European Federation of Building and Woodworkers

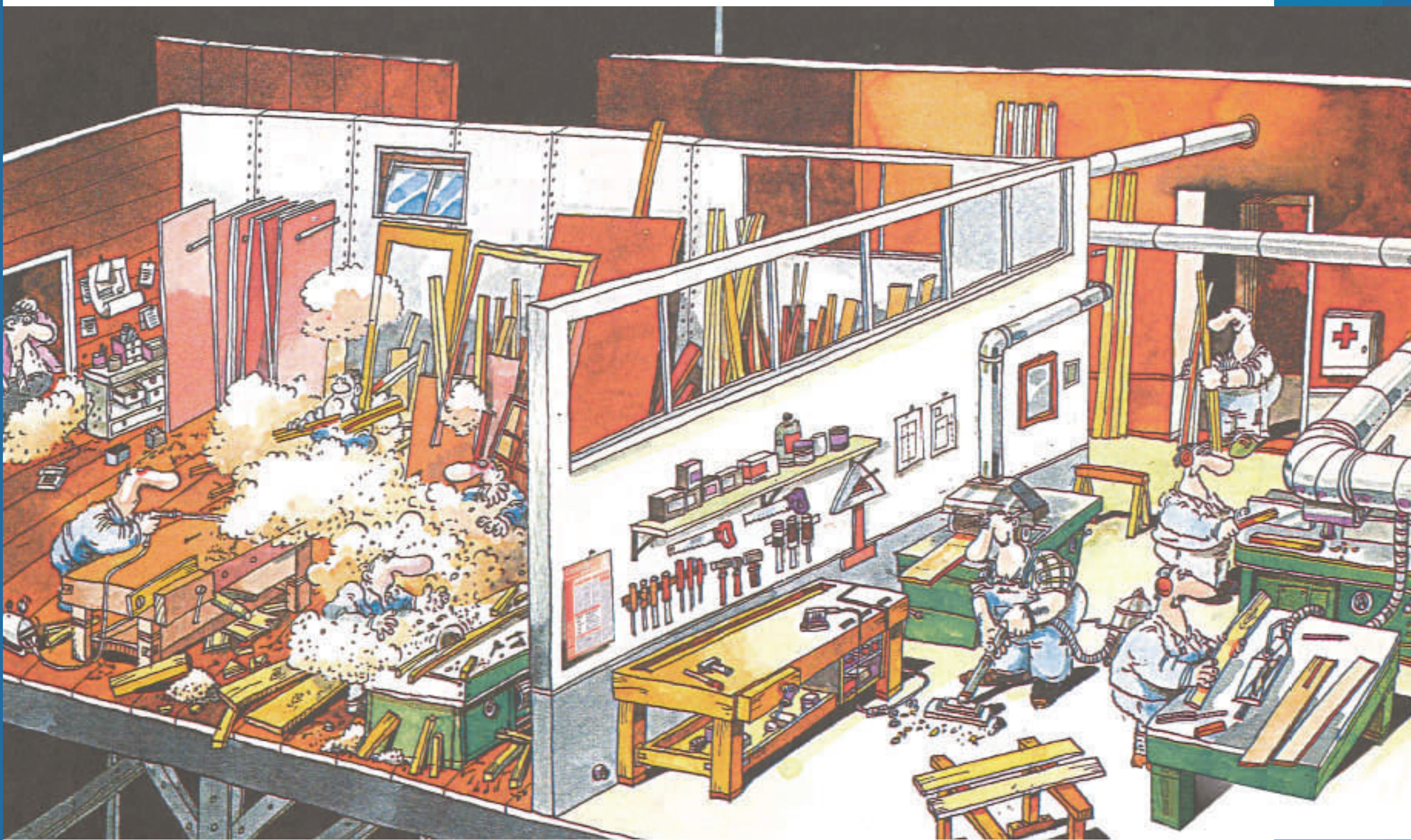
EFBWW

CEI-Bois

REGIONE TOSCANA

SST Azienda USL 7 Siena

Servizio Sanitario della Toscana



LESS DUST

This report was drafted by the EFBWW, CEI-Bois and Usl7.

With the financial support of the DG for Employment and Social Affairs of the European Commission.

Foreword

The European social dialogue for the wood industry plays an important role in a sector with a long tradition as part of the overall economic fabric. Wood and the occupations which have evolved around this raw material are economically significant, are in the vanguard of design, of interest from a technological viewpoint, and in this respect the woodworking sector has always been an engine of innovation – right up to the present day.

