort of the worker (risk postures, exertion, etc.).
- technico-organisational factor: stoppages of the line, delays, production mix, etc.

The amount of time allocated (TA) defines also the "saturation" level or intensity of the work performance. The higher the "rest coefficient," the lower the amount of assigned work, and consequently, the lower the saturation level of the performance.

If, for example, 54 operations of 1 second are assigned in a work phase with a cycle time of 60 seconds, a saturation level of 90% is obtained for the cycle time, and a "rest coefficient" of 10% (6 seconds). Clearly, if the saturation level is high, to manage to carry out the required operations in the cycle time, the worker will have to increase the speed of execution, the pace of work.

The final phase, after having established the cycle time or "pace" of the line, is that of "balancing," from the distribution of "workloads" to the individual points on the assembly line. As we shall see, this phase entails mainly the assignment of the "rest coefficient" to the individual posts.

After this summary description of the standard criteria and basic concepts of what is known as the "work metrics," we can analyse the work measurement procedures used by companies in the European automotive sector.

2.2 Work measurement in companies of the European automotive sector

The procedures used to measure the work performance are similar in all the companies of the sample.

The model defined in the previous paragraph (basic time + rest coefficient = final cycle time) is used in all companies, and the basic time is calculated using the tables of the MTM system (mainly MTM2-3 and MTM-UAS) associated with the chronometric system. The latter is used in particular in new production and for the empirical verification of times in certain specific work phases.

Beyond the model, which is used by all the large manufacturing companies, there are two very relevant aspects that characterise the companies in the European automotive sector specifically:

a. The definition of the "rest coefficient" through the association of the MTM system with ergonomic analysis methodologies
b. The use of methodologies derived from the Lean Production model to optimise the work performance by eliminating what are known as "non-value added activities" (NVAA).

I would like to examine these two aspects in greater depth, because they play a relevant role in the definition of the material conditions for the quality of life at work for millions of workers.

2.2.1 Association of work metrics systems with ergonomic analysis methodologies

Work metrics methodologies have always considered the "fatigue" factor to define the workload to be assigned in a given time (cycle time). In the presence of greater "fatigue," seen as musculoskeletal discomfort and energy expenditure for the worker, a smaller quantity of operations to be carried out was assigned.

These were "summary criteria," however, such as the tables which considered in very simplified terms, risk postures (e.g. raised arms, pushing of the breast, etc.) or exertion on the part of the worker.

In the last decade, on the other hand, companies in the automotive sector have started to use methodologies borrowed from ergonomic research to measure the biomechanical load of the work phase (risk postures for arms and the spinal column, exertion, etc.) in a relatively more precise manner.

In this way, the "rest coefficient" assigned in a given work phase becomes directly proportional to the level of ergonomic risk obtained. If the risk is low (green band), the rest coefficient becomes low as well. If the risk is medium (yellow band) or high (red band), the rest coefficient increases gradually.

This change would in theory represent progress from the methodological point of view as well as from the cultural approach on the part of the companies. There is a shift, in fact, from a procedure for measuring the work performance based almost exclusively on "work metrics" criteria, to a procedure that considers also the effects on the health of the workers, and in particular on the musculoskeletal system (the biomechanical load). We shall see, however, that this is not the case in reality.

Let us now examine summarily the characteristics of the ergonomic methodologies used to define the "rest coefficient" in the companies of the research study's sample.

In this chapter, I shall provide only a summary description of the ergonomic methodologies. A more in-depth analysis will be carried out in Chapter 3.

A. PSA (Peugeot - Citroen)

The basic time is defined with the MTM2 system, which is associated with the chronometric analysis in specific cases. The "rest coefficient" is calculated with the "Equinox" software system on the basis of two factors:

- The assessment of the ergonomic risks carried out with the METEO (Work and Organisation Assessment Method);
- The "production mix:" the more or less complex characteristics of the different types of vehicles to be assembled on the line.

As regards the ergonomic risk, the "Equinox" system, used to calculate the "rest coefficient," considers only the parts of the Work and Organisation Assessment method relating to the "posture" and "exertion" of the whole body as risk factors; therefore, the values obtained from the Work and Organisation Assessment methods which analyse the risks for the upper limbs are not taken into account.

To summarise therefore, for each of the elementary operations carried out by the worker, the basic time is calculated with MTM and the "rest coefficient" with Equinox; the sum of these two times therefore provides the final time for a single operation (example "grab a screw and put it on the part").

The next step is the sum of the times obtained for the single operations; the final (cycle) time of a phase or work post of the vehicle assembly line is thus obtained (e.g. the assembly of the ceiling light).

B. Renault

The basic time is defined with the MTM3 system and/or with a specific Renault system, "MODAPTS" which carries out a more detailed analysis of the elementary actions of a work phase. For example, the operation to "take and place" an object (MTM2-3), is broken down into the elementary movements with " MODAPTS" (extend the arm, grab, move the object, etc).

The "rest coefficient" is still calculated on the basis of the two factors: ergonomic risk level and production mix.

A very simplified checklist known as "FSSE" (simplified sheet for safety and ergonomics assessment) is used for the ergonomic analysis. In the ergonomics section, it considers the physical (musculoskeletal) as well as cognitive aspects (relation between the characteristics of the task and the resources – skills of the worker).

The "FSSE" checklist, like the one used at PSA to calculate the "rest coefficient," assesses only the "posture" and "exertion of the whole body" as risk factors; the risks for the upper limbs are not considered therefore.

C. Fiat

The basic time is defined with the MTM-UAS, the "rest coefficient" is calculated mainly on the basis of the ergonomic risk assessment carried out with the "EAWS" checklist; only a small standard percentage of the "rest coefficient" (1% of the cycle time) is assigned on the basis of technical and organisational factors (stoppage of the line, delays, production mix, etc.).

Unlike the checklists used at Renault and PSA, the "EAWS" checklist considers also the factors of the upper limbs but, as we shall see in greater detail in Chapter 3, the "EAWS" is based on two calculation parameters that lead to an underestimation of the risks with regard to the methodologies required by the international reference standards.

In the event of "EAWS" values in the green band (low risk), the "rest coefficient" is reduced to 1% of the cycle time; this therefore causes a saturation-intensification of the work performance in 99% of the cycle time.

Prior to the introduction of the ERGO-UAS system (of which the "EAWS" is the ergonomic part) in Fiat, a "rest coefficient" minimum threshold was calculated on the basis of the cycle time; the rest coefficient threshold increased for brief cycles.

A rest coefficient minimum threshold of 8% of the cycle time was required for 1-minute cycles, for instance. This value was reduced from 8% to 1% of the cycle time, in the case of a risk in the EAWS green band when the ERGO-UAS system was introduced.

D. Volkswagen

The basic time was defined with the MTM-UAS system. Unlike Fiat, the "rest coefficient" is not calculated on the basis of the risk indices obtained with the EAWS checklist (the ergonomic part of the ERGO-UAS).

The ergonomic analysis method is not used directly to calculate the "rest coefficient" at Volkswagen, but rather to "balance" the workload to be assigned to the different work phases of the assembly line based on their risk level.

The amount of workload is assigned on the basis of the risk indices obtained with a simplified checklist known as APE (Arbeit Plan Ergonomie), derived from the EAWS method. If the risk index in a work phase is high, a lower workload is assigned; if the risk index is low, a greater workload is assigned.

To summarise, it can be said that the use of ergonomic methodologies to define the workload in a cycle time represents progress for companies only from the methodological and cultural point of view, but not in terms of the effects on working conditions. In reality, the use of methodologies that do not assess, or underestimate, the risks of the upper limbs causes an increase in the saturation of the work performance compared to the rest coefficient calculation methods used previously.

The most obvious case from the methodological and quantitative perspective is that of Fiat, but the situation is similar in the other companies as well.

As already touched on, the introduction of the ERGO-UAS system at Fiat (in 2008) led to the cancellation of trade union agreements that provided a rest coefficient minimum threshold (ca. 68% of the cycle time) beyond the ergonomic risk level, for a speciously technical reason.

As of 2008, therefore, if the risk index of a work phase is low (green band) at Fiat, the rest coefficient is reduced from 8% to 1% of the time cycle; in this way, the level of saturation of the work performances goes from 92% to 99% of the cycle time.

Based on the described data, it can therefore be stated that the ways that ergonomic methodologies are used by the companies to calculate the rest coefficient cause mainly a boost in productivity instead of an increase in the protection of the workers' health. This observation is further supported by the fact that the methodologies used by the companies are not compliant with the parameters required by the international standards for the assessment of musculoskeletal risks.

The potential actions by the shop stewards on these issues are easy to grasp already from these initial analyses. Stewards capable of checking the accuracy of the risk assessments carried out by the companies can obtain quite relevant results for the correct calculation of the rest coefficient of the cycle time. Trade union action of this type would have relevant effects for health protection as well as for the improvement of the quality of working life.

In this paragraph, we analysed the procedures for calculating the rest coefficient of a cycle time. In the next paragraph, we will analyse the procedures that are used in all the companies to "optimise" the work performance pursuant to Lean Production.

2.2.2 Use of Lean Production to "optimise" work performance

Work organisation procedures based on what is known as lean production (or lean manufacturing) inspired by the production philosophy of the Toyota Production System were introduced in all the companies of the sample during the past decade. Beyond the name of the specific model implemented, e.g. World Class Manufacturing (WCM) at Fiat, the work organisation procedures are similar in all the companies. They are organisational procedures that have relevant effects on the productivity of the companies as well as on the quality of working life.

In this paragraph, I shall present only a summary of the key points of the theoretical model of Lean Production. Readers can refer to the extensive literature on the subject for a more in-depth treatment as well as a more detailed analysis of the characteristics and effects of lean production in companies of the automotive sector.

The Lean Production organisational model has two objectives: "zero waste" and "zero defects." These objectives are to be attained through a process geared to the continuous improvement of the company's performance in time.

The "zero waste" objective should be attained through the gradual elimination of the company's organisational inefficiencies in general (for instance, waste of raw materials, unused stocks, overproduction waste, useless transport, etc.), as well as work performance in particular, through the elimination of what are known as "non-added value activities" (NVAA).

The "zero defects" objective, on the other hand, should be attained through quality control carried out on the output of the workstation.

Attaining both of these objectives would require a high level of involvement and "intrinsic motivation" on the part of the workers. Lean Production considers the contribution of workers to be of fundamental importance in order the identify operating procedures so as to eliminate "waste" (NVVAs), and to reduce product quality controls at the end of the assembly line gradually ("zero defects").

But the "intrinsic" or spontaneous "motivation" of workers regarding the company's objectives is strictly related to the level of satisfaction of the needs and desires concerning the different dimensions of the quality of working life: salary and physical and environmental conditions (including occupational health and safety), decision-making autonomy, career advancement, social relations and hierarchical level in the company.

Let us now see the characteristics of the lean production model introduced in the companies of the research sample.

The organisational arrangements of lean production are similar in all the companies and are structured as follows:

A. Work groups: Subdivision of workers on the line into groups (elementary technological unit) of ca. 8-30 members, with an (elementary technological unit) head and a "supportive" team leader for every group of 6-10 workers.

B. "Assistance" call system on the posts ("Andon"). In case of problems, the worker can activate a " call system" (switch or cord) which in turn produces a sound-light signal with indication of the number of the post concerned on a board. Such a "call" should be followed by the support intervention of the team leader. The "calls" are recorded in a database.

C. Modules and periodic meetings of the teams to stimulate and garner suggestions from workers on how to improve productivity and quality ("zero waste" and "zero defects").

D. "Bonus and penalty" system for workers: Bonuses (usually monetary) are provided for suggestions on productivity, as well as penalties for workers whose performance falls below the standards defined by the company.

E. Assembly line structure: The fundamental changes are the precise delimitation and reduction of the area relating to the individual posts, the arrangement of the materials to be assembled near the work posts.

F. Work performance optimisation: This is the key point of lean production and provides for the use of a system for eliminating what are known as non-value added activities (NVAA) and replacing them with value-added activities (VAA).

After this summary description of the lean production organisational procedures, let us take a look at the applied procedures and the effects on the working conditions.

2.2.3 Work metrics and lean production: effects on work performance

The analysis of the data collected with the different methodologies of the research study (interviews, empirical observation, film footage, etc.) clearly shows that the organisational procedures introduced by the company lead to a reduction of the rest coefficient and a sizeable increase in the work performance, particularly for the upper limbs.

The main causes of this phenomenon are as follows:

A. Elimination of NVAA (non-value added activities) and their replacement by VAA (value-added activities)

B. Association of work metrics (MTM) with ergonomic assessment methodology that underestimates the risk for the upper limbs;

C. The production "mix" problem: the amount of work assigned by "methods-time" engineers does not correspond to the actual operations carried out for more complex vehicles.

These three aspects deserve an in-depth analysis because of their effects on the working conditions, and consequently, in order to provide trade unions with the knowledge tools they need to enhance their action on the organisation of work.

A. Elimination of NVAA (non-value added activities) and their replacement by VAA (value-added activities)

Of all the methodologies and instruments used by the Lean Production (but also the WCM) model, the companies are focusing on those designed to obtain "*a systematic assault on every type of loss and waste."* Cost deployment, which uses the NVAA (non-value added activity) as the main application, is widely used, for example in WCM, among these methodologies.

To identify the NVAAs, a software is normally used to:

- Display and classify the activities carried out by a worker;
- Subdivide them into "added-value" and "non-added value" activities;
- Measure the quantity of "non-added value" activities
- Quantify the possible improvement margins.

The term NVAA is used to define activities-operations which, even though they are eliminated, do not compromise the specific output of work phase-post.

If the output of a post, for example, is the assembly of the "sun visors" of a vehicle, the elimination of the movements for picking up the necessary parts and tools does not compromise the completion of the finished product (the assembly of the "sun visors").

The time used by the worker for such movements, therefore, is a time that bears a cost for the company, i.e. the worker's salary, but does not produce (add) value or "added value" with regard to the capital invested for the remuneration of the worker; the "movements" are therefore non-added value activities.

