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THE PREVENTION OF ACCIDENTS RESULTING FROM THE USE OF MACHINERY: TODAY'S EXPERIENCE AND CHALLENGES FOR THE FUTURE

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TUTB attaches great importance to the identification of issues affecting the health and safety of workers. In particular, TUTB is well aware of the still high rates of accidents and injuries caused by machinery in many European countries. TUTB is convinced that accident prevention relies on machinery designed by taking into account input from the workers who are exposed to risks at work on a daily basis.

Over the years, TUTB has continually stressed the need to better explore and take into account the human-machine interface for all conditions of use, as well as the necessity of integrating machinery design with information based on the actual experience of machinery operators.

The 1999 European Union labour force survey illustrates the high risks involved in manufacturing workplaces of 1 to 9 employees, and identifies craftsmen, machine operators, and installation and assembly workers as particularly high-risk groups[1].

These groups of workers use a large majority of work equipment covered by the Machinery Directive. It is worth noting that in Europe, the health and safety of millions of machinery operators is largely dependent on the manufacturers' sense of responsibility, since for as much as 95% of all machines sold in Europe the manufacturer can declare that his product meets the requirements of the Machinery Directive without the intervention of a third party.

So, what happens when essential aspects of equipment design are underestimated or even ignored by manufacturers, who are often unaware of the real conditions in which the equipment is operated? There is evidence that managers of SMEs are slowly beginning to learn how to improve their ability to inspect machines before purchasing them in order to determine whether they are safe or not. As their knowledge improves in their contacts with suppliers, they are becoming more proactive about identifying safety deficiencies.

But choosing a good machine is only one part of the picture, as it must also be adequately integrated into the workplace. Good workplace organisation is an essential prerequisite for the improvement of health and safety conditions. In particular, for SMEs, it is an essential precondition for any integrated prevention policy covering all work-related factors that workers should become active protagonists of accident prevention.

However, for small companies, occupational safety and health issues are often only one of a great number of concerns. Furthermore, promoting occupational safety and health through appropriate prevention

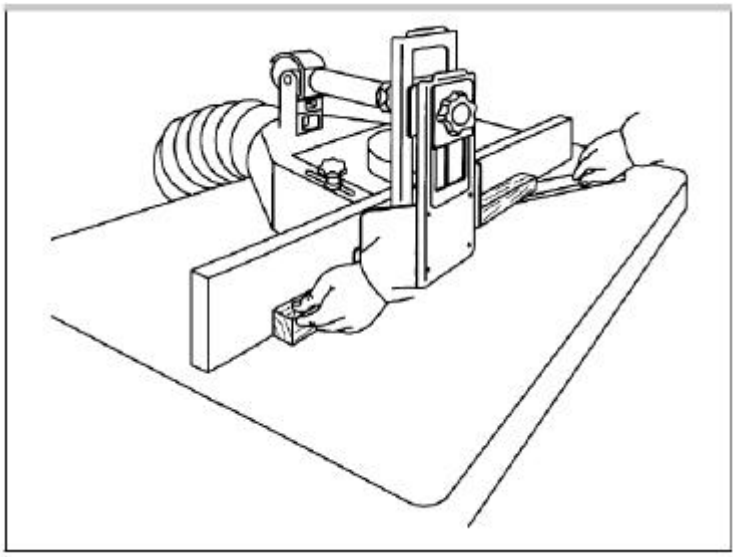
[1] Eurostat, Accidents at work in the EU, 1998 - 1999.

programs is often a difficult task for small businesses because of the dispersion of workplaces, the variability of work settings, and the small number of workers who can be reached at any one workplace. Also, in SMEs, employers often lack the resources to develop an expertise and familiarity with rules, obligations and procedures on machinery safety. While larger corporations can afford the services of full-time safety personnel, small firms often cannot.

TUTB will present an Italian experience that illustrates the difficulties and challenges of integrating machinery into SME's workplaces and preventing accidents. It is currently applied at regional level.

In this experience the strategy for preventing machinery accidents in SMEs is initiated by selecting an economic sector, relevant work equipment, and geographical areas in which usage of the selected machine is sufficiently widespread.

In particular, **spindle moulders** - illustrated in the following pictures - are still associated with a large number of accidents:



An observatory is established made up of representatives of trade unions, public prevention experts, manufacturers and workers' safety representatives: The observatory carries out a preliminary study to classify accidents and "near misses" involving the machinery in question. Accident data is mainly collected from the National Institute for the Insurance of Workers' Accidents (INAIL). In-depth analysis of single accidents enables the identification of relevant causative factors such as:

1. poor machinery design;
2. inappropriate or poorly designed machine guarding;
3. machine guards, even if in place, misused by the worker;
4. inappropriate operating procedure.

Working groups are formed where each group is 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.

The working groups analyse each working phase and split them into "basic operational tasks", which are examined to identify *operating procedures, knowledge base, risk factors and suggestions for injury prevention*. Consideration is given to job mobility, performance area, 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.

Then the assumptions made by the experts in accident categorisation are validated or tested, where the workers act as key players in evaluating their own working environment. In this phase a significant result is achieved through the identification of all behavioural aspects – rarely described in accident reports – and without which it is difficult to plan and implement prevention measures.

This information is then tabulated as shown below:

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 work piece cutting	Finishing work to be carried out by means of push block or push stick to push work piece against the blade	Push block must be carefully selected in relation to stock characteristics	Finishing work and angle cutting may expose operator's hands in 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.

The review of the work processes is supplemented by an analysis of the manuals (provided by manufacturers) and user instructions compiled by employers.

From this exercise, recommendations are drawn up specifically addressing the provisions of relevant technical standards, as shown in the following table, which deals with 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:

Recommendations	EN 1848-1:1998 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. Suitable gloves use is not recommended to handle tools and raw material. The use of suitable and safe shoes is not recommended to protect workers feet from tool and raw material falling.	4 'List of hazards 5.2.3 Protection against mechanical hazards: tool holder and tool design 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 baseboard height, should be improved in the light of respecting a coherent ergonomic approach taking into account the position of the workers. Tipping-over of the workpiece is a common cause of accidents: maximum dimensions and weight of workpieces should be suggested depending on baseboard dimensions.	5.2.6.2, Table size Annex E, Machine table and insert minimum dimensions 6.3 Instruction handbook

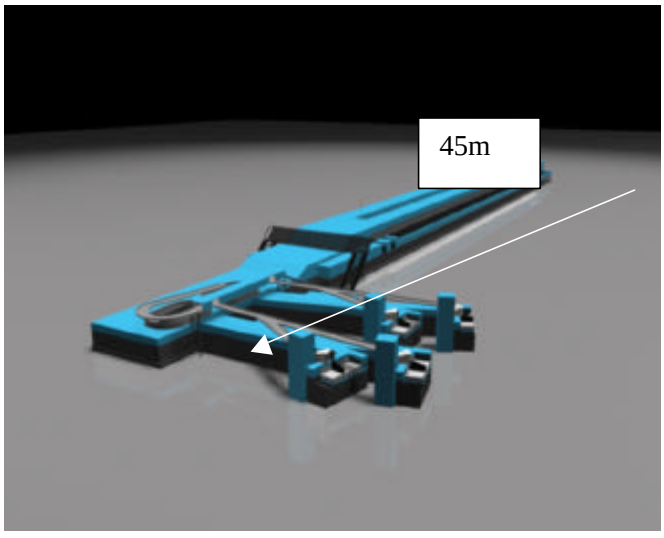
This approach – tailor-made for small establishments – illustrates that collecting user experience with work equipment *and* data on accidents and "near misses" can be effective in improving machinery design and technical standards for a safer working environment.

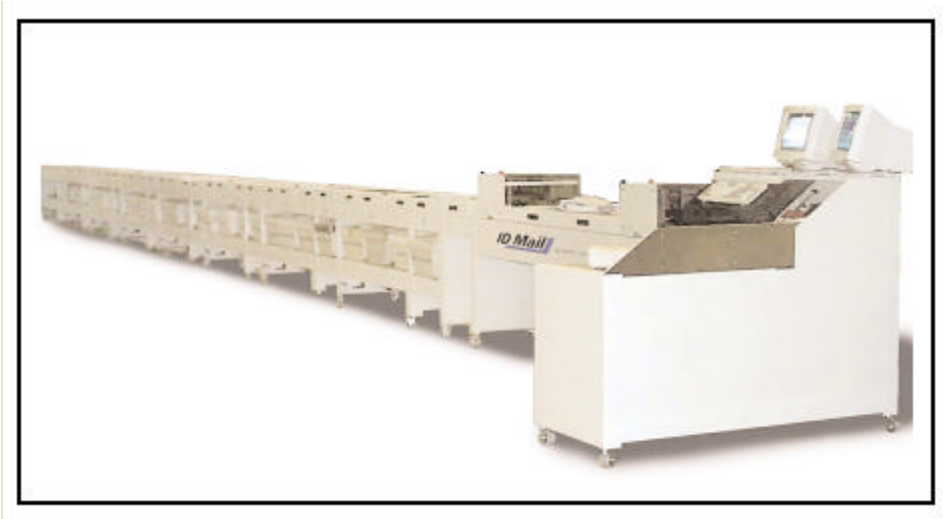
It is a invaluable experience to allow the worker to participate in this process because it means that the technical standards of the machinery they use will become worker rather than designer oriented.

TUTB is currently carrying out a research project on participatory strategies for machinery design, which also includes relevant cases studies implemented in SMEs.

An experience currently carried out in UK, in a public limited company wholly owned by the Government, will be illustrated.

It concerns a new automated system for sorting A4 flat mail pieces, as shown in the two pictures below.





The approach in customizing the new equipment by means of working groups comprising a wide representation of operators will be illustrated.