The woodworking and furniture industry currently employs about 2.9 million workers in Europe and encompasses dozens of occupations. This sector accounts for some 6% of total economic activity of the manufacturing industries and commands an annual turnover of 270 billion euro.

In the current debate on climate change, wood is gaining in popularity as a renewable raw material as well as a climate neutral contributor to economic activity and, we believe, will have a part in many innovations in the near future. It could be said that the sustainability of the raw material wood has come into its own. And we are happy about that.

However, this also brings us to the basic thinking behind the project, the findings of which are set out in this booklet. In a complex structure, sustainability can only be understood in its overall context and never in a causal sense. And the economy has always been a complex thing.

In this sense, we believe that high quality products, good working conditions, interesting jobs and also opportunities for improving skills and for development are all closely interlinked.

Against this background, as part of their European social dialogue for the wood industry, CEI-Bois, EFBWW and A. Usl7 Siena have conducted a project on minimising wood dust exposure in the different branches of the woodworking sector. The project ran for one year and the main findings are spelled out here.
Besides general information about the potential effects of wood dust on health, a host of good examples are given of ways to reduce wood dust exposure, some by very simple means. In addition, and from our point of view this represents a new step in European social partner projects, the findings of two workshops, at which manufacturers and users of woodworking machinery (i.e. producers and consumers) entered into a fruitful dialogue on the problems of wood dust exposure, are documented.

We hope that all those who read this booklet will find it useful. Practical prevention is one of the key factors in improving the work environment and thereby also contributing to sustainability in the sense of protecting people's capacity to work as well as the significant contribution of wood to the economy as a whole. We shall in any case seek to continue along the path opened up by this project.

EFBWW	CEI-Bois	A. Usl7 Siena
Sam Hagglund General Secretary	Filip De Jaeger Secretary-General	Laura Benedetto General Director

Table of contents

Foreword 3

Table of contents 4

Introduction 5

Good practice examples 12

1. Short checklist for wood dust 12
2. "Wood Dust – No thank you!" 13
3. Good Housekeeping - Less Wood Dust 15
4. Two solutions aimed at reducing wood dusts in the sector of the "wooden frameworks for sofas and armchairs" 18
5. Capture device for spindle vertical moulding machine 23
6. Capture device for CNC 4 axes router machine 24
7. Example of financial support for small and very small enterprises providing access to prevention measures 25
8. Example of the French scheme introduced by the National and Regional Sickness Insurance Funds in partnership with the Industrial Sectors 26
9. Primary requirements for filter and exhaust equipment 28
10. Net sanding by Mirka - The dust-free solution 29

Standardisation and prevention 31

Report from the two work shops 40

1. Workshop on stationary machines and CNC equipment 40
2. Workshop on manually operated machinery 45

Joint Declaration between CEI-Bois, EFBWW and A.USL 7, Tuscany Region, on Working Conditions and Wood Dust 50

Introduction

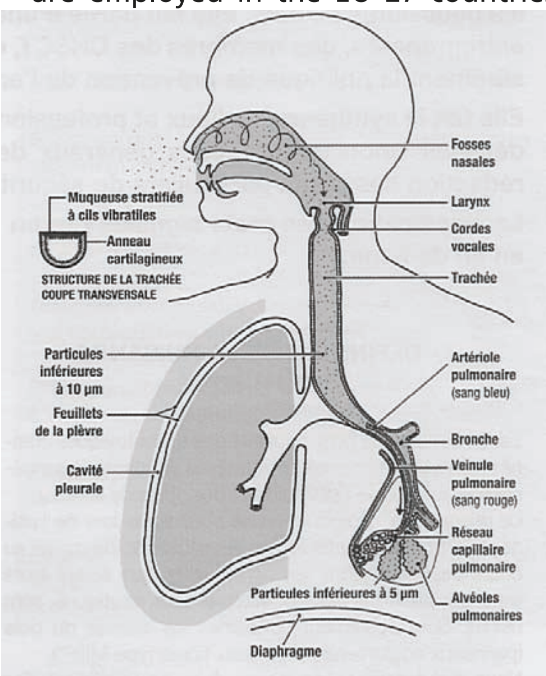
Wood: A Wonderful Material

Wood is a natural, versatile and excellent working material. If we were to write a cultural history of wood, it would coincide with the cultural history of the human race. It has accompanied the very earliest expressions of human culture as a material for making fires, weapons, building homes, making storage vessels, transport, for creating art objects and many other uses.