The types of "non-value added" operations can be considered to include: *unnecessary movements, delays, re-processing operations, tallies, inspections and tests.*

Specific activities considered as having no added value include: "*waiting, turning, attempts to screw-assemble-insert-position, transfer, placing tools, putting in place, searching, counting, replacing, laying out, measuring, selecting, releasing; activities entailing musculoskeletal risk (carrying, overturning, lifting, pulling, lowering, pressing, etc.),*

Eliminating NVAAs and replacing them with VAAs can have different effects on workers depending on the type of NVAAs eliminated:

- The elimination of *carrying, overturning, lifting, pulling, lowering, pressing, and suchlike* activities, for example, may reduce the biomechanical load on the spinal column but their replacement with VAAs, to be carried out manually ("*screwing screws, etc.)*, increases the biomechanical load on the upper limbs;
- the elimination of *"walking"* movements reduces the biomechanical load on the lower limbs; but their replacement with VAAs, to be carried out manually, increases the risks on the upper limbs and on the spinal column (owing to the "static fatigue" caused by the erect posture without movement).
- The elimination of the "*waiting, searching, counting, measuring and suchlike activities,"* and their replacement with VAAs to be carried out manually, represents a "pure" increase in the saturation of work performed by the upper limbs -- inasmuch as part of the cycle time during which the worker could "rest" his arms is considered as a "waste" for the company and is therefore "filled up" with added operations.

To summarise, therefore, the effects of this "rationalisation" of one task, with the elimination of NVAAs, entail a probable reduction of the biomechanical load on the spinal column and the lower limbs, but also an increase on the biomechanical load of the upper limbs. This phenomenon, which we shall examine in depth in Chapter 5, is confirmed by the significant increase of musculoskeletal disorders in the joints of the arms (wrist, elbow, shoulder and hands).

As we shall see in Chapter 5, an overload on the mental level is added to the effects on the physical level. The near total "filling," the saturation of the cycle time with "added value" operations, actually leads to an increase of information that the worker has to memorise to perform his work phase.

The relevance of the quantitative dimension of this "rationalisation" of the operations of a task is attested by the statistical data provided by the methods-time engineers of the company: in eliminating the NVAAs, companies have on average recovered ca. 30% of the cycle time, whilst facilities engineers expect that 50-60% of the cycle time will be "optimised."

The effects on all the posts of an assembly line are consequently added to those on the individual work posts.

The recovery of 30% of the cycle time on post No. 1 of the line through the elimination of the NVAAs, for example, enables facilities engineers to move certain operations from Post no. 2 to Post no. 1, from Post no. 3 to no. 2, etc. The extension of this mechanism over the entire assembly line enables companies to reduce the overall number of posts, and therefore of workers needed for the production of a given quantity of vehicles.

According to the data provided in the interviews by shop stewards and workers as well as facilities engineers, a reduction of NVAAs relating to 30% of the cycle time corresponds to the elimination of 15% to 20% of the posts on an assembly line.

The NVAA reduction systems therefore constitute a formidable instrument for boosting productivity and flexibility with regard to the market requirements. Companies can in fact adopt two strategies to adjust to demand and to reduce labour costs:

A. If market demand for vehicles is low:

The elimination of the NVAAs reduces the number of posts on the assembly line and thus the number of workers needed for production. In a production site of one of the companies in the sample, for example, ca. 400 posts were eliminated on an assembly line over three years.

B. If market demand for vehicles is growing:

The elimination of the NVAAs enables the company to reduce the cycle time and consequently to boost the hourly production of vehicles without increasing the number of workers on the line; in a production site of one of the companies in the same, for example, the time cycle was reduced from 90 to 55 sec over the period 2007-2011, and hourly production was increased from 40 to 65 vehicles.

The effects for the workers in both case A and case B are: intensified work performance, more physical and mental wear and tear, and a higher probability of being made redundant.

Let us now take a look at the characteristics of the second factor that increases the saturation of the work performance.

B. Association of work metrics (MTM) with ergonomic risk assessment methodologies

The risk assessment methodologies to determine the rest coefficient in a cycle time (with the characteristics I have described in paragraph 2.2.1) constitute an element that companies can use, together with NVAA reduction systems, so that they can subsequently boost productivity and reduce labour costs.

We have seen how Fiat, with the Ergo-UAS system, if the risk index calculated with the EAWS checklist is in the green band, recovers ca. 5-7% of the cycle time.

An analysis of the ergonomic methodologies used by companies to calculate the rest coefficient of the cycle time reveals two basic characteristics:

- The use of methodologies that do not assess the risks for the upper limbs, and in particular the risk factor of “frequency of actions per minute”
- The use of methodologies that do analyse the upper limbs as well, but underestimate the level of risk for them.

Taking into account that the rest coefficient to be assigned in a cycle time is connected to the ergonomic risk level, the reason why companies use methodologies that do not assess or underestimate the risks for the upper limbs becomes obvious.

The elimination of NVAAs and their replacement with added value activities actually leads to an increase in the biomechanical load on the upper limbs (increase in the number of operations to be carried out with the arms). If companies were to carry out a precise assessment of the risks for the joints of the arms, therefore, they would nearly always find high risk indices.

In such a case, in order to comply with the legal requirements for the protection of the workers’ health, companies would have to reduce the “frequency of actions per minute” risk factor above all. As we shall see in Chapter 3 however, this result can be obtained by increasing the cycle time or reducing the number of operations carried out during the cycle.

A correct assessment of the risks for the upper limbs is in conflict with the systems used by companies to improve productivity.

Having analysed the first two factors, namely the elimination of NVAAs and the use of ergonomic methodologies that underestimate the risks, let us now take a look at how the saturation of work performance is impacted by the third factor, i.e. the production mix on the assembly lines.

C. The problem of production Mix

Two to three different models of vehicles are assembled on the same assembly line in nearly all the companies. Furthermore, different versions of each model have been produced in recent years to satisfy the variability of demand.

The production mix makes it extremely complex to programme the type and quantity of models, as well as the versions of the same model, to be produced on the same assembly line during a shift.

Such variability of the production mix can have considerable effects on the consistency between the theoretical product load, assigned by methods-time engineers, and that actually performed by workers on the individual work posts.

If the number of operations provided in the "work analysis sheet" drawn up by the facilities engineers does not correspond to the actual number of operations carried out, the worker will have to speed up his movements if he is to carry out his work phase within the time cycle. If, for example, the "work analysis sheet" drawn up by the facilities engineers provides for 60 operations of 1 second each for a 60-second cycle, the worker will have to work at the rate of 1 second per operation. If there are actually 70 operations to be carried out however, instead of the 60 foreseen, the performance speed becomes 0.85 second per operation.

In theory, there are procedures for determining the workload by taking the variability of the production mix into account. The facilities engineers, for instance, may assign a flat-rate rest coefficient (e.g. 5-10% of the cycle time); or they can plan certain work posts on the line with a longer cycle time. The interviews conducted in the companies, however, including with the methods-time officials, show that these procedures for reconciling the theoretical with the actual operations to be carried out in a cycle time are difficult to implement.

A solution for reducing the effects of these difficulties in programming the production mix that the trade union could propose is to assign a sufficiently high flat-rate rest coefficient (e.g. 10% of the cycle time).

This solution is in conflict with the pronounced trend of companies boosting productivity and reducing the rest coefficient percentage, however. In Fiat, for example, to solve technical/organisation and production mix problems, the Ergo-UAS system assigns a standard rest coefficient of only 1% of the cycle time.

"Assistance calls" by workers using the Andon system under lean production can be considered as empirical proof in support of the increased saturation of work caused by combining the three aforementioned factors (elimination of the NVAAs, underestimation of the ergonomic risk, and production mix). A high number of "calls" clearly indicates that workers are faced with an excessive workload and may therefore not be able to carry out all the planned operations in the time cycle on their own.

The report shows that a group of 6-10 workers resorts to 40 to 200 "assistance calls" during a shift. The high number of "calls" proves that the worker might not finish the operations planned for the cycle time for his work post.

By way of further confirmation of this empirical proof, interviews with workers and shop stewards show that the majority of these "calls" are due to the difficulties that the worker experiences in performing all the operations of a work phase within the required cycle time.

The high number of "calls" moreover creates serious difficulties for the team leaders who, according to the Lean Production model would have to intervene to support a worker in difficulty.

Very often, in fact, since they are not likely to intervene in all the "calls," team leaders tend to ask the workers of their own technological unit (PIU), not to use the Andon system and to make "voice calls." This behaviour on the part of the team leaders can be considered as a strategy to avoid having too many calls from their own PIUbeing recorded in the IT system, which would mean that the performances of said unit could be considered to fall below the standards set by the company.

The lean production model is applied in similar fashion in all the production sites examined in this research study with the exception of the Volkswagen site in Hannover. Andon "calls" are nearly non-existent on the Volkswagen assembly lines (ca. 1-2 per elementary technological unit in an 8-hour shift) and quality control operatives at the end of the assembly line are also far fewer.

These data may be due to two factors:

- The workers are less "saturated" and therefore in a position to carry out the operations planned in the cycle time more calmly; so they do not need to ask for support from the team leaders.
- Precisely because they are not as much stressed because of excessive workloads, the workers are in a better position to do superior quality work, and therefore the quality controls to be carried out on the vehicle at the end of the line are reduced.

It is worth pointing out however that the assembly line of a more upmarket vehicle (compared with the products in other companies under study) was analysed at this Volkswagen site. The production of a more expensive – and therefore higher quality – vehicle can have effects only on the strategies adopted by the companies concerning the quality of working life.

In these cases, in fact, the companies may be more attentive to the "cause-and-effect" nexus between the quality of output on the individual work posts and the final product; this situation therefore makes the companies more aware of the fact that the motivation of workers for a "quality performance" depends on the quality of their working life.

In any event, beyond the differences as to types of vehicle produced, the Volkswagen's lean production model may represent a stimulus for the managers as well as the trade unions of other companies in the automotive sector.

It is worth pointing out, however, that this is an organisational model that Volkswagen itself applies only in production sites on German territory. At Volkswagen's Seat site in Spain, in fact, the working conditions are similar to those in the other companies under study.

In this chapter, we analysed the procedures companies use to measure the performance of workers and to define the amount of work to be carried out within a cycle time. The combination of three factors (elimination of the NVAAs, use of ergonomic methodologies to calculate the rest coefficient and the production mix) causes a significant increase in work saturation.

Such information shows the potential for trade union action in checking aspects of work metrics to improve the quality of life of workers. In Chapter three we shall analyse the procedures companies use to assess the effects of the organisation of work on the health of workers.

3. Ergonomics: Assessment of musculoskeletal risks for the upper limbs

The musculoskeletal disorders of the upper limbs are defined as alterations of the musculotendinous units, the peripheral nerves and the vascular system. These disorders constitute a widespread phenomenon, particularly on mechanised traction assembly lines, for workers who carry our cyclical and repetitive tasks with their upper limbs.

The main factors that can cause such disorders are as follows:

a. The frequency of actions per minute (the speed of movements with the arms),
b. The intensity of exertion with the hands,
c. The assumption of "risk" postures with joints of the arms (wrist, elbow, shoulder and hands),
d. The lack of recovery time or rest of the limbs (breaks),
e. The duration of repetitive tasks during a work shift.

Each of these factors contributes to a greater or lesser extent to these disorders among workers who carry out repetitive tasks.

In this chapter, a summary description of the international standards for assessing these risks and the preventive measures taken.

This will be followed by an analysis of the procedures applied in companies in the automotive sector.

3.1 Musculoskeletal risk assessment procedures in international standards

The technical and scientific reference criteria for a correct risk assessment of the upper limbs and the adoption of appropriate preventive measures are those defined in the ISO 11228/3 standard (March 2007).

This standard provides for a risk assessment in two phases:

A. Analysis with a first level method

This analysis provides an initial risk estimate and is carried out using simplified checklists. The standard recommends the ISO checklist or, otherwise, a series of checklists, including the OCRA checklist.

The risk assessment carried out with a checklist should end with a "semaphore" classification table: green band (low or no risk); yellow band (medium risk); red band (high risk).

If a value in the green band is obtained with the checklist, the risk assessment procedure is concluded. On the other hand, if values in the yellow or red band are obtained, the Standard provides for an in-depth analysis with a second level method.

B. Analysis with a second level method

This analysis is conducted to examine the risk level of the individual factors (frequency of actions/minute, exertion, etc.) in greater depth, in order to identify appropriate risk reducing measures.

If a value in the green band is obtained with the 2nd level analysis, the risk assessment procedure is concluded. On the other hand, if values in the yellow or red band are obtained, the Standard requires that

measures be taken to reduce the risk level. The procedure for such preventive measures must be continued until values are obtained in the green band when the risk assessment is repeated. The methodology recommended by the Standard for the 2nd level risk assessment is the "Ocra index."

Applied in 2 phases, this procedure makes it possible to conduct a correct assessment of the risks only in a work phase, but not an assessment of the level of risk to which the individual workers are exposed. The probability of a worker suffering health impairment depends in fact on the level of risk in each of the phases that he carries out in a shift. A correct assessment of his level of exposure therefore requires the reconstruction of an average shift that takes account of the variability of production in the company.

If, for example, a worker carries out 4 different phases (A-B-C-D) in an 8-hour shift, his level of exposure to risk is calculated by assessing the level of risk in each of these phases, and then calculating the level of risk for the individual worker on the basis of the intensity of the risk and the duration of each of the 4 phases in the shift.

The concept of "work phase" needs to be properly defined for a proper understanding of this fundamental aspect for the assessment of risks to which workers are exposed.

A "work phase" in an assembly line, for example, refers to all the actions/operations that the worker has to carry out in a pre-defined period of time (the cycle or pace of the line) in order to obtain a certain output (e.g. the assembly of the steering wheel or the ceiling light of the vehicle).

It is worth pointing out, however, that the risk level depends on the quantity and specific type of movements carried out by the worker with his arms. To assemble the same part, for instance the ceiling light, in two different models of vehicles or different versions of the same model, the worker may have to carry out different movements and therefore the risk assessment has to be carried out for each of these work phases.

Given the different models of vehicles produced, it is easy to grasp how low the probability is that the assessment of the musculoskeletal risks in a company is a faithful reflection of the work phases carried out by a worker in a shift.

3.1.1 Risk prevention measures in ISO 11228/3

In addition to the risk assessment procedures, the ISO 11228/3 standard defines also the measures to be taken to prevent musculoskeletal disorders. The measures are subdivided into two types: structural (changes to the structure of the work post) and organisational (breaks, rotation of tasks, etc).

To reduce the risk index of a work phase it is necessary to reduce the values of its constituent risk factors: frequency of actions/minute; exertion; risk postures; lack of time to recover (breaks), duration of repetitive tasks in the shift. Let us look at some procedures for reducing these values:

A. Risk factor relating to "exertion and risk postures:"

Action can be taken to change the structure of the work post. For example, the assembly line can be changed so that the vehicle is turned in the positions where the parts are assembled under the "body" of the vehicle; thereby sparing the worker from having to assume the risk posture of "arms raised to the level of the shoulder."

B.Factor relating to "lack of time to recover:"

Breaks can be introduced to allow the musculotendinous structures of the arms to recover their natural physiological state.

The ISO standards considers a ratio of 5 to 1 between working time and recovery time to be optimal: to be

considered to comprise “adequate recovery time” one working hour should consist of 50 minutes of work and a 10-minute break.

C.Factor relating to “duration of repetitive task in a shift:”

Organisational measures can be taken so that a worker can “rotate” (change) from repetitive tasks to non-repetitive tasks.

It is important to point out that “ergo-rotation,” as it is known, has little effect on the value of the risk index, if the worker “rotates” between two repetitive positions on the assembly line.

D.Factor relating to frequency of actions/minute.

Two intervention procedures are provided for dealing with this factor:

D.1. Increasing the cycle time without changing the number of actions in the cycle.

If, for example, a worker carries out 60 actions in 60 seconds, his frequency will be 60 actions/minute. If the cycle time is increased to 80 seconds, his frequency becomes 45 actions/minute. The adoption of this preventive measure entails also a reduction in the number of vehicles produced during a shift. For example, if the cycle time is increased from 60 to 80 seconds in a shift of 420 minutes of effective work, production is reduced from 420 to 351 vehicles.

D.2. Reducing the number of actions without changing the cycle time.

If, for example, a worker carries out 40 actions (instead of 60) in a cycle time of 60 seconds, his frequency is reduced from 60 to 40 actions/minute.

If this preventive measure is implemented, the number of vehicles produced in a shift remains unchanged, but the number of posts, and therefore of workers on the line, has to be increased by 30%.

At this point, I think it would be useful to draw a comparison between the action scheme and the objectives of the ergonomic methodologies to reduce the risk factor relating to “frequency of actions/minute” and those adopted by the work metrics methodology for reducing the NVAAS.

Both phases entail breaking the work phase down into the operations/actions needed to obtain the output, but the objectives and effects diverge.

Ergonomics, at least in its scientifically correct” version, is intended to protect the health of workers by reducing the speed at which the joints of the arms move (the number of actions to be carried out in a cycle time).

Work metrics, on the other hand, is intended to increase productivity by eliminating what is referred to as “waste” (NVAAs) and increasing the speed of the movements that the worker makes with his arms.

This analysis reveals a substantial incompatibility between the increase of productivity, if understood only as an increase in the pace of work, and the prevention of musculoskeletal disorders of the upper limbs.

The widespread tendency in companies to assess the risks in which the “frequency of actions/minute” factor is not assessed properly is no coincidence, therefore.

3.2 Risk assessment methodologies used in companies

An initial significant element worth underscoring is the fact that none of the methodologies used in companies appears in the list of risk assessment methodologies provided by the ISO 11228/3 standard.

Let us now take a look at the characteristics of the methodologies in the companies in the sample of the study and how they are used.

A. PSA Group (Peugeot- Citroen)

The Work and Organisation Assessment Method (METEO) is used in the production sites of the PSA Group. This is a method used to analyse the work performance overall, and therefore it considers physical as well as cognitive and organisational aspects.

The work analysis pursuant to this method is divided into 5 areas, which are in turn subdivided into sections, each of which pertains to a specific type of problems relating to work performance:

- Area A. Physical and biomechanical load problems;
- Area B. Cognitive aspects relating to the processing of information on the work post; assessment of the worker's attention level, etc.
- Area C. Organisational aspects: inactivity time (of the worker), capacity to intervene in terms of problems, etc.;
- Area D. Ergonomic structure of the work post: distance and accessibility of parts, characteristics and visibility of the controls and display of the machines, etc.;
- Area E. Physical environment: noise, vibrations, temperature, etc.

The risk level is assessed for each of the 22 sections into which the 5 analysis areas under the Work and Organisation Assessment method are subdivided, in accordance with a three-band classification: green (value up to 2.5); yellow (2.6 to 3.5); red (3.6 to 5).

In this section, we shall deal only with Area (A) which analyses the musculoskeletal risks of the whole body, in particular, section A3 relating to the risks of the upper limbs.

Area A is subdivided into 3 sections:

- A1. analyses the risk factor relating to the worker's "exertion" and expenditure of energy; assesses the intensity of the exertion and its duration in percentage of the cycle time;
- A2. assesses the risk factor relating to the "posture" of the whole body: the work position (standing, seated, on bended knees), the postures of the torso (bending, turning, etc.), the position of the arms (raised arms, etc.);
- A3. assesses the risks for the upper limbs

Let us analyse section A3 of the Work and Organisation Assessment method in a more comprehensive manner because the research study is focused in particular on disorders of the upper limbs.

Section A3 analyses only 2 risk factors of the upper limbs: exertion and posture.

- The "exertion" factor is calculated by crossing the intensity of the exertion (measured with a dynamometer) with the frequency (the number of times in which the action entailing exertion is carried out in one hour).
- The "posture" factor is calculated on the basis of the value of the angles assumed during the work phase by three joints of the arms: the wrist, the elbow and the shoulder.

The final risk index of section A3 is calculated as follows: the risk indices for the "exertion" and "posture" factors are added and the sum is divided by 2 (for instance, if "exertion"= 3 and "posture" = 2, the final index = 2.5).

Comparison of Section A3 of the Work and Organisation Assessment method with the criteria set in ISO 11228/3 (cf. section 3.1).

An initial aspect to be underscored is the fact that, like all the methods used in automotive companies, the Work and Organisation Assessment method entails using a checklist for a 1st level risk assessment. According to the criteria set in the ISO standard, such lists can be used only to conduct a rapid initial screening of the work positions, to identify the work phases with little and/or no risk (green band). For the medium and high risk phases (yellow and red band), on the other hand, a 2nd level assessment with an in-depth method is required. If the analysis procedures are stopped after the first level, the probability of conducting an appropriate risk assessment clearly becomes very low, and therefore the probability of identifying adequate preventive measures to protect the health of workers is also low.

Beyond the aspects relating to the stages of the (1st and 2nd level) analysis procedure, the problem is that the Work and Organisation Assessment method checklist does not assess a series of risk factors for the arms: the frequency of actions/minute, the lack of time to recover (breaks), the assumption of risk postures with the hands (pinch, etc.).

Such risk factors, particularly the frequency of actions/minute, are of fundamental importance for determining the risks for musculoskeletal disorders of the upper limbs.

B. Renault Group

The "FAE" (Fiche d'Analyse Ergonomique) [Ergonomic Analysis Sheet] checklist is used at the production sites of the Renault group, either in its full version or in a simplified version known as "FSSE" (Fiche Simplifiée Sécurité-Ergonomie) [Simplified Sheet for Safety and Ergonomics Assessment].

It is a methodology which, by analogy with that of the PSA, analyses the physical as well as cognitive and organisational aspects of the work performance.

Only the "exertion" and "posture" factors are analysed in the section on the checklist for musculoskeletal risks. It is therefore a methodology for which the same considerations apply as those made for the Work and Organisation Assessment method checklist.

C. Fiat Group

The production sites of the Fiat group use the EWAS checklist, the ergonomic part of the Ergo-UAS system, which analyses only the physical risks and is subdivided into 5 sections. Each of the sections deals with a specific potential risk factor for the musculoskeletal system:

Section 0. "Extra" factors: Presence of vibrations, use of hammers, etc.;
Section 1. Posture. Analyses the types of static postures (lasting more than 4 seconds) assumed during work: the worker's position (standing – seated, on bended knees), the postures of the torso (bending, turning, etc.), the position of the arms (raised arms, etc.).
Section 2. Exertion: Analyses the level of exertion during work;
Section 3. Manual movements of loads: analyses the risks for the spinal column entailed when moving objects heavier than 3 kilos.
Section 4. Repetitive movements of the upper limbs: analyses the risk for the joints of the arms.

Values are assigned to each of the sections pursuant to the analysis between the characteristics of a work station and the reference tables of the checklist. The values of the first four sections (0-1-2-3) are added to obtain an ergonomic risk relating to the "whole body". The values of section 4 (repetitive movements) on the other hand assess only the risks for the arms.

The final risk index of the checklist is derived by taking the highest value between that obtained from the sum of values of sections 0-3 (whole body) and that of section 4. The risk is classified in the "green" band (low or no risk) for values between 0-25; the yellow band (medium risk) between 26-50: and the red band (high risk) for values over 50.

Comparison of section 4 of EAWS with the criteria set in ISO 11228/3

In the first months of 2010, a technical and scientific discussion developed in Italy on a comparison between Section 4 of EWAS and the OCRA methodology (recommended by ISCO 11228/3). Apart from myself, the debate was joined by the authors of the OCRA method, representatives of the SNOP (National Association of Occupational Health and Safety Operators] and the authors of EAWS.

The outcome of the debate brought to light that Section 4 of the EAWS, at least in its current version, is based on calculation criteria that differ significantly from those set by the OCRA method for the analysis of a series of risk factors, the most relevant being the "frequency of action/minute, the hand pinch posture, and the posture of arms at shoulder height.

At issue are differences which, as shown by the empirical analysis of the same work phases with both methodologies, lead to a significant underestimation of the final risk index by the EAWS with regard to OCRA.

To summarise, being a level 1 checklist, the EAWS carries out a specific analysis of all the risk factors for the upper limbs. Nevertheless, the calculation parameters used lead to an underestimation of the risk of the same factors, "frequency of action/minute" and "hand pinch posture," which the methodologies used in PSA and Renault do not analyse at all.

As to the methodologies used at Fiat, the following has to be stressed: A specific trade union agreement on the Ergo-UAS agreement provides that the company is to assess the risks for the upper limbs with the OCRA method as well. It is not possible to verify whether there is any truth to this assertion by Fiat in the data collection phase of the research study, however.

D. Volkswagen Group

In the Volkswagen Group, at least in Germany, the risk assessment is conducted using both EAWS and its simplified version, the APE (Arbeit Plan Ergonomie) checklist.

The comparison between the criteria of EAWS and those set in the ISO standard made for Fiat are therefore valid also for Volkswagen.

To summarise, therefore, beyond the fact that they do not appear in the list of ISO 11228/3, the risk assessment methodologies used in companies do not satisfy a series of requirements set by the international standard. The most significant of these are:

- The risk assessment is carried out only with simplified checklists. In other words, no in-depth risk assessment is conducted with a 2nd level methodology.
- Certain risk factors are underestimated or not assessed at all. The most significant of these are the "frequency of actions/minute" and the "hand pinch posture."

Combined with others, these two shortcomings reduce significantly the probability of an adequate risk assessment of the actual risks to which workers are exposed, and thus reduce the probability of adequate measures being adopted to protect their health.

Beyond the characteristics of the methodologies used, the quality of risk assessments depends also on the level of training and competence of those who conduct them.

In most companies of the sample, the risk assessments are conducted essentially by the heads of "elementary technological units," who have very limited training in ergonomics. Moreover, there is a serious discrepancy between the quantity of work phases to be assessed and the number of "ergonomists" present in the companies.

It is a situation that leads also to a widespread condition of "embarrassment" among the ergonomists of the companies, owing to the perception that they do not have the time and resources to carry out in-depth risk assessments, and therefore to propose adequate measures for protecting the health of workers.

3.2.1 Measures to reduce more widespread risks in the companies of the sample

In section 3.1.1 we analysed the measures for the prevention of risks for the upper limbs provided by ISO 11228/3. Let is now go briefly over the measures taken in the companies under study.

First of all, a valid premise is needed for all the companies: on the assembly lines situated in the production sites of Eastern Europe, in spite of the fact that a higher number of manual operations is required, fewer actions are taken to improve the ergonomics of work posts than at the production sites in Western countries.

Generally speaking, in line with the risk assessment methodologies, the companies have a tendency to implement mainly structural measures to reduce the risks for the spinal column (e.g. manual movement of loads, bending and turning the torso, etc.). Measures to reduce the risks for upper limb disorders on the other hand are sorely lacking.

Let us now analyse the most widespread procedures in companies to reduce the individual risk factors for the risks of the upper limbs keeping the preventive measures of the ISO standard in mind.

A. "Exertion and posture" risk

Actions to reduce exertion with the hands or risk postures for the arms are rare, and when taken, they are predominantly in production sites in the West. Such measures include in particular fitting assembly lines with a vehicle overturning functionality to spare the worker from having to assume the risk posture of "arms raised at shoulder height."

B. Factor relating to the "lack of time to recover" (breaks):

The breaks taking in companies are not sufficient pursuant to the criteria set in the ISO standard. Three breaks of 10 minutes maximum are taken in fact. The optimal condition pursuant to the ISO standard is 10 minutes for every hour of work.

C. Factor relating to "duration of repetitive task during shift:"

Actions to reduce the time during which workers are exposed to repetitive movements are in theory the most widespread in the companies.

The problem, however, is that what is known as "ergo-rotation" has little effect on the value of the risk index if, as happens in the companies, the worker "rotates" between two repetitive posts on the assembly line. The "rotation" pursuant to the ISO can be efficient only if the worker "rotates" from repetitive to non-repetitive tasks.

D. Factor relating to the frequency of actions/minute.

Since the analysis methodologies used in the companies do not assess, or underestimate this risk factor, measures are clearly not taken to reduce its effect on the risks for musculoskeletal disorders.

There are two ways to proceed, as we have already seen, in order to address this factor:

- Increase the cycle time without changing the number of actions in the cycle;
- Reduce the number of actions without changing the cycle time.

As we have stated on several occasions, however, companies refuse to take such measures because they run counter to the ever more widespread trend of boosting productivity by intensifying the pace of work performance, and in particular by eliminating NVAAs.

The analyses conducted in this chapter show serious shortcomings in the musculoskeletal risk assessments carried out in the companies, due to the characteristics of the methodologies but also to the lack of competence of the people who conduct them.

Such aspects highlight the high potential for action by shop stewards to verify that the risk assessments conducted by engineers of the company are in line with the procedures in international standards and that the data on which the company risk assessments are based are in line with the actual situation under which the worker performs his work.

What is the current level of competence and capacity of shop stewards on these aspects, however? These are the issues that we shall analyse in the next chapter.

4. Training and trade union action on ergonomics and the organisation of work

In this and in the next chapter, before analysing the relevant data, I would like to present some excerpts from the more interesting interviews conducted with shop stewards.

This type of presentation affords readers a greater "immediacy" to the reality of work, in my view, and enables them to understand better the aspects that I shall describe subsequently in the analysis.

4.1 Direct testimonials of shop stewards

Trade unionist Nº1

Question: Have you ever heard anyone speak about "work analysis sheet?"

Answer: I've never seen anything of the sort. They are never made available. For us they are taboo… They are in the methods office. Only the bosses can work with such data.

Question: Have you ever undergone training on methodologies for organising the work post?

Answer: There are criteria: ergonomics, movements are analysed. Training would be required to understand properly how it works… We recently found out that there were classifications for each post (green, yellow and red)… An ergonomist came to explain, generically, the number of posts at low, medium and high risk…

Trade unionist Nº2

Question: If a worker encounters difficulties in a post considered green, what can you do?

Answer: The problem is that we do not know whether the post is green or otherwise, because we have no details on the assessment. We hope to manage to get the assessment of every post so that we can use it and to enquire why the worker suffers at a post, even if it turns out to be green. In general, if there is a problem at a (green) post, the head of the elementary technological unit calls the ergonomist… In most cases, however, the ergonomist confirms that the post is green and the worker continues to suffer…

Trade unionist Nº3

Question: Has the company ever proposed to provide training on the risk assessment methodologies?

Answer: No, never. The company wants to keep data concerning working conditions to itself. We, as members of the "joint occupational health and safety committee" can broach the issue of safety (accidents) but not of working conditions…

Trade unionist Nº4

Question: Are you capable of analysing the risks of a post to verify whether it is in the green band or not? Could such capacity prove useful in strengthening trade union action and improving working conditions?

Answer: It depends on the point you start from. If you consider that the system that management uses is correct, it could be useful for us. If the system used is to their advantage, on the other hand… Nevertheless, I tend to think that only those who know the facts well can wage a struggle properly.

Trade unionist Nº5

Question: Does management keep you informed on the systems for defining times, on the method used to organise work?

Answer: I would say it does not. There are presentations… but management does not explain what method was used to go from 5 posts to 3 (with reduction of NVAAs)… They inform us by saying simply that they improved the posts so as to be able to do the work with 3 (workers instead of 5)….

Question: If a worker contacts you about problems (pain, etc.) are you capable of verifying the risk assessment of his post?

Answer: I do not believe so.

Question: What reply do you get when you report that a worker has problems (pain, etc.)?

Answer: 30% of the time we are told that the worker fails to comply with the "work analysis sheet," 30% of the time they say "we will look into it," and in 30% of the cases they say that the worker is lazy…

Trade unionist Nº6

Question: Would it be useful, in your view, to have more knowledge, with appropriate training on the technical aspects of risk assessment?

Answer: Yes. Absolutely.

Question: Have you ever asked the company to be allowed to attend that type of training?

Answer: Yes.

Question: What was their reply?

Answer: The (training) module is not ready… It does not exist. We do not have a budget for such training. We will try to create a group (with an adequate number of participants), etc."

Trade unionist Nº7

Question: Could it be useful for you to have the technical capability to verify the quality of the risk assessment of the posts?

Answer: "It is very important for us… An ergonomist rarely works on the post (to assess the risks)… He does not consider the reality that the worker faces… he does not consider the reality of the post, the worker's postures…I am very much in favour of training so as to obtain the tools for gauging a situation directly. A worker who contacts me bemoans his condition and when I get an ergonomist to come, he rarely makes changes in the worker's favour… The managers… are concerned about having green posts only so that they are not scolded by their superiors; they are rarely concerned about the risks for the health of the workers. Their priority is to meet the production objectives, not musculoskeletal disorders… They work for the moment, without considering that an operator suffers…"

4.2 Analysis of the data on training, skills and trade union action

The testimonials from these interviews clearly show the feeble average level of training and skills of -- and consequently, of the capacity for action by -- shop stewards to tackle problems relating to ergonomics and the organisation of work.

For a more cogent analysis, however, a distinction must be drawn between:

- The training and skills of "basic" shop stewards and those of stewards who sit on joint (company and trade union) committees on the topic of occupational health and safety and works metrics (methods-time): Unlike the latter, the "basic" stewards usually get no training at all.
- Training and skills on the methodologies for work metrics and for risk assessments.
- Shop stewards who sit on committees usually receive training regulated by bargaining agreements. Such delegates should, in theory at least, serve as a point of reference for all the other delegates with respect to skills as well as the possibility to access company data on ergonomics and work metrics.

The role of the joint committees should essentially be to broach certain issues, such as occupational health and safety, with better knowledge of the fact. Because of their skills, shop stewards should be able to solve problems "jointly" (with the other side of industry) thereby reducing the probability of forms of trade union infighting.

The efficiency of the actions taken by such stewards on the working conditions and health protection however depends on their skills and their ability to access the data of company analyses.

In this research study, an in-depth analysis of the characteristics and quality of the training given to shop stewards who sit on joint committees is not possible because of lack of resources and of time. In the interviews, however, I have nonetheless tried to ascertain the level of skills of stewards directly, and thus, indirectly, the quality of the training they received.

Data from the interviews show that though present, the level of skills on aspects of work metrics is very low, but there is a nearly total lack of knowledge about the methodologies for the assessment of musculoskeletal risks. This disappointing scenario reveals a moderate level of knowledge only among the stewards of some Italian trade unions on Ergo-UAS -- the ergonomics and work metrics system used at Fiat.

On the work metrics aspects, however, the skills of the shop stewards pertain essentially to the capacity to verify the company analyses with the chronometer; skills for dealing with the procedures in the MTM "time" tables are very rare.

As regards risk assessment, it turns out that companies are inclined to some degree to tackle, "jointly" (with the other side of industry) aspects relating to occupational safety and to the prevention of accidents. On the other hand, the readiness of companies regarding training and access to data, is reduced drastically when it comes to the problem of health risks, in particular as concerns musculoskeletal disorders of the upper limbs.

Shop stewards who sit on joint committees, even though they have a minimum level of skills, denounce the substantial difficulties in accessing ergonomic risk assessment data and are very frustrated because of the inability to solve discomfort and health problems raised by workers.

These stewards consider themselves "snared" to some extent in a company net consisting of an "infinite" series of meetings on technical issues which seem to be ultimately aimed at postponing continuously the solution to health problems raised by the workers.

Whereas it is important, on the one hand, for shop stewards to acquire adequate skills, it is fundamental, on the other, to see clearly that trade union action based on knowledge must not replace classical forms of trade union action, otherwise such action risks being reduced to a sort of "clause for cooling down the conflict" about working conditions.

The strategic importance of a trade union action based on knowledge, particularly on the methodologies for musculoskeletal risk assessment, is clearly deduced from three factors:

- Companies use mixed "ergo-metrics" systems to define workloads and times;
- Beyond the quality of the methodologies, the results of risk assessment depend on the accuracy of the data obtained from analysts on the work posts.
- Upper limb disorders, especially after the introduction of methodologies to eliminate "non-value added activities," are always more widespread among workers.

We saw in chapter 3 that the final risk index of a work post (green, yellow and red band) depends on the values of the single risk factors (frequency of actions/minute, exertion, posture, etc.). The values of these factors in turn depend on data collected by the analyst. To calculate the "frequency of actions/minute" factor, for example, the actions carried out by the worker with each limb during a time cycle have to be counted. If the facilities engineer considers 40 actions, for instance, but the worker actually carries out 60, a lower risk index than is actually the case is obtained.

If a post turns out to be low risk, the company does not implement preventive measures, and therefore the probability of disorders for the worker increases. Cases often cited in interviews where the post is given green classification and the worker "suffers" and falls ill have become commonplace.

It is easy to grasp, therefore, how important it is for shop stewards to be able to ascertain, in addition to the quality of the methodology used, whether the data on which the risk assessment is based provide a true reflection of the actual working conditions.

The report shows that training provided by the company for shop stewards is scarcely efficient. It is vital, therefore, for shop stewards to be trained autonomously by the trade unions.

Autonomous training provided by the trade union actually makes it possible to identify key points for improving the skills of shop stewards, and enabling them to take action to improve the working conditions.

5. Effects of the organisation of work on health and the quality of working life

There are two ways, in my view, to ascertain the effects of an organisational model on workers: a technical and scientific analysis of the procedures used to apply such a model in companies; and listening to the view of workers who are subjected to the effects thereof.

In Chapters 2 and 3, we analysed the work metrics and risk assessment methodologies from a technical point of view; in this chapter, we shall have workers and shop stewards "speak directly" through testimonials from interviews.

We shall follow the same pattern as in Chapter 4, and provide comments once the testimonials have been cited.

I wish to point out that I am not going to indicate the specific production site or the trade union to which workers belong for the individual citation, this is in an effort to respect the privacy of the interviewees and of the companies, but also because the descriptions of the working conditions are very similar in the different companies.

Another point to stress: all the cited testimonials and analyses in this chapter pertain to production sites under study here (FIAT, PSA, RENAULT, SEAT), with the exception of the Volkswagen site in Hanover.

This exception is due to two factors:

- No interviews were conducted with workers at the Hanover site.
- As already pointed out in the section on lean production, the situation at the Volkswagen site in Hanover gauged on the basis of the other sources of data (interviews with the trade union, empirical observation of the assembly line, etc.) is better in terms of the quality of working life and stress for workers. Problems with musculoskeletal disorders are nonetheless reported, albeit to a lesser extent than in other production sites.

5.1 Direct testimonials of workers and shop stewards

Worker Nº1 (France)

Question: What are the consequences of these changes (reduction of non-added value activities, etc.) on the workers at the physical level?

Answer: Today, young people who start working have health problems in a far shorter period of time than before… Today, if a temporary worker starts working on a work post and shortly afterwards has problems with his spine, he is made redundant and another temporary worker is taken on in his place.

Question: What are the most widespread occupational illnesses?

Answer: The back, the cervical vertebrae, the carpal tunnels, the tendons of the hand, shoulder, etc. To deal with the pain, workers apply (pain-killing) cream every day as to be able to continue working.

Question: Is the use of painkillers widespread?

Answer: Yes, cream is applied, then infiltrations are carried out, and in the end they are operated on. On some occasions, the occupational physician (for workers with problems) suggests a change of post. The worker goes back to his team, and his superior tells him he has no post for him. If there is no post to change to, the worker has to go back to his original post, which caused his pain in the first place…

Worker Nº2 (France)

Question: What are the working conditions for occasional workers?

Answer: Occasional and temporary workers suffer more… But they do not say it. They are afraid of being dismissed. We were talking about the red (high risk) posts. First of all, the manager assigns a temporary worker to such a post because he knows that the worker cannot speak out… It is one of the methods used by management to try to solve the problem of red posts."

Female worker Nº3 (France)

Question: How do you feel when you get back in the evening?

Answer: I cannot even climb the stairs… I got back home and I slept in the afternoon because I was extremely tired… When I started here, I was young, I still had strength to ride a bike in the afternoon, but now, I can no longer do it. And yet I should…

Question: You described a highly stressful situation in both physical and psychological terms. What does the company do to convince workers to accept such changes?

Answer: People are forced to accept the changes… If a worker does not do his work (if he does not often manage to finish the operation required within the cycle time)… he is warned by the head of the elementary technological unit. If the situation continues… then there are sanctions… Workers are also afraid of losing their job… simply because most people who work need the job to live, to eat. They are afraid of losing their job and of not being able to find another one. Many have loans to reimburse… Furthermore, the precarious situation of temporary workers convinces those under open-ended contracts to persevere…In general, workers are not very inclined to complain, but when they reach the point of blocking the line, they can no longer stand it, and that the situation is really insufferable."

Worker Nº4 (France)

Question: What are the most significant effects of the introduction of lean production?

Answer: Generally speaking, being a veteran, I can say that the company has changed 100% in 10 years. We can say that new developments have occurred in the last ten years that were simply not there before. For example, a young man taken on just two years previously is operated on the carpal tunnel… Today, after the Hoshin sites (slated for lean production), posts that had 5 or 6 operations now comprise more 8-12 operations… simple, but more numerous operations, whereby the risk of problems for arms is increased. The situation is improved for the legs, but worsened for the arms which are under more strain. This could explain the widespread incident of carpal tunnels even after 2 years of work.

Trade unionist Nº5 (France)

Question: What are the most significant effects of the introduction of lean production?

Answer: We hear people complaining about the low pay, but what is heard most is the issue of working conditions. There are complaints about health problems… carpal tunnels. After 4 or 5 years, workers realised that they no longer had time even to breathe. They cannot even exchange a couple of wisecracks with their colleagues. They used to take 10 seconds to speak with us (shop stewards), now they no longer do so. Management wants to keep questions about working conditions to itself… when we point out something, they always say that they will attend to it, but then they do nothing about it. They do not want the trade unions to address the issue… Moreover there is the problem with the replacement of workers with reduced working capacity… It is difficult to find work posts for them… positions for preparation (of materials outside the assembly lines) were previously used, but not any longer because the preparations are carried out directly on the line."

Worker Nº6 (Italy)

Question: What are the most widespread problems for the workers?

Answer: Before (lean production) I used to get back home tired; now I get back dead. At night I feel as if my hands weigh 20 kilos, and I cannot fall asleep. The situation used to be hard… but now it's inhuman!!!… At the end of the shift you are destroyed. The back in pieces.. hands and wrists, etc. hurt. If things go on like this for another year, I will no longer exist. I will be destroyed. I hate to say it, but days when they are laid off (and not paid) are seen as a sort of liberation by the workers… in spite of the lost income… 2 weeks being laid off correspond to 2 months of mental and physical rest… Workers count down for lay offs… but there are repercussions on the mental level… There is no time any more even to drink… It is mentally murderous… because of the reduced cycle time… I always have to run… It's difficult to keep the pace for 5 days, for a month… I do not like it that sacrifices are made to be a machine… But the speed of the lines is such that something can easily be assembled incorrectly… and then the customer is faced with a defect (on the vehicle)… I realised that I never let down my arms in 8 hours of work!!! Even when I am taking a break, I always keep my arms somewhat raised... in a working position.. .But the situation is even worse for those working underbody (assembly of parts in the lower section of the vehicle)."

Trade unionist Nº7(Spain)

Question: What are the most significant effects of the introduction of lean production?

Answer: The worker always has to deal with more tasks, and must be more agile with his movements. With more operations to be memorised and carried out now, the worker is physically and mentally exhausted at the end of the day… There are people who do not even manage to stop for a drink of water…as they may fall out of pace with the work… We used to have the rest coefficient (in the cycle time), but now that the ergonomists consider that workers are working under good conditions (green band)… they find a good reason to add other operations….

Question: How do workers react to these changes?

Answer: They no longer bother… They used to be physically worn out… Now they are also mentally so… There are many workers who can no longer get a good night's sleep… Because they keep thinking about what they did at work during the night… The footage of the day is played out at night… They cannot manage to disconnect from work… There are more and more people who want to leave the assembly line."

Trade unionist Nº8 (Eastern European country)

Question: What are the most significant effects of the introduction of lean production?

Answer: The employers take advantage of the fact that workers are afraid of losing their job. The workers keep quiet, and take care of themselves during the weekend, at home; they work until "exhaustion" and say nothing about the work because they are afraid of being laid off by the occupational physician and being declared incapacitated for work… there's widespread fear of losing one's job. I am perhaps pessimistic, but I fear that 75% of the workers in the company are in pain but keep it to themselves.

Question: What happens when a worker is declared "incapacitated" to perform his work and the company says that it has no other task for him to do?

Answer: The worker is made redundant and is given 7 months of severance pay.

Question: What, in your view, could be done to reduce these "pains" on the upper limbs?

Answer: The simplest solution, in spite of the economic cost, would be to increase the number of workers on the line… so as to reduce the number of operations per worker. The other solution would be to reduce the speed on the line.

Trade unionist Nº9 (Eastern European country)

Question: Beyond the statistical data, what is your knowledge of the most widespread problems between the workers?

Answer: The problem comprises a whole. The stress at work keeps increasing. The company continues to increase the workload. Cases of tendonitis are increasing and are more and more widespread among young people. In the past, a person could have a discal hernia between the age of 40 and

50, while now there are people who have it even at 25… But there is a great deal of concern about stress due to the workload and to the bosses. Workers are required to do well from the outset, they are not allowed to make a mistake, and if they do make a mistake, they are punished. The worker is summonsed to the office, he is scolded, and that destabilises him mentally.'

Worker Nº10 (Eastern European country)

Question: Could you say how many workers have musculoskeletal problems in your elementary technological unit?

Answer: I think around 75% of the workers in my elementary technological unit complain about pain. It depends on the post and the posture. Those who work on cables have to bend over all day and have problems with their back."

5.2 Data analysis

The testimonials by workers and shop stewards help put the reader in a direct "physical" perspective of the working conditions on the assembly line. These testimonials confirm, from the point of view of those who do the work first hand, the analyses conducted in Chapters 2 and 3, on the methodologies used in companies to measure the work performance and to assess the musculoskeletal risks.

We analysed the fact that the significant "intensification-saturation" of the work performance is characterised particularly by a sharp increase of the biomechanical load on the joints of the higher limbs (wrists, elbows, etc.), which is caused by three factors:

A. The elimination of NVAAs (non-value added activities) and their replacement by VAAs (value-added activities);

B. The association of work metrics (MTM) with ergonomic assessment methodologies that underestimate the risk for the upper limbs;

C. The problem of the production "mix:" The fact that the quantity of work assigned by the "times-method" engineers does not correspond to the operations actually carried out by the workers for more complex vehicles.

In this paragraph, I shall try to summarise systematically the key points of the effects on the working conditions – in physical as well as in mental terms.

5.2.1 Effects on the physical level

The elimination of the NVAAs and the shortcomings in the ergonomic structure of the work posts, particularly in the area of the line for the assembly of the "underbody" parts and the cab of the vehicle, are the cause for the increase of the two main risk factors for musculoskeletal disorders of the upper limbs: the frequency of actions/minute and the assumption of risk postures.

The diffusion of symptoms, pains and disorders among workers stems also from the tendency of companies to carry out assessments which, precisely because they underestimate the risks, reduce the probability that adequate measures will be taken to protect the health of the workers.

One very prominent element in support of the nexus between the intensification of work and the increase of disorders is the growing dissemination of disorders among even younger workers. An even more alarming element, however, is the tendency that companies have, particularly in France, to "solve" the problem by assigning occasional workers to higher risk positions on the assembly line.

Occasional workers actually have a double advantage for companies: Whereas it can be easier to keep hold of them with the promise of being presumably hired under an open-ended contract, if they are "worn

out," they can be dismissed without any difficulty. The situation of workers under open-ended contracts is not much different, however.

The crisis in the automotive sector, and the consequent fear of their job force workers to adopt "extreme" strategies to deal with the problems of symptoms and disorders: the use of drugs and other measures to relieve the pain and to continue to work, instead of asserting their rights, and the obligation of the employer, to protect their health.

The highest percentage of musculoskeletal disorders is found among workers at production sites in Eastern European countries. This element is due primarily to the higher presence of assembly phases carried out manually, and at the same time, to the lesser implementation of measures to improve the ergonomics of the work posts (in particular for the assembly of parts in the "underbody" of the vehicle).

A direct consequence of this situation is the increase of workers who wind up with "reduced capacity for work" in companies because of musculoskeletal disorders. This is a phenomenon whose dimension is certainly underestimated because of two factors: a tendency among workers themselves to avoid reporting health problems out of fear of being declared "unfit for the job" and thus risk being made redundant.

In addition to the "wear and tear" effects on workers on a physical level, the intensification of the work performance has negative effects on the mental level as well; this is a phenomenon that should be analysed with an in-depth report, on which I have only a few summary comments to make.

5.2.2 Effects on the mental level

There are two very important factors that cause negative effects on the psychological and cognitive level among workers: the increase of operations to be carried out in the time cycle, and the elimination of changes and isolation of the worker on his work post.

The increase of operations, owing chiefly to the elimination of NVAAs, causes an overload of the work memory, due not so much to the complexity of the operations, but rather to the increase in their quantity and the speed at which they have to be carried out.

To increase the speed of execution and to reduce assembly errors, ergonomists have tried to plan work posts in such a way as to provide the worker with "stimuli" that goad him to carry out specific actions ("affordances") as well as "restrictions" that induce him to avoid other actions. These are procedures for the ergonomic planning of posts that aim to enable the worker to carry out operations virtually automatically. By way of example, the materials to be assembled are placed in containers divided into compartments that contain specific types of parts.

Attempts by ergonomists to simplify the working activity, however, are not likely to offset the increase in the speed of execution required by "methods-time" engineers. The result is an increase in the "cognitive load" as well as the stress caused by the fact that the worker cannot reconcile the speed with the requirement of not making any errors. This aspect of stress, owing to the fear of making errors, is amplified by the presence of IT devices, required in lean production, for the filing and traceability of errors made by individual workers.

The worker is therefore subject to a combination of three factors that generate stress: the speed of execution, the prohibition of making errors, and the anxiety of control and sanctions connected to any errors of execution.

In addition to the mental overload aspects, the worker also experiences serious psychological and social discomfort. The "rational" organisation of work connected to lean production focuses a great deal on eliminating having to change the position of workers by placing the parts to be assembled close to the work post. The fact that the workers are practically "nailed down" to their post causes a situation of isolation and makes it far more difficult to communicate with other workers and with the shop stewards.

6. Conclusions and trade union strategy assumptions

We embarked on this research voyage to see "beyond:" to see something beyond the cards that we use every day; something beyond the emphasis on improving the quality of working life in the organisational model known as "lean production;" something beyond the emphasis by companies on using ergonomics to improve the working conditions; something beyond the declarations of principle of trade unions about the protection of the health of workers.

What we have seen can be summarised as follows:

A. Taking advantage of the fear induced by the crisis and threatening redundancies, the companies have intensified the work performance at very high levels. This intensification is "disguised" by companies through an emphasis on the "assessment of human resources" and the involvement of workers pursuant to the Lean Production model.

B. "Crushed" by the fear of losing their job, the workers are forced to accept a deterioration in their working conditions and to adopt "extreme" strategies to deal with the problem of musculo-skeletal symptoms and disorders. They take drugs to relieve the pain and be able to continue their work, instead of asserting their own rights and the obligation of their employer to protect their health.

C. For their part, owing to lack of skills or of will, the trade unions are practically impotent when it comes to dealing with the problem, and therefore not in a position to adopt efficient strategies to improve working conditions.

D. In order to avoid the threat of closing of production sites on their territory, the public institutions in different countries refrain from making sure that companies comply with their legal obligations to protect the health of the workers. The institutions are little inclined to "remind" companies of their "social responsibility" whereby the latter, as organisations that operate in the social system, have to provide socially useful products and services and therefore cannot cause social damages such as the physical and mental wearing down of workers.

To summarise, I have set out the fundamental aspects of the scenario delineated by the results of the report. As this is an action-research study, however, I deem it useful to go briefly over the key points that can be used to make certain strategy assumptions for trade union actions.

Work organisation procedures based on what is known as "lean production" (or lean manufacturing) have been introduced in all the companies of our sample in the last decade. Lean production has two objectives: "zero waste" and "zero defects."

The "zero waste" objective should be achieved with the gradual elimination of organisational inefficiency in the company at a general level, and through the elimination of what are known as "non-value added activities" (NVAAs) at the particular level of work performance.

These organisational procedures caused a significant increase in the saturation – intensification of the work performance, particularly for the upper limbs.

The main causes of this phenomenon are as follows:

A. Elimination of NVAA (non-value added activities) and their replacement by VAA (value-added activities)

B. Association of work metrics (MTM) with ergonomic assessment methodology that underestimates the risk for the upper limbs;

C. The production "mix" problem: the amount of work assigned to "methods-time" engineers does not correspond to the actual operations carried out for more complex vehicles.

The NVAA reduction systems in particular constitute a formidable instrument for boosting productivity and flexibility with regard to the market requirements; companies can in fact adopt two strategies to adjust to demand and to reduce labour costs:

A. If market demand for vehicles is low: The elimination of the NVAAs reduces the number of posts on the assembly line and thus the number of workers needed for production;

B. If market demand for vehicles is high: The elimination of the NVAAs enables the company to reduce the cycle time and consequently to boost the hourly production of vehicles without increasing the number of workers on the line.

The effects for the workers in both case A and case B are: intensified work performance, more physical and mental wear and tear, and a higher probability of being made redundant.

The action scheme used to reduce the NVAAs causes a significant increase in the number of operations to be carried out with the arms, and thus increases also the value of the "frequency of actions per minute" – the primary risk factor of the disorders on the upper limbs.

There is consequently a clear incompatibility between the increase of productivity, if seen only as an increase in the work pace, and the prevention of musculoskeletal disorders on the upper limbs. The widespread tendency in companies to assess the risks in which the "frequency of actions/minute" factor is not assessed properly is no coincidence, therefore.

If after eliminating the NVAAs, companies were to carry out a precise assessment of the risks for the joints of the arms, therefore, they would nearly always find high risk indices. In such a case, in order to comply with the legal requirements for the protection of the workers' health, companies would have to reduce the "frequency of actions per minute" risk factor above all. But to obtain this result they need to reduce the number of operations carried out during the cycle. A correct assessment of the risks for the upper limbs is in conflict with the systems used by companies to improve productivity.

The adoption of these organisational models therefore causes a serious deterioration of working conditions at the physical and mental level. In the face of such a scenario, it is clearly necessary to chart efficient trade union strategies to protect the health of the workers.

6.1 Trade union strategy assumptions

Trade union organisations, at European level as well as in the individual countries, should set a general goal to avoid the "blackmail" of companies (deterioration of working conditions and redundancies) and assert the principle that the protection of health and the quality of work constitute a value that disregards competition factors on the market; the companies should therefore produce vehicles and not patients!

Trade unions must act efficiently to interrupt the vicious and "diabolical" circle where workers risk being "worn out" (physically and mentally) and without a job. The increase of the work pace (particularly with the elimination of NVAAs), in fact, worsens the working conditions, and reduces the number of workers needed on the assembly line.

Trade unions must chart a strategy at company level and for the social system (at European level and in the individual countries).

A. <u>Action at company level</u>

A fundamental strategy is to increase the knowledge and skills of shop stewards to ascertain the veracity of company risk assessments. In this way, the trade union can capitalise on the potential of legal obligations for health and safety to bolster its own action for the protection of health and to improve the quality of work.

The trade union could shortly conduct a campaign based on the most evident results of this research at European level geared to the companies on the following aspects:

A.1 Action to give workers, by way of minimum rest factor threshold, part of the time recovered by the company from the elimination of non-added value activities (NVAAs). For instance, 15% of the cycle time could be used as a rest coefficient – a percentage that corresponds to about half the time that the companies declare that they recovered thanks to the elimination of the NVAAs.

A.1 Action to increase the number of breaks during a shift, as an urgent measure to reduce musculoskeletal disorders. An adequate preventive measure, for example, could be the adoption of at least five 10-minute breaks during a work shift.

B. <u>Trade union action on the social system (at European level and in the individual countries).</u>

B.1 Action to give visibility to the fact that although they receive substantial financial resources to deal with the crisis, companies cause other costs for the social system, namely the costs to cure sick workers!

B.2 Action to prohibit companies from making workers who have fallen ill redundant and to reduce the work capacity;

B.3 Action to make the laws and obligations of companies concerning the protection of the workers' health more stringent and more standardised, particularly the obligations for the prevention of musculoskeletal disorders.

During our voyage "inside" the automobile world, we observed a situation of intense discomfort and suffering among workers on assembly lines. We examined the causes of these problems and identified the high potential of a strategy based on increasing the knowledge of shop stewards. This strategy, combined with (but not replacing) other forms of trade union action, is the only one feasible for improving the quality of working life and the prevention of health impairment.

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- "Commenti e rettifiche all'analisi di Colombini, Occhipinti ecc." By Caragnano, G., and Lavatelli., I.; Ami-Mtm
- "Ergo-UAS: ergonomia e produttività, obiettivi inscindibili" by Caragnano, G., and Lavatelli, I.; Ami-Mtm
- "Analisi del documento Ami-Mtm sul sistema ErgoUas" by F. Tuccino
- " Tempi e metodi di lavoro secondo il sistema ErgoUas" by F. Tuccino

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Complementary report: Fiat Pomigliano (Italy)

Standard Questionnaire on the findings in Pomigliano

By Alberto Cipriani

Foreword

The research study provides for interviews in each of the production sites of the companies concerned with trade union representatives (3 or 4) and company officials in charge of the analysis of "times and methods" and the assessment of musculoskeletal risks.

"Semi-structured" interviews will be used, where the researcher will stick to the letter of the questions (written in the questionnaire), but will also give the interviewee an opportunity to express himself freely. The purpose of the researcher is to cover all the points provided in the questionnaire, irrespective of their order or sequence.

REPORT: VISIT TO FIP

(FABBRICA ITALIANA POMIGLIANO) 16 November 2012

Introductory remarks by the company (Fabbrica Italia Pomigliano)

- Managers and employees in the new organisation of the factory must remain close to the areas of manual labour.
- The distinction between blue collar and white collar workers, which was once absolute, is being gradually reduced. The differences in status between blue collar and white collar workers need to be reconsidered.

Questionnaire outline and points broached

1. Working time, breaks and shifts

- Average daily working time

First shift 6 a.m. – 2 p.m.
Second shift 2 p.m. – 10 p.m.
8 hours presence, one half hour in the canteen paid at the end of the shift; three breaks of 10 minutes on the mechanised tensile lines, each of which is paid during the work shift; 7.00 effective hours of work.

- Average weekly working time

40 hours including canteen; 35.00 effective hours of work.

- Average overtime (in addition to the normal working time) provided by the trade union agreement over a year

Maximum 200 hours of individual overtime, 120 hours of work shifts required by contract

- Average overtime put in by a worker in one year

In this phase around 12 hours per person for the period from January to November 2012

1.b Breaks (per shift)

3 breaks of 10 minutes each on the mechanised tensile lines (one break every two hours)
Paid canteen break of 30 minutes at the end of shift
Only around 10% of the workers stay to eat in the canteen

2. Company production data

- number of assembly lines:

One assembly line

- Number of cars produced per shift and per assembly line

350 at line exit (average)

- Number of workers per shift and assembly line

420 workers and 70 team leaders

- Time set for the completion of a phase (cycle) on an assembly line (line speed or pace)

1.13 minutes

3. Work performance measuring methods (time and method systems)

3.a Type of system used:

Ergo-UAS (MTM International system)

All analysts are certified

- Describe the timekeeping method: the selection criteria for workers with "average capability", the number of workers who compose a sample subjected to timekeeping, etc.

System with predetermined periods of time.

3b Mode of application of predetermined time systems

- Is the number and sequence of operations that compose a work cycle (the "work analysis sheets") determined on the basis of on-site observations of workers at their workstation or in the offices of "times and methods" based on elementary defined in the MTM tables?

The analyst analyses the cycle on the basis of the operation card.

The analysis is then checked at the workstations.

- Consequently, do the number and sequence of operations of a work cycle ("work analysis sheets") correspond to operations actually carried out by the workers at their workstation?

The level of correspondence between the description present in the system and the operations performed at the workstations is checked. If the results are incongruous, either the worker is shown how to carry out the work correctly as shown on the operation card, or else the latter is modified.

Link of the pre-determined time system with the ergonomic risk assessment methods: are mixed systems, such as the Ergo-UAS system, used?

In the plant, measurement is combined with ergonomics. Consequently, the analyst is competent not only as regards the work cycle for ergonomics, as an Ergo-Analyst.

During the planning phase, once the analysis of the various activities has been made with MTM-UAS, the ergonomic analysis is performed using MTM-EAWS.

The sum of the basic times of the individual operations give a basic cycle time for each specific workstation.

All workstations are attributed an organisational increase of 1%.

The ergonomic assessment may add extra percentage increases (or rest time) on the basis of the bio-mechanic load assessment.

4. Methods used to assess the ergonomic risks (in particular for the upper limbs)

The planned ergonomic analysis is to be made according to norms UNI EN 1005-1.2.3.4.5.

A feature of the industrialisation phase is risk prevention by application of the Ergo-UAS system.

During the process phase the risk is assessed pursuant to Legislative Decree 81/08.

- The risk assessment is conducted on the basis of a simplified checklist (first level method for rapid risk mapping).

4.a Type of system used:

An initial risk assessment is conducted using a simplified checklist; all work phases with a medium or high risk are subjected to an in-depth analysis (second level method).

The individual risk areas are checked using the methods listed below.

ISO 11228-1 Ergonomics, Manual moving: lifting	NIOSH method
ISO 11228-2:2007 Ergonomics, Manual moving: pushing and pulling – transport	Snook & Ciriello method
ISO 11228-3:2007 Ergonomics, Manual moving: small loads very frequently	C.L.OCRA method

- Describe the method used for the “first level” assessment: ISO 11228/3 checklist, OCRA, EAWS checklist, etc.)

During the industrialisation phase the Ergo-UAS method will be used (EAWS checklist)
During the risk analysis phase, the above-mentioned checklists will be used at all workstations.

- Describe the method used for the “second level” assessment: Ocra Index, Rula, Strain index, etc.
  The only second level method used is NIOSH

4.b Mode of application of assessment methods

The method proposed in ISO11228-1 at STEP 3 is used

4.b.1 Risk assessment of different work cycles

a. Data collection on different risk factors: does the analyst film the work cycle, or does he limit himself to a simile observation?

The data is collected by direct observation at the workstation by two ergonomists.

b. Calculation of the different risk factors:

- Frequency of actions per minute: describe the counting method used to determined actions carried out by the worker during a work cycle

In order to calculate the frequency of actions in C.L.OCRA, the technical actions performed during the time unite are defined (a.t. = action involving joints, muscles, tendons of the arms)

Exertion: Describe the calculation method used to determine the exertion by the worker during a work cycle (Borg scale, dynamometer, etc.).

During the industrialisation phase the measuring instruments used are:
Dynamometer, ergonomic glove (piezo-resistive exertion measuring systems)

During the process phase the Borg scale will be used.

- Posture: describe the methods used to calculate the posture angles adopted by the worker during work (angles of joints of the arms: wrist, elbow, shoulder).

For each technical action defined the posture adopted by the various segments of the arms is analysed: the observation is made by calculating the time during which the arm remains in a dysergonomic position with respect to the shoulder (flexion, extension, abduction), to the elbow (flexion-extension and pronation-supination) to the wrist (flexion-extension and radio-ulnar deviations) and to the hand (type of grip).

4.b.2 Assessment of the risk to which the individual worker is exposed

- Calculation of the risk index of a worker: Are the different work cycles completed by a worker during a shift taken into account in the risk assessment? (If, for instance, a worker performs three different cycles, his overall risk index will depend on the level of risk and the duration of each of the cycles completed).

There are no activities in FGA that are divided into multi-tasks and the work cycles do not differ between one shift and another. Consequently, analyses are carried out for titular line workers of the workstation in the different shifts with respect to the same work cycle

4.b.3 Risk prevention measures

Does the company implement preventive measures when the risk level reaches the “yellow zone” (medium risk)? Or only when it reaches the “red zone” (high risk)?

The measures used include the following: workstation rotation, ad hoc training programmes and / or refreshment training courses, apart from health supervision. Any workstations in the “red zone” are the object of an immediate technical intervention and / or balancing of the workload of the line activities.

- Describe in detail the type of preventive measures taken in the company:

Measures pertaining to the structure of the workstation (aimed at avoiding risky postures and inappropriate exertion by the worker); measures pertaining to the organisation (task rotation, reduction of work pace, introduction of breaks, etc.).

Operators are appointed to the workstations whose physical characteristics suit the height of the workstation. These operators are given appropriate training and practice. In cases in which inclusion loads exceed the limit values established by the rules for the use of force, appropriate work equipment is assigned (manual devices, tie pullers, device for manual tacking, etc.) or suitable PPEs to reduce the exertion of hand exercised pressure.

Job rotation and jump seats are in any case included as organisational options.

5. Training for trade union delegates on ergonomics and the organisation of work

- Describe the characteristic elements of the training courses taken by the representatives, in-house and/or at the trade unions, on work metrology methods (pre-determined times and methods: MTM, etc.), and on ergonomic risk assessment methods (OCRA, EAWS, etc.), by specifying the number of hours of training courses, the number of representatives concerned, the type of instruction (supervised courses, group work, etc.), training courses intended for workers.

The trade union organisations organise training courses on work metrology and ergonomics. Certain trade union representatives obtain a certified training level.

What training for delegates and Workers' Safety Representatives?

The training for WSRs is planned, carried out and checked by a joint body composed of trade union and company representatives.

What level of consultation and participation of the representatives?

In addition to the moments of consultation stipulated by law, the employment contract provides for a system of participatory relations in which there are joint committees and procedures for the management of critical situations.

On the issue of the production process an Organisation and Production Systems Commission operates.

6. Trade union leeway on ergonomics and organisation of work

6.a Access to data

Describe the characteristics of the data communicated by the company to the trade union representatives concerning the work metrology methods (times and methods: MTM, etc.) and the ergonomic risk assessment methods (OCRA, EAWS, etc.)

The WSRs have at their disposal all the risk assessment data.

With regard to an individual workstation, workers have access to data concerning them by asking their respective superior. Workers may request the assistance of a trade union representative.

Ergonomics Project in the Automotive Sector

Seminar Florence – 16 and 17 July 2012

Detailed minutes

1st day (Monday 16 July 2012): General approach – sociological aspects

Opening by Wolf Jäcklein – industriAll Europe

Welcome speech by Enzo Masini (FIOM-CGIL)

- Necessity for the European trade union organisation to conduct research into working conditions and health in the workplace.
- Difficulty for workers in participating in improving working conditions to safeguard their health and safety.
- Interesting to address the differences between companies and countries in Europe and consider the different paces of work and their impacts on workers' health.
- Efforts at presenting solutions to bad practices and bringing about improvements.
- Framing of an autonomous point of view as a European trade union on the occasion of an exchange of ideas at global level.
- Necessity to negotiate better agreements to safeguard workers' health and improve working conditions, in contrast to the current trend in companies where the aim is to increase the pace of work to the detriment of working conditions.

Presentation of the project and the objectives of this first study day – Wolf Jäcklein (industriAll Europe)

The study, which falls into two parts, concentrates on MSDs of the upper limbs on the ceiling fitting assembly line:
1st strand: empirical study to understand the implication of the organisation of work in workers' (physical and mental) health, to determine the possibilities for action on the risks, to compare and identify good practices in terms of work station layout, to create a network between practitioners, researchers and unionists.

2nd strand: development of a trade union training module on ergonomics questions, possibilities for intervention, methods of job evaluation, and the possibility of contacting those responsible for the layout of the work stations.

Funding still needs to be found for this second strand.

The objective of this first day is to analyse the working situation in the automotive sector from the point of view of researchers, trade unionists and practitioners and to determine what capacity for action we have on the ground as trade unions.

Daniele di Nunzio (IRES Rome – in charge of health and safety and work organisation): Trends in work organisation and health and safety management systems (Italian experience). See ppt at annex

Discussion

Francesco Tuccino (FIOM-CGIL) Companies should not confine themselves to applying the law, but instead, they should be implementing additional measures as part of these management systems in order to gain better control over the potential risks to health and safety. With the certification bodies being private and being paid for by the companies, the latter can get themselves certified by reference to certain health and safety standards (OSHA, ISO, etc.) simply for the sake of their image and/or to avoid undergoing checks by the monitoring bodies (in Italy, the law on health and safety in the workplace allows a certified company to dispense with checks by the monitoring bodies). The adoption of measures other than those laid down by the law in terms of health and safety at work requires the delegates in charge of these questions to be competent and know about these systems.

Wolf Jäcklein (industriAll) Do these certificates not also serve to make risk acceptable? Because a company is certified, the consequences on health are no longer the employer's responsibility. What attitude should the trade unions be taking?

Christian Brunkhorst (IG Metall) The social protection systems (professional associations, health insurance, old age insurance) have a primarily financial interest in being involved in work station management. What is their influence on the control of ergonomics, on certified systems, and on legislation?

Fabien Gâche (CGT – Renault) There is a slippage between the legislation and the reality of its application within companies. Falling staffing levels and more intense labour are cancelling out the improvements delivered by ergonomics.

The need for trade union representatives with greater knowledge of ergonomics must go hand in hand with rights for workers to express themselves about the reality of their working conditions in order to close the gap between labour prescriptions and the reality of working conditions.

We also need to beef up the trade unions' ability to intervene more globally on the issue of standards.

Daniele di Nunzio (IRES) Certification systems have some merit in promoting the image of the company, specifically vis-à-vis investors. They also help to simplify the company's management (in terms of respect for the environment, health and safety).

These certified systems also make it possible to sustain a high level of social dialogue within the company with union participation.

In Italy, the INAIL (Italian Workers' Compensation Authority) system provides for a reduction in insurance premiums if companies bring in additional measures on top of those provided by the standards to protect workers.

Companies adopting non-certified risk management systems are subject to checks by the INAIL welfare body. Several studies by the INAIL in Italy indicate that companies with certified health and safety management systems record a reduction in accidents; so the consequence of this type of health and safety management is greater well-being for workers, and lower expenses for companies.

Raymond Buchholzer (FGMM-Cfdt, retired PSA) The company chooses to supplement a Taylorian organisation with a standardised organisation. To monitor this organisation, it needs to concentrate the powers. The result is: greater flexibility, insecurity, and longer hours. It is the changes to working arrangements that generate insecurity, with the search being for longer hours.

Giuseppe Baffaert (FIM-CISL) Every company pays the INAIL fees based on the risks, under the law and with a bonus-malus system. Companies which exceed the average accidents/diseases pay more. Companies below the average pay less. The INAIL covers the salary in the event of accidents leading to an absence of more than three days.

Other monitoring systems may kick in when it comes to serious industrial accidents leading to an absence of 30/40 days. If a monitoring body believes it has to intervene on a company via checks, it will need to consider whether the company has applied a health and safety management system, but this does not involve sanctions.

Certification of a management system also involves the total implementation of constraints provided by the standard on safety, as well as a system for employee participation. In Italy, all companies with more than 15 staff must have a safety officer with powers laid down by law.

A certified management system cannot fail to recognise the worker participation system.

The safety officers are entitled to 32 hours of training and 8 hours/year of refresher courses. This is not enough; the officers' capacity and preparation need to be increased to enable them to intervene on these complicated issues.

Wolf Jäcklein (industriAll Europe) The study shows that a distinction needs to be drawn between the prevalence of the risk, worker reporting and recognition of occupational disease.

Daniele di Nunzio (IRES) The question of cause and effect is a complicated one. The objective of the presentation was to understand the functional link between a trend towards growing flexibility and continuing changes in the production process and increasing intensity of work and the necessity for the company to carry out a very rational production management control.

María José Sevilla Zapater (ISTAS-CC.OO, training for prevention officers, prevention services technician) Experiences with participatory ergonomics: ERGOPAR method (Spanish examples) – See ppt

Discussion

Franco Tuccino (FIOM-CGIL) Are there plans for a technical analysis of the possible risks associated with work station posture?

María José Sevilla Zapater (ISTAS-CC.OO) The findings of the questionnaire and the 'ergo' group make it possible to detect all the causes and risk factors. But the Ergopar programme provides other measures, such as interviews with workers and detailed observation of the work station. If that is still not enough, we can use the ergonomic study, although on a smaller sample.

Juan Manuel Gomez (MCA-UGT) Can a system like this apply to the automotive sector? 80% of jobs in the automotive sector consist of extremely repetitive tasks. The application of the measures depends on the companies. The simplest measures which involve no costs are applied. Are job rotation systems to avoid ergonomic risks effective?

María José Sevilla Zapater (ISTAS-CC.OO) We have some very different proposed solutions: modification of the layout of the production line, specific training, technical training-related measures. It is the measures proposed by the workers that should be applied. What is interesting is not to record whether the low-cost or costly measures are applied, but rather whether the measures proposed by the workers in the prevention group are.

We need to find alternatives to automation. Rotation might be applied if it is proposed by the workers.

The Ergopar method can be applied to the automotive sector (for example at Johnson Control for the station for fitting the seat into the car). The rotation system reduces exposure time, but by changing tasks, it is possible that the worker may call upon other movements.

Heiko Spieker (IG Metall retired VW – technical and scientific advisor): Trends in work organisation in the sector over the past few years, impact on working conditions and areas and topics for trade union action – German experiences [presentation + discussion] – See pdf and documents at annex

Discussion

Wolf Jäcklein (industriAll Europe) Heiko's presentation raises the question of the extent to which this flexibility strategy is possible in countries with demographic problems, and where the limits on this strategy lie. We have to deal with the intention of the companies which organise work and their vision of the problems and see how the implementation of the various measures to be taken can be accompanied.

Raymond Buchholzer (FGMM-Cfdt) What are the indicators set up by VW in Germany to identify the number of employees reporting MSDs or pain? Whereas in France, a recent law allows employers to shed workers on the basis of medical unfitness for the job, what are the concrete measures which are obligatory under the law or agreements to hold on to employees suffering from MSDs?

Heiko Spieker (IG Metall) In Germany, research shows that there are virtually no occupational accidents any more. Companies are researching 'quasi-accidents' by questioning workers in order to act before an accident actually occurs. Daimler, VW, Opel, etc. are contacting workers and asking where there are complaints and what can be done. The outcome is measures that need to be examined subsequently; in principle, they are a step in the right direction.

Alberto Cipriani (FIM-CISL) The idea of 'dancing and boxing' is interesting. Where does it fit in? Within the participation structures?

Heiko Spieker (IG Metall) Codetermination at VW has historical reasons, but it is also an important basis in other companies where unions regard such participation as essential, for example at ThyssenKrupp.

It is a case not solely of opposing what the adversary wants, but also of finding out what we ourselves want. We must not prevent important changes: on the contrary, we must participate in their management. We need to pursue a staff policy that accompanies staff in a credible way so that the worker understands that change will not make his situation worse but actually improve it. The other basis for codetermination is the qualification of the unionists with whom the negotiations are different.

Where there is no codetermination, reference is made to legislation, and the courts are called in.

Workers and management need to be helping each other mutually and working together.

Wolf Jäcklein (industriAll Europe) The trade union action cannot be considered in isolation, it makes it possible to have an impact on some symptoms but not with the long term in mind. Account also needs to be taken of the legislative framework which supports/permits trade union action.

Franco Tuccino (FIOM-CGIL) and Raymond Buchholzer (FGMM-Cfdt) asked about the optimisation of production and the increase of productivity.

Heiko Spieker (IG Metall) The agreement of principle at Toyota and VW is that increased productivity can bring nothing but advantages. This is the so-called 'boxing and dancing' principle. In Hanover, for example, workers have some room for manœuvre and the possibility of deciding their working conditions for themselves. Their decisions have to be applied. This makes for better acceptance of change.

Fabien Gâche (FTM-CGT) The solutions proposed with the involvement of workers, for example to reduce travel, can enable companies to justify increasing productivity and thus over-intensifying work. This then raises the question of the risk of instrumentalisation turning against workers.

Heiko Spieker (IG Metall) At VW, but also at Audi, SEAT and Poznan in Poland, there is an agreement of principle. If productivity is increased, then an examination is carried out to find out whether this lightens the burden on workers. Workers have to be allowed to apply what they think is right for them (e.g. micro-breaks). Good proposals are rewarded.

María José Sevilla Zapater (ISTAS-CC.OO) Pilot trials at Campofrio sought to reduce time, but with an agreement that provided for compensation through an increase in encouragement measures and increased recovery time (micro-breaks). This leads to improved working conditions.

In Spain, the trade union advisory committee (CSC) should be a joint body for decision-making. But it does not always deliver concerted decisions; this depends on the management, and where employees make proposals, the final decision to implement a measure lies with the company.

Zinta Podniece (manager EU-OSHA, Bilbao): comparative aspects in Europe regarding interactions in terms of work organisation and working conditions in the automotive sector. Presentation by EU-OSHA (founded in 1976) – See ppt at annex

Discussion

Raymond Buchholzer (FGMM-Cfdt) With MSDs presented as multi-factor disorders, it is crucial to understand the environmental factors which promote their development.

In France, it is assumed that stress is the worst factor and that it is therefore responsible for MSDs.

Giuseppe Baffaert (FIM-CISL) More cases of MSDs are being recognised today than 20 years ago. Did they not exist previously, or were they neglected in the face of other, more serious, problems? Are people taking more care over their health?

Heiko Spieker (IG Metall) It has to be recognised that people's attitude to health has changed. There is a growing awareness, and people are much more attentive and quicker to turn to specialists when they have problems.

ROUND TABLE (researchers + trade unionists): what is the scope for trade union action and which strategic approach?

Chaired by Christian Brunkhorst (IG Metall)

Participants: Daniele di Nunzio (IRES), Jean-Michel Miller (Eurofound), Zinta Podniece (EU-OSHA), Heiko Spieker (IG Metall), María José Sevilla Zapater (ISTAS-CC.OO), Raymond Buchholzer (FGMM-Cfdt), Fabien Gâche (FTM-CGT)

Christian Brunkhorst (IG Metall) What can we do with the resources available? VW is a special case in Germany, and the situation is very different for subcontractors.

What would be the recommendations to the unions? How can they work in a more targeted way to improve workers' health?

Daniele di Nunzio (IRES) The German experience is positive. We need to be gathering our good practices in order to harmonise our actions.

We need to invest in training workers' representatives and in the quality of the training. We need to include not just standards on quality (of production, etc.) but also aspects around the quality of work, the competences of the workers' representatives and the quality of the social dialogue.

The role of the other (external) experts needs to be reinforced.

Christian Brunkhorst (IG Metall) What can science do?

Jean-Michel Miller (Eurofound) We need to distinguish between the world of research and the world of the players. Research analyses and presents the results to the players, but it is for the players to bring about changes. Research makes it possible to track the evolution of the situation and surveys provide a clear image of the situation because the people questioned have a good understanding of their own situation.

Welfare at work (motivation, personal development, etc.) is more difficult to tackle through surveys, partly because of the different levels: there is a European regulatory framework, which has repercussions for the national level, with consequences at sectoral level.

Work organisation is a whole field of activity to be explored. The social dialogue is a method of intervention in which we need to be investing.

The Commission's framework directive stipulated an obligation for a risk assessment before being able to have an opinion on the situation in companies. The project worked on the assumption of nil-risk for micro and macro-companies.

Zinta Podniece (EU-OSHA) According to some very new indications, MSDs are due to several factors. We are looking at the influence of psychological factors, and we need more proof on the subject and more practical research.

María José Sevilla Zapater (ISTAS-CC.OO) There is an interaction between psychosocial factors and ergonomic factors. Workers and their representatives must participate in the design of work stations. We need to provide mechanisms to guarantee active participation.

There needs to be an obligation to provide risk management procedures. This is another area for trade union action.

Christian Brunkhorst (IG Metall) Is the presence of three retired experts symptomatic when looking at issues of ergonomics?

Heiko Spieker (IG Metall) We need to shift away from research into MSDs and towards an examination of the factors that make it possible to keep in good health. Mental fatigue must be recognised and evaluated, and not just once a year at the end of the year.

IG Metall must bring in changes in the compensation policy when it is shown that the most painful jobs are also the least expensive. We cannot defend them against mechanisation.

Encouraging creativity to improve working conditions is what can produce quality. The best practices in companies are closely linked to the people, the development of an increased awareness. The law and standards are not enough. We need to see a work ethic that leads to a universally raised awareness.

Raymond Buchholzer (FGMM-Cfdt) European manufacturers have relocated all the painful jobs that were leading to MSDs into companies where the unions have a lower profile. It is important for our study to be able to make proposals in terms of improvements to working conditions that affect all workers, whether in the assembly workshops or at subcontractors.

Christian Brunkhorst (IG Metall) IG Metall considers the question of working conditions when it comes to outsourced tasks.

Fabien Gâche (FTM-CGT) The example of Germany does not match what is happening at Renault and PSA, where they constantly want to make production cheaper.

We have to take an interest in the content of the work, because that is the same as taking an interest in workers' health. Active research at Renault has shown that reorganisation turns into intensification. We have to question how to give greater weight to what the unions have to say about the organisation of work and how people can do their work better. Producing ever faster does not allow for producing quality.

One trade union approach is to train the representatives and develop workers' ability to make proposals themselves.

María José Sevilla Zapater (ISTAS-CC.OO) A doctor makes a diagnosis, but does not do prevention. That task falls to the technicians. Micro-breaks do not resolve psychosocial problems, but they do make it possible to relax the parts of the body that undergo the greatest fatigue. They are a palliative, but not a solution to the problems. Reducing exposure time and frequency does not eliminate the risk. We can resort to rotation where there are no technical solutions.

Outsourcing is also a way of outsourcing the risks which affect other workers, so it is not a solution.

Wolf Jäcklein (industriAll Europe) The consensus is that the role of workers must take priority, as it does in German unions. We have to relearn how to look at work.

It is the production line workers who can report on the situation, not a theoretical approach.

2nd day (Tuesday, 17 July 2012): Technical implementation and specific issues of the field work

Daniela Colombini (EPM[1] Research Institute): Evaluation of the biomechanical overloading risks for upper limbs and joints – addressing the various evaluation methods in terms of the benchmark standards (pitfalls for trade unionists, loopholes, elements to be considered) – ppt not available

Discussion

Raymond Buchholzer (FGMM-Cfdt) What literature are you drawing on when you say that exposure for 10% of the time at 90 degrees will generate a risk of tendinitis? Are the data that have been captured by the French labour code, specifically at the behest of the primary sickness fund and driven by the employers, what you consider to be objective?

In France, we tend to want to add other factors to the biomechanical consequences, such as the mental burden factor. A stressed worker not exposed to repetitive movements does not develop MSDs. It is a strategy by the employers which drives down the number of cases of illness reported.

Daniela Colombini (EPM Research Institute) In the case of the shoulder, application in France is very consistent compared to the literature.

A study of 2000 workers confirms the observation of first pathologies at 10% of the time at 90 degrees. The more the exposure time increases, the more the pathologies increase. This study has been used to determine the scores in the OCRA method.

As to the issue of stress, psychologists argue that a worker who is already stressed has more carpal tunnel problems or inflammation of the tendons. But a worker suffering from a carpal tunnel problem, for example, is forced to carry on working to earn his living, which is a source of stress. Psychologists should visit the assembly lines to meet the workers who need to earn their living and put up with painful working conditions.

Francesco Esposito (FIM-CISL) Why is the worker's age not taken into account?

Daniela Colombini (EPM Research Institute) There are indeed studies around age, with clinical data divided up by age bracket and by sex.

However, we have a shortage of data for the over-50 age group. Our cases look at the 20 to 50/55 age bracket.

Studies on the evaluation of risks linked to noise and stress have been conducted for 8-hour jobs. If the shift is extended to 9 or 10 hours, the data no longer apply.

Sergio Barbano (FIOM-CGIL) At FIAT Melfi, the Ergo EAWS method was introduced, and we fear that this method might create other pathologies.

Is it possible that a company like FIAT could apply a method which is not yet standard? What can we do to contest this method?

Daniela Colombini (EPM Research Institute) In Italy, it is enough to rely on decree-law 851, which stipulates that these standards must be used in making evaluations.

The EAWS method is valid in situations not calling for too much force, or too high a frequency.

Gianni Alioti (FIM-CISL) Information on the FIAT agreement

1) Ergonomics of posture and movement

Bruno Delavant intervention (see annex)

Preliminary results of the research (Francesco Tuccino, IRES Bologna) – see ppt at annex

Discussion

Carlo de Simone (FIM-CISL) At FIAT Pomigliano, the Ergo EAWS method contains factors to take account of certain difficulties in the implementation of work. Improvements have been made to the layout of work stations.

Franco Tuccino (FIOM-CGIL) At Pomigliano, measures have indeed been applied for the MSD risk factors (posture, force, load shifting). However, the added-value actions at the level of the arms are increasing, and as a result, the arms are also put at greater risk. The Mirafiori plant applies the same type of assembly system as Pomigliano. The innovations go back to 1995, but there has been no associated decline in cases of tendinitis.

Daniela Colombini (EPM Research Institute) The paramount objective is to safeguard workers' health. Attention must be paid to ensuring that the measures, even if well applied, do not create other problems by adding new actions. Safeguarding health is also plainly stipulated in the lean manufacturing method.

Our research department can supply practical information on training.

Juan Manuel Gomez (MCA-UGT) At PSA in Spain, the recording of alarms (based on lean manufacturing) issued by workers is a source of conflict, with workers fearful of alerting the management too often. The concept of lean manufacturing is thus applied incorrectly. The key point is zero waste. Companies want to apply these systems without investment, for example in ergonomics. Workers' delegates and representatives need to be better trained and better informed to apply these methods correctly. Access to the METEO system to measure actions has been possible only via the factories inspectorate, because the company was unwilling to supply the documents.

We need clear directives to harmonise the systems for evaluation and to force companies to provide correct information to workers and allow their participation. We need to see action before health problems arise, not afterwards.

Working conditions are getting worse in our sector and we need to act fast. Training for union representatives is the major aspect to concentrate on.

Wanda Strozik (NSZZ Solidarnosc) Do the companies that you have already visited have systems for suggestions to help the annual workers' evaluation? In the case of workers with no ideas, this system can be a source of stress and mental illness and might be the subject of a study.

Are workers' suggestions being taken on board? Are they rewarded? Is there an impact on productivity, on the line?

Franco Tuccino (FIOM-CGIL) There can be an incentive on the part of certain companies to modify the work station in terms of quality (zero defect) and productivity (zero waste).

When workers realised that their suggestions were being used to increase productivity and the pace of work, they started to mistrust this system. These data can be examined at the end of the study.

Cooperation between the agency in Bilbao and the trade unions: joint EU-OSHA Bilbao campaigns (Zinta Podniece) – See ppt at annex

Discussion

Zinta Podniece (EU-OSHA) The competition is indeed open to trade unions, but they have to prove that they have cooperated with the management or the employers' organisations to set up the actions. The main idea in the campaign is to work together.

Reports, problems and questions from colleagues from the field: France (Peugeot/Renault); Spain (SEAT); Italy (Fiat); Germany (Volkswagen)

Serge Journoud (FTM-CGT) The Renault plant in Douai (Scenic, Grand Scenic, Mégane Cabriolet) employs 4600 people, 2/3 of them on the production side; in-post passage time in terms of assembly is one minute. The assembly line is rigid and not at all adaptable ergonomically to workers.

For the risk assessment, the management confines itself to the legal provisions. For example, no account is taken of the recovery coefficient.

Estimates indicate that the setting up of research into added-value or non-added-value operations has gained some 20% of productivity, the objective being to gain a further 40 to 50% of productivity. At present, the average rate of commitment is 80%. The objective is to achieve 100%, with no rest period.

Of the staff, 1300 employees are recognised as suffering occupational diseases linked to MSDs. In 2011, 121 new cases of occupational diseases linked to MSDs were reported.

Unlike Peugeot, Renault does not use the METEO alerting system, which allows for statistical tracking of problems. Renault only has industrial medicine data. There is no anticipation, only monitoring of results.

The link between reduced down time, more intensive working time, physical and mental overloads and consequences, MSDs and stress is established.

Another finding common to all (unions, operators) is the early onset of MSDs, with cases of people being affected by MSDs at the age of 25-30.

Workers unfit for their job are sent to the 'employability' service, which in theory has to suggest three jobs. If no suggestion is suitable, the employment contract may be severed on grounds of unfitness.

Juan Manuel Gomez (MCA-UGT) We are the only centre in the group with a special employment service in the case of unfitness to work on professional grounds.

In Madrid, the employment centre welcomes workers with a disability of more than 33%, the legal threshold for being recognised as disabled. The job is adapted in light of the disability. We need to try and transfer this practice everywhere.

At the Vigo centre, if the suggestion is not accepted, the employment contract is severed.

Serge Journoud (FTM-CGT) It must be noted that the hardest jobs are reserved for the insecure, making it easier to get rid of them if they are not capable of carrying out the work.

Christian Brunkhorst (IG Metall) Does this mean that people under irregular conditions, in other words without an open-ended work contract, can work on the assembly line?

Fabien Gâche (FTM-CGT) Across the 3 Renault assembly plants, the proportion of insecure workers on the assembly lines is 60-75%. For them, the issue of redeployment does not arise. When they are unfit for work, Renault does not take them back on. So they are not counted in the company's statistics or social balance sheets.

Juan Manuel Gomez (MCA-UGT) At the Madrid centre, the opposite applies. The rate of insecure workers is 16-18%. Most of the workers on the assembly line are on an open-ended contract or some other type of 5-year contract allowing for early retirement.

Wanda Strozik (NSZZ Solidarnosc) At Fiat in Poland, the 5100 staff are all on open-ended contracts. Last year, 800 people on limited-term contracts were laid off.

People with medical contra-indications, even partial, work on the assembly line or in the case of invalidity, they look for other jobs.

There are lots of partial invalids, with problems with their back, their carpal tunnels, or mental illness, but we have no accurate information on the exact number. The pace of work is extremely high at our site. 30 people a month are laid off, mostly people with occupational diseases. A letter has been sent to Fiat to complain about this situation, and these people do not have the protection we would wish. The employer has more opportunities to get rid of these employees.

Sergio Barbano (FIOM-CGIL) FIAT Melfi has 5400 staff, 50% of them with reduced working capacity. The introduction of ERGO EAWS has increased production by 20-25% in 4 years: theoretical output of cars has gone from 480 in 2008 to 620 today. This pace will lead to other similar pathologies. Is it possible to intervene?

Using the example of the micro-breaks won by workers at VW in Germany, following their proposals, can we intervene to bring about less saturation at work stations? This is where research might act.

The law protects invalids, they are not made redundant. But with redundancies on economic grounds, these people will be excluded from the world of work. The trend is the same right across Europe, even though things in Germany seem a little different.

Christian Brunkhorst (IG Metall) The image of Germany being different needs to be put into perspective. Because of the adaptation of the Toyota production system, this tendency to have only profitable activities also exists in Germany, and is shared across all the manufacturers.

The innovative working systems agreed with IGM in the 1970s, such as teamwork, have been scrapped.

For economic reasons, colleagues have to accept that the pace is slowed down, and on certain assembly lines, it is only one minute. So there are some similarities.

Toyota, in addition to its production system which has been copied, also has a staff management system, which managers in Europe forget.

In Japan, Toyota is aware that workers need to be fit to work; they change station after 5 or 10 years and go on to less arduous work. This enables them to grow old within the company.

In Germany, layoffs are avoided in the case of sick workers where there are agreements, and where works councils are strong enough. These days, it is more complicated to find less arduous jobs within companies, because the tasks suitable for colleagues in difficulty (such as logistics or catering) are often outsourced.

The bodies representing the disabled, originally intended for the war wounded, are influential. They strive to find them jobs and training, and include a mechanism for protection against redundancy. Public institutions must be consulted in the event of redundancies.

Heiko Spieker (IG Metall) In Germany, every plant has to find a job for those suffering severe invalidity, otherwise they have to pay a charge. Companies employing more invalids receive subsidies, and integration offices get more money. This means it is possible to invest in job adjustments.

Regarding the possibilities for employing people with disabilities, at VW in Hanover, for example, there is an integration service which must make it possible to get employees back in their units so that they do not have to be posted elsewhere. There is a need for an accompanying programme to get them performing again. It is not enough simply to manage the situation of invalidity.

Over the past 4 years, 1/3 of people are once again able to work, 1/3 have had to be moved to a job where their limits are respected, and 1/3 have been able to retire with a decent pension.

Following the example of Toyota, attitudes to work station problems need to change. Employees are fearful of being punished if they report any problems. Yet asking the technical service for help makes it possible to improve the work and is of benefit to other colleagues.

Maria Luisa Hervia (FI.CC.OO.) This study day shows that in the automotive industry, ergonomic measures seem to be used only to increase productivity and drive down costs, and not to improve workers' health. Companies are not addressing prevention. It also has to be noted that when efforts are made to reduce MSDs, the effect is to increase mental and social problems.

Companies are really not doing their job in terms of ergonomics.

Juan Manuel Gomez (MCA-UGT) The alert system is part of those good practices which enable technicians to solve problems, but at the Madrid centre, we have a hard time persuading workers that they have to report problems because their experience makes them fearful of the consequences.

A problem that calls for investment cannot be solved unless the company decides to invest. On the other hand, there is a quality problem, workers will hesitate to flag up problems because of this culture of fear. Workers, particularly those on insecure contracts, are afraid of losing their jobs.

Ergonomics is a fine idea, but our production system is geared to an objective of maximum performance by workers. Those on insecure contracts are being abandoned, along with their problems with their backs and their wrists.

Heiko Spieker (IG Metall) Aside from the technical organisation, we have to look at the understanding of work, and at the corporate culture. Talking about things really does help to improve them.

Is it not possible to achieve work that is more productive but also easier, that workers can benefit from? You can have more breaks, and remuneration, a shorter working week and a time saver account that will allow people to retire earlier, and the possibility of being transferred to another job: there are other scenarios, it is important to negotiate on these issues.

Maria Luisa Hervia (FI.CC.OO.) Obviously we have to try to work as a team. The information, consultation and participation of workers that the European agency is talking about are anchored in the 1989 directive.

In Spain, though, this concept of working as a team with the EWCs does not work. In many SMEs, worker participation is limited to making proposals which are subject to the goodwill of the management.

The fact that the European agency is running a campaign like this shows that the culture of prevention is still not embedded and that things are not as they should be. There is a difference between the desire, the intention and the reality.

Zinta Podniece (EU-OSHA Bilbao) The situation varies from country to country, which is why the campaign has been put forward by all the social partners. We have examples of good practices, in particular in Germany, where workers and companies are reaping the benefits. But there are also examples of good

practices in Spain, which is actively involved in the competition.

Working together is important to ensure the success of prevention. It will take time for mind-sets to be changed, and things have to be repeated.

Maria Luisa Hervia (FI.CC.OO.) As a union, we are not involved in the management of companies. The trade union system in Spain is different from the one in Germany. The power of the unions in Spain is not comparable to that of the German unions. Within the safety committee, the workers' representatives receive the information that the employer wishes to give them. It is through workers' complaints that we get to understand the reality, because the documentation is kept in an office by the management. The suggestions are not generally implemented. Generally speaking, the situation is very different from what is presented here.

Fabien Gâche (FTM-CGT) There are human limits on getting more and more productivity with fewer people, particularly from the point of view of the health of the workers who work in ever more arduous conditions, and in economic terms, because rising unemployment raises the question of demand. The more we seek to gain in terms of productivity, the more unable we will be to do any prevention.

Within the company, they do no more than what will deliver a short-term profit. The optimum in a system is not the same as the sum of the optimum values of the said system. There has to be an acceptance of things that are not economically profitable, which represent a cost but which enable the company to survive from the social point of view. This question is closely linked to the way that work is organised.

Another point is the idea of playing off employees in a company in one country against those in the same company in another country, as is the case at Renault, which focuses on differences in productivity from one country to another. This attitude drives employees to agree to work more intensively in order to hold on to their jobs, to the detriment of working conditions (deteriorating health).

If we do not address these issues which affect the management of the company, people will continue to be regarded as a cost (which by definition needs to be got rid of) rather than as an investment (which creates and makes it possible to purchase wealth).

Temporary staff are going to have to be more productive than an employee on an open-ended contract if they are to have their contract renewed, and staff on open-ended contracts are going to have to be at 100% of their ability.

With people being 'standardised', why not standardise the law or social rights around the world? The unions might focus on the complementarity of the workers rather than opposition or competition. These questions are directly linked to health in the workplace and the way they are approached from the trade union point of view.

Victor Fernandez Cajide (USO) Unlike in Germany, workers in Spain receive no advantage in return where non-added-value actions are eliminated. Only the workload increases. The improvements to be applied serve only to make the workers' situation worse. Our culture is the same as in Italy or France: the aim is to increase productivity. The ergonomic aspects might be in the process of being improved, but the stress factors are increasing.

Wolf Jäcklein (industriAll Europe) A project at European level like this one does not make it possible to put forward ready-made solutions which will be applicable in all companies and in all countries. What works in one company does not necessarily work as such in another company.

However, exchanges about diagnosis, understanding and analysis of the context as well as the presentation of successful solutions do deliver some pointers which will help us to tackle the problems and find approaches that might become functional and adaptable at our local level.

Giuseppe Baffert (FIM-CISL) The two days of debates have shown us some problems, which is necessary.

However, we have to stress that in big companies, improvements to working conditions have been brought about, and there have been adaptations to the person on the production side. Research should deliver some results that focus on the positive aspects. Simply stressing the negative aspects is discouraging. We have to focus on our negotiating and participation capacities in order to improve the situation. For example, the 2009 FIAT agreement on a pilot scheme on safety, which provided for a system to capitalise on knowledge and participation, made it possible to pinpoint 1500 ergonomic aspects, half of them being resolved.

Final questions & conclusions Wolf Jäcklein (industriAll Europe)

The management at SEAT has been approached for the case study, but it has not yet reacted. We would need to intervene in support of this request, perhaps via the VW group.

Thanks to the participants, speakers and interpreters.

The final conference for this 'Ergonomics' project will be held on 23 and 24 January in Brussels.

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