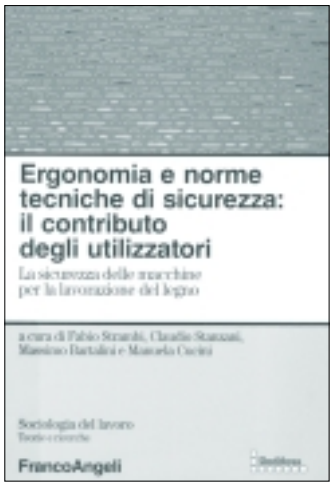
# Safety of woodworking machinery : benefitting from workers' experience




*Ergonomia e norme tecniche di sicurezza: il contributo degli utilizzatori. La sicurezza delle macchine per la lavorazione del legno* (The user input to ergonomics and technical safety standards. Safety of woodworking machinery).

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Following a data collecting project run in co-operation with the Swedish union LO in 1997, the TUTB commissioned SindNova, an Italian trade union institute, to develop a research project to involve workers and firms in assessing the effectiveness of technical standards on the safety of woodworking machinery.

The project was carried out in 1999 in Tuscany, Italy, by Fabio Strambi and colleagues from the Siena Local Health Authority Unit (USL). The outcomes were published under the title: *Safety of woodworking machinery in the Val d'Elsa: ergonomics and technical standards. Collected data on user input*[1], along with a series of articles dealing with safety, ergonomics and technical standardization in the woodworking industry (see inset).

This article reviews the project's methodology and main results, as well as future developments. Ongoing TUTB projects following up on the outcomes of this Italian pilot project are also described (see box p. 23).

## Introduction

The project run in Val d'Elsa, Tuscany in conjunction with the Local Health Authority Unit (USL) aimed to introduce a participatory model in a specific high-risk industrial environment, collecting input from machinery users and integrating it into a strategy for improving machinery technical standards.

In 1998, Europe's wood and wood products industry suffered around 90 000 work accidents involving more than 3 days' absence from work. Fatalities rose by 5.0% in the period 1996-98. This is significant, seen in the context of the high risk in manufacturing workplaces of 1 to 9 employees, where the relative incidence is 28% above the industry average. Finally, a 1999 labour force survey identified craftsmen (+64%), and installation and assembly workers and machine operators (+55%)[2] as particularly high-risk groups.

Italy's woodworking industry is made up of more than 90 000 companies employing 370 000 workers in all – half of them craftsmen. Few of these companies employ more than 100 workers.

The woodworking trade in general industry rates as one of the most hazardous occupations in Italy. Rotating devices, cutting or shearing blades, in-running nip points, and meshing gears are examples of potential sources of workplace injuries, while crushed hands, severed fingers, amputations, and blindness are typical woodworking accidents.

In 1997, more than 3 600 work accidents leading to more than 3 days' sick leave involved woodworking machines in Italy. Over half these were in Tuscany, where thousands of woodworking sector SMEs represent the region's biggest economic resource.

## The Italian Context

The National Industrial Injuries Insurance Institute (INAIL) is the main source of information on work accidents due to the obligations laid down by Presidential Legislative Decree (DPR) No. 1124 on compulsory insurance of work accidents and occupational diseases.

INAIL also has to submit to the National Health Authority annual data on workplace accidents and occupational diseases, together with a list of all companies insured. The Ministry of Health then sends relevant data out to all regional authorities. INAIL is also set to work with the central OSH agency ISPESL to develop new criteria for collecting and analysing data on workplace risk factors, but that is still very much a work in progress.

However, Legislative Decree 626/94 – transposing Directive 89/391/EC – has introduced into Italy's industrial relations system a new framework for enterprise representation, a network of joint regional bodies, and consolidated main offices for tripartite consultation. Workers' safety representatives (RLS) now have rights to access information, training, consultation on health & safety issues; trade unions and employers' associations can meet within *joint regional committees* to discuss and promote initiatives to improve working conditions; while the Standing Committee for Accident Prevention and Health examines operational issues of implementation of health and safety provisions in a framework of practical social partner involvement.

## Basic source of information

In the first phase of the project, figures on woodworking sector accidents were culled from INAIL and from the Tuscany regional authorities so as to identify the most dangerous machines.

The research was then widened by collecting accident information from the Val d'Elsa USL, which has been collecting medical certificates and police reports in connection with work accidents for the past ten years.

The finding that **circular saws** and **spindle moulders** were responsible for most accidents was consolidated

[1] *La Sicurezza delle Macchine per la lavorazione del legno in alta Val d'Elsa: ergonomia e norme tecniche. Come raccogliere il contributo degli utilizzatori*, Fabio Strambi, Massimo Bartalini, Manuela Cucini, Simone Pintaldi, Corrado Barone, Alessandro Fattorini, Marta Dei, Marco Fanti, Claudio Stanzani.

[2] Eurostat, *Accidents at work in the EU 1998 - 1999.*

by analysing ISPESL's investigations into the worst accidents occurring in the Val d'Elsa region over the previous nine years. Relevant technical standards and various technical documents were also collected.

Local trade unions, employers' associations, and workers' safety reps (RLS) from different woodworking firms then attended workshops to identify the different parties' expectations of machinery safety, and to map out the strategy for phase two.

## Working group activity

The analysis of accidents involving woodworking machines and the preliminary meetings of all parties involved were useful in pinpointing companies to be inspected to glean further information on how woodworking accidents happen. Preliminary inspections were to examine the working environment of the machines being studied, and describe it on special risk filter forms. Each company's accident book was then consulted to single out those involving **circular saws** and **spindle moulders** for further analysis.

In-depth analysis of single accidents now enabled the following aspects to be identified:
- poor machinery design;
- regulation machine guarding, but inappropriate or poorly designed;
- machine guards, even if in place, misused by the worker;
- inappropriate operating procedure.

Working groups were then formed, each group being made up of workers using the same machine (even if in different companies), employees and/or employers with technical knowledge of that machine, and technical staff from the public prevention service.

Initially, each working phase was split into "basic operational tasks", which were examined to identify *operating procedures, knowledge base, risk factors and suggestions for injury prevention*. Consideration was given to job mobility, area of performance, ongoing operations in surrounding areas, specific hazards in the area, relative age of the workforce and job experience, applicable health and safety rules, and recognition of abnormal or unforeseen problems.

This was the time to validate the assumptions made by the experts in accident categorization, with the workers acting as key players in evaluating their own working environment. This information was tabulated as shown in the table below.

This systematic approach was overseen by experts from the public prevention service, which promoted and coordinated an open debate, and compared workers' input with past accident investigations and technical standard provisions[3].

This exacting review of work *processes* was supplemented by an analysis of instruction books provided by manufacturers and user instructions compiled by employers.

From this exercise, recommendations were drawn up specifically addressing the provisions of relevant technical standards, as shown in the tables page 22.

| Task | Operating Procedure | Knowledge Base | Risk Factors | Suggestion for Injury Prevention |
|---|---|---|---|---|
| 1. Commissioning | Protection hood selection and setting up. | Angle work often requires changing of protection hood in order not to jam against the edge of the board and prevent cutting. | Incorrect hood selection leads to potential contact with saw blade. | Accessories to be provided so as not to perform cutting with unsuitable hood. Proper training in selecting protection hood. |
| 2. Small workpiece cutting | Finishing work to be carried out by means of push block or push stick to push workpiece against the blade. | Push block must be carefully selected in relation to stock characteristics. | Finishing work and angle cutting may expose operator's hands to contact with the blade. | These sticks protect the hand while allowing good hand control of the stock as it is pushed through the cutting head or blade *only if carefully selected*. Instructions for use must address proper stick selection. |

[3] In particular EN 848-1:1998 (CEN/TC 142) Safety of woodworking machines - One side moulding machines with rotating tool - Part 1: Single spindle vertical moulding machines, and EN 1870-1:1999 (CEN/TC 142) Safety of woodworking machines - Circular sawing machines - Part 1: Circular saw benches (with and without sliding table) and dimension saws.

| Recommendations | EN 1870-1:1999 relevant provisions to be improved |
|---|---|
| The standard does not address the manufacturer's obligation to define minimal dimension of removed wood chips, so as to use both protective hood and push stick in the space between hood's lateral edge and the rip fence. Minimum dimensions of workable stocks to be defined according to protection hood characteristics. Protections hood ought to be used even if push sticks are used. | 5.2.7.1. Guarding of the tools<br>5.2.9. Safety appliances |

| Recommendations | EN 1870-1:1999 relevant provisions to be improved |
|---|---|
| The risk of cutting, abrasion and stabbing during the manual handling of tools (blades) and raw material (especially some type of wood) is not considered and the related hazard is not included in the list of hazards.<br>The use of suitable gloves is not recommended for handling tools and raw materials.<br>The use of suitable safety shoes is not recommended to protect workers' feet from falling tools and raw materials. | 4. List of hazards<br>5.2.3. Protection against mechanical hazards: tool holder and tool design<br>6.3. Instruction handbook |
| Provisions concerning the dimensions of machine table and extension table, the distance between the centre line of the saw spindle and the far end of the table (or table extension), the table height, should be improved to follow a coherent ergonomic approach which takes into account the position of the workers.<br>Tipping of the workpiece is a common cause of accidents : maximum dimensions and weight of workpieces should be suggested depending on table dimensions. | 5.2.6.2. Table size<br>Annex E, Machine table and insert minimum dimensions<br>6.3. Instruction handbook |

Other recommendations not referred to specific standard provisions were also classified:

| Recommendations | Addressee |
|---|---|
| ▪ Manufacturers of dust collection systems should provide the user with instructions on how to monitor design performances over the life cycle of the system.<br>▪ Workers should be given information on how to safely perform finishing work when manoeuvring stocks in close proximity to blades; workers should be given information on how to periodically assess guard and safety device characteristics over the time, as well as information on maintenance.<br>Workers should be informed about the training they must receive on the use of work equipment. | ▪ Manufacturers<br>▪ Employers |

Workers were also given questionnaires to evaluate what they knew about safe work practices, machine guarding, and protection devices, and were also asked for their opinions and comments to co-workers, employers, and manufacturers.

## Conclusions and comments

The project successfully demonstrated the benefits of collecting user experience with work equipment, as well as data on accidents and near misses, to make technical standards more effective in specifying safer working environments.

The methodology could be systematically applied to monitoring specific machines in order to develop recommendations for new or existing technical standards.

After selecting an economic sector, relevant work equipment, and geographical areas in which the machine to be studied are sufficiently widespread, an Observatory made up of representatives of trade unions, public prevention experts, manufacturers and workers' safety representatives would carry out a preliminary study to classify accidents and near-misses involving the work equipment under study.

Working groups would then look at the work activity in the round, in order to frame recommendations which addressed specific provisions of standards.

The Observatory would collect the working groups' recommendations, and consolidate them to address the different parties.

*Manufacturers* would be asked to improve machinery design by developing solutions to the problems identified (e.g., making protection systems more usable[4]) and periodically update the instructions for use in the light of relevant comments and suggested improvements. The file might then be submitted to Notified Bodies (at least for Annex IV machinery). Collecting information on accidents or near misses involving a machine might also possibly be made an obligation for the manufacturer.
*Employers* would make good use of manufacturers' indications by incorporating them in training provision for workers to reinforce safe behaviour.
*Workers' Safety Reps* would be helped to identify appropriate prevention programs to be run in individual companies in co-operation with employers, based on workers' demands and suggestions.
*Standards developers* would have relevant supplements to the five-yearly revision process of technical standards.
*Public authorities* would be able to improve existing accident databases and possibly set up new ones to support prevention strategies. ■

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[4] The analysis of accidents involving circular saws and spindle moulders showed that protection of workers relies on safety devices which must be – from time to time – selected for the specific job, properly set and correctly used. EN 1870 - for example – needs improvement as regards setting of devices to avoid contact with the saw and the *refusal* of the piece.