The fascinating thing about this history is that wood has lost none of its values as a contributor to human activity. In all the areas of application listed above, wood has played a significant role until now. We will just mention here two more recent developments which demonstrate the continued viability of this material in future:

- Nowadays, wood has many applications, but particularly in furniture manufacture combined with other materials. A constant flow of new combinations is appearing on the market.
- As already pointed out in the foreword to this booklet, wood is also justifiably playing a key role in the general debate on climate change and sustainability. And this role could and should become even more important in the future.

Today, an estimated 2.9 million people are working in the different subsectors of the EU woodworking industry. In the furniture sector alone, close on 1.5 million people are employed in the EU 27 countries in a broad spectrum of different occupations. Alongside the traditional woodworking occupations, we find designers, marketing personnel, as well as workers skilled in installing and maintaining the ever more complex technology, production planners and administrative workers. Alongside the fascination of the material and its applications, these are additional aspects of the existing and potential attraction of the sector for skilled workers and young people seeking training.



But another factor of the attractiveness of any economic sector is the fact that working in that sector will not harm the worker's health. Work shall not make people sick. For this reason, the European social partners have launched a project aimed at helping to reduce the level of wood dust which is often still too high in our sector.

What dust is?

At the workplace, dust is frequently present in far higher concentrations than in other areas of our lives. And here lies the nub of the problem.

High dust concentrations at work almost always involve high concentrations of a

single substance with specific effects on health.

Dust is a suspension of fine solid particles in gases. For our purposes, we are concentrating on airborne dusts, more particularly in the air breathed in and coming into contact with the skin, where this occurs. Of all the suspended particles (dust)s in the air around a worker only a portion is breathed in. This is referred to as the inhalable fraction. But even this inhalable dust is further subdivided into different fractions. For the purposes of describing and measuring wood dusts, the total dust is considered Europe-wide to be the inhalable dust. A large portion of the dust remains in the nose to some degree, a further fraction passes into the bronchi, while fine dust particles with a diameter of 5 µm (5/1000 millimetre) and less, referred to as the alveolar fraction, can enter the very smallest branches of our lungs, the alveoli.

According to their chemical composition, size, shape and particularly depending on their concentration and the extent of exposure, dusts have a different effect on people. In order to assess whether dust in the air inhaled or on the skin represents a health hazard, the following factors need to be taken into account:

- How high is the dust concentration?
- What size and shape are the dust particles?
- What is the dust composed of?

Incidence of dust in the woodworking industry

Europe-wide several million people are regularly exposed to wood dust in the course of their work. Wood dust remains the principal health hazard in the woodworking sector and to some extent also in the building industry, in almost all types of activity in which wood is worked by machine or manually. This is demonstrated strikingly in a study conducted by the Social Affairs Ministry of Hessen (FRG). For example, for sanding and grinding work an average dust concentration of 3.6 mg/m³ was measured; for sawing work the figure was 2.4 mg/m³; for turning and lathe work it was 8.1 mg/m³. Generally speaking, the highest exposure is reported from wooden furniture manufacture and carpentry workshops, particularly where machine grinding and similar processes are involved.

Effects of dusts

Effects	Possible risks of disease
Fibrogenic dusts	**Dust-related lung diseases**
Toxic dusts	**Intoxication**
Irritant dusts	**Irritation and inflammation of the skin and mucous membranes, cell damage, bronchitis**
Allergenic dusts	**Allergies, asthma**
Carcinogenic dusts	**Cancers**

Exposure levels exceeding 1 mg/m³ were also recorded during the final working stages in plywood and chipboard plants, where wood is sawn and sanded, as well as in the workshop air of sawmills and planning mills in the vicinity of cutting machines, saws and planning machines. Wood dust exposure also affects workers in carpentry workshops and in window and door manufacture, the manufacture of wooden boats, during laying and sanding down of wooden floors, during production of templates and models, in cellulose and paper mills, and in construction carpentry and tree felling.

Diseases caused by wood dust

Industrial medicine globally agrees that the working and processing of wood as a raw material or working material can give rise to occupational diseases. Adverse health effects occur following exposure to wood dust from a wide variety of wood species and wood materials. The main health problems are listed in the European schedule of occupational diseases:

- Acute toxic contact dermatitis (acute inflammation of the skin caused by toxic agents),
- Contact urticaria (extremely itchy allergic reaction)
- Irritant contact dermatitis
- Allergic rhinopathy (allergic disease of the nasal mucous membranes)
- Asthma
- Extrinsic allergic alveolitis
- Cancer of the nose and nasal cavity

*(**Source:** diagnosis notices for the European schedule of occupational diseases. European Commission 1994)*

In the woodworking industry and wood craft industry, diseases of the skin and the respiratory tract are occuring. They can be traced back to substances (such as phenols, terpene, benzoquinone, naphtha-quinone), which have been proved to be in over 100 different wood species. In particular, tropical types of hardwood, but also some indigenous types of wood, can be considered to be the cause of the above-mentioned complaints. The adjoining table lists the types of wood and the disease effects they cause.

There are other "natural" causes of disease in wood dust such as bacteria, mildew, mushroom and moss spores. The action of toxic and irritant substances contained in the dust is also magnified by its water-absorbing property. This hygroscopic property of the dust layer can dry out the skin or the mucous membranes and so accelerate the effects of the substances contained in the wood dust particles on the human organism.

Types of wood and health risks

Type of wood	**Origin**	**1**	**2**	**3**	**4**	**5**	**6**
Softwood							
Spruce	Europe, North America, Asia	*	*	*	*	*	
Pine	Europe, Asia	*	*	*	*		
Western red cedar	North America	*	*	*	*		
Oregon pine	North America	*	*	*	*		
Hardwood							
Red Meranti	Asia	*					
All types of oak	Europe, North America, Asia	*	*	*	*		
Bongossi	Africa	*					*
Merbau	Asia	*	*	*	*		
Beech	Europe	*	*	*	*		
Balau, bangkirai, selangan-batu	Asia	*					
Iroko / kambala	Africa	*	*	*	*	*	

Ramin	Asia	*	*	*	*	*	
Keruing / yang	Asia	*					
Okoumé	Africa	*	*	*	*	*	
Poplar	Europe	*	*	*	*		
Abachi	Africa	*	*	*	*		
Sapele	Africa	*				*	
Bilinga	Africa	*	*	*	*		
Mahogany	South America	*	*	*	*	*	
Teak	Asia	*	*	*	*	*	

1. Dermatitis
2. Actinic conjunctivitis
3. Inflammation of the nasal muscular (Rhinitis)
4. Breathlessness (Asthma)
5. Hypersensitivity of the pulmonary alveoli (extrinsic allergic Alveolitis)
6. Itchiness (Pruritus)

The incidence of disease

Allergic reactions of the skin and particularly of the respiratory organs are common. Comprehensive studies on the woodworking industry in North America, Canada and Sweden show that up to 13.5% of those exposed to wood dust suffer from respiratory disorders. Direct proof has been established of allergens in, so far, over 100 types of wood, both tropical and temperate. For instance, extensive data and studies have now established conclusively the sensitivity of the lower airways to wood from red cedar, abachi, limba and oak. There are also reports of asthma triggered by dust from pine and cherry wood, or from some types of African wood. For wood from the silver fir, gaboon, qutibe, macorè, mansonia and meranti this effect has been proven by skin tests. The same also applies to white cedar and some types of birch, for which specific IgE antibodies (skin-sensitising antibodies) were shown to be triggered.

In a recent Danish study, it was shown that a wide range of diseases and disorders of the respiratory organs can be caused by wood dust. In particular, asthmatic diseases and impairment of the lung function were found. Consequently, this also gives rise to a significant incidence of occupational disease. In Austria 15% of all recognised occupational diseases between 1995 and 2008 concerned allergic (8%) and chemical irritant (7%) asthma. *(**Source:** Sichere Arbeit 6/2009; p. 19)*

Occupational exposure to wood dust can cause cancer

Already by the mid-1960s, the first suspicions were being voiced that wood dust could have a carcinogenic effect on humans. In the meantime, studies have been carried out in many European and other countries confirming the increased risk of contracting adenocarcinoma. This has also been confirmed by the international cancer research centre in Lyon (IARC), an agency of the United Nations. Against this background, in many countries cancers attributable to the working with and processing of wood are now recognised as occupational diseases.

When discussing carcinogens at work, the question of limit values also arises. In the case of carcinogenic substances there is in fact no lower limit at which there is no longer any risk. For economic and other considerations, the practice has been developed of setting limit values according to the technically feasible level. The remaining risk is then to be minimised by means of personal protective equipment or other measures.

Overview Wooddust Limit values		
A : All kinds of wood **B** : Hardwood **C** : Softwood		
Country	Limit value – Eight hours mg/m³	Limit value – Short term mg/m³
Austria (1)	2 inhalable aerosol (**A**)	5 inhalable aerosol (**A**)
Belgium	3 (**A**)	
Denmark	1 (**A**)	
European Union (2)	5 (**B**)	
France (3)	1 (**A**)	
Finland	2 (**A**) 1 (new and refurbished factories)	
Germany (AGS)	2 (4, 5) (**A**) 5 (4, 6) (**A**)	
Germany (DFG)	- (**B**) (7) - (**C**) (8)	
Hungary	5 (**A+C**)	
Italy	5 inhalable aerosol (**A**)	
Norway	1 (**B**) 2 (**C**)	
Spain	5 (**B**)	
Sweden	2 (**A**) 0.5 (pressure impregnated wood)	
Switzerland	2 inhalable aerosol (**A**)	
The Netherlands	2 (**B**)	
United Kingdom	5 (**A**)	

Remarks:

(1) TRK value (based on technical feasibility)
(2) Indicative Occupational Exposure Limit Values [2,3] and Limit Values for Occupational Exposure [4] Binding Occupational Exposure Limit Value – BOELV
(3) Restrictive statutory limit values
(4) due to carcinogenicity, no OEL is included in the OEL list (Technical Guidance Document 900); instead, Concentration Values are prescribed in the Technical Guidance Document on Wood Dust (553).
(5) Concentration Value prescribed in Technical Guidance Document 553
(6) Concentration Value prescribed in Technical Guidance Document 553, based on state of technology for certain tasks / tools. Additional control measures are prescribed for these situations.
(7) classified as "C 3B" – suspected carcinogen; currently no MAC value derivable
(8) beech wood dust and oak wood dust classified as "C 1" – known human carcinogen; no MAC value to be derived

Whatever the case, existing epidemiological studies (studies on the diseases actually contracted by people, their frequency and progression - as opposed to animal trials) show that increasing exposure also leads to a higher risk of disease. Today it is assumed that a dust concentration of over 5mg/m3 gives rise to a considerably increased risk of disease. For a quantity of 1-5 mg there is an increased risk and only for dust concentrations below 0,5mg no increased risk is established. This is also a reason for reducing exposure wherever possible. *(**Source:** SCOEL 2003)*

Industrial medicine proceeds on the basis that earlier cases of inflammation and infection causing damage to the mucous membranes are often the origin of carcinogenic changes. Initial symptoms may be, for example: rheumy, occasional nose bleeds, one side of the nose blocked, one-sided swelling of the upper jaw, preliminary signs such as red or watery eyes. In addition, allergic and non-allergic rhinitis (inflammation of the nasal mucous membranes) is considered to be possible prior damage. Besides other impairments to the functions of the nose, the clearance function (self cleaning of the nose) has a decisive role. These diseases and prior damage can favour the development of a tumour. At the same time, the observable symptoms are fairly similar to those described earlier for allergies due to the effects of wood dust – although with fatal consequences for those concerned.

Prevention

So how can prevention measures be improved in the plants? In practice, making a distinction between the different types of wood dust is usually difficult, if not impossible. This is particularly the case for smaller craft businesses in which the types of work and types of wood and working materials are constantly changing, and many different activities take place in a small area. This is another reason why measures need to focus on a general reduction in dust levels. This objective must also be pursued regardless of the potential cancer risks as dust carries a general risk to health, adversely affects the well-being of workers and, furthermore, can influence the work flow and product quality.

Before taking action, a precise analysis of the existing risks should always be undertaken. This entails recording all influencing factors and also questioning the workers about their situation, their experiences and their proposals. On this basis, measures should be established for improving the working environment. Dust removal at source should always take priority here over personal protective equipment. This is also in line with the basic requirements formulated in the European framework directive (Directive 89/391 EU, Art. 6). The hierarchy of measures defined in Article 6 is as follows:

a. evaluating the risks which cannot be avoided:
b. combating the risks at source;
c. adapting to technical progress;
d. developing a coherent overall prevention policy which covers technology, organisation of work, working conditions, social relationships and the influence of factors related to the working environment;
e. giving collective protective measures priority over individual protective measures;
f. giving appropriate instructions to the workers.

The following chapters of the booklet set out examples of good practice in the sense of minimising dust exposure from a very wide range of applications. These include technical solutions as well as improvements to work organisation or else simple (but often hard to achieve) changes in approach to cleaning activities. But in particular we would like to highlight the last part of the booklet which contains reports on the workshops conducted as part of the project, and at which we initiated discussions between manufacturers and users of woodworking machines. We want to take this dialogue forward as we believe that technological design holds the key to less dust and therefore also to the (to use this term once again) sustainability of the sector.

Good practice examples

1. Short checklist for wood dust

Measures to prevent workers from the exposure to wood dust can be taken at very different levels and comprising various aspects of the work environment, for example the choice of work equipment, the arrangement of the workplace, the exhaustion system used but also the way how workplaces are cleaned up. For a first evaluation of all the different aspects, the following check-list is a useful example for a structured procedure. *(**Source:** IG Metall brochure: "Holzstaub? Nein Danke! Gesünder@rbeiten – Arbeitshilfe 13)*

Short checklist for wood dust	**Yes**	**No**
Risk evaluation		
Has a risk evaluation been carried out in accordance with the European framework directive?		
Inventory / risk evaluation obligation		
Are dust measurements carried out in the plant?		
If so, are technical/organisational measures taken subsequently?		
Evaluation of the measures or of the results of the control measurements		
Extraction equipment		
Are all dust-intensive/cutting machines attached to an extractor?		
Is the extraction and filter equipment adequate for the machines operated in the plant?		
Is the effectiveness of the extraction equipment regularly checked and maintained (e.g. by an expert from the Employers Liability Insurance Organisation for the wood industry, maintenance log/documented evidence)?		
Has any advice been received from prevention bodies on cleaning up or retrofitting?		
How can dust extraction be improved and made more efficient for old equipment?		
Has older filtration and extraction equipment been removed from the workplace?		
Are any mobile dust removers (not industrial dust extractors) which may be present technically up-to-date?		
Manual work/sanding areas		
Is it also ensured for manual sanding work that the permissible wood dust concentrations in the air breathed are not exceeded?		
Has manual work equipment without extraction attachments been replaced by equipment with such attachments?		
Is manual sanding work carried out on sanding tables with extractors attached?		

Instructions/training in the plant		
Have the workers received instruction about the health risks of wood dust (min. once a year)?		
Are instructions specifically related to the work carried out given at the plant?		
Medical checkups for workers		
Have there been indications from the works doctor/ medical service that allergic reactions or harm due to wood dust has been established?		
Where appropriate, have external experts been brought in?		
Are medical checkups carried out?		
Cleaning/maintenance		
Are machinery and equipment regularly cleaned?		
Is it ensured that dusty work areas are not blown off?		
Are particle filters or filter half masks provided as personal protective equipment?		
When working on a piece rate basis, is sufficient time allowed for complying with these health and safety requirements?		

2. *"Wood Dust – No Thank You!"*

Report on the Seminar by IG Metall, October 2008

By Petra Müller-Knöß , Health and Safety Policy Advisor, IG Metall Frankfurt

In October 2008 a one-week seminar entitled "Wood dust – No Thank You! Ways of taking action and tasks for the Works Council" was held at the IG Metall training centre in Sprockhövel.
This seminar was organised following the introduction of new rules on wood dust in the German legislation on occupational health and safety. This new Technical Regulation on Wood Dust (TRGS 553) was adopted in August 2008 by decision of the "Committee on dangerous substances" which is consulted by the Federal Ministry of Labour on all occupational health and safety questions concerning dangerous substances. The Committee's members include trade union and employers' representatives working in a voluntary capacity. These rules must now be applied in practice in the plants.
The implementation of these rules and a broad participation by workers and their representatives in all aspects of occupational prevention formed the basis for the design of the seminar programme. The aim of the seminar was to examine the new rules and the information on which they are based for worker representatives in the plants and to pass these on to those concerned by their practice. This should increase the chances of the new rules actually reaching the shop floor and being implemented. The regulation on its own is no guarantee of that.

The main target group for the seminar was therefore worker representation bodies in firms in the sectors concerned. Under the German system of occupational health and safety these bodies have a key role. Through their various rights to be involved in health and safety matters in firms and their rights to participate in planning and

implementing health and safety measures under the German law on employer-worker relations (*Betriebsverfassungsgesetz*) they can make a decisive contribution to protecting workers. In this context, participation means that the works council can itself ask for concrete measures to be taken to implement laws or in areas in which the employers have scope for action. The employer must in that case enter into negotiations. Should no agreement be reached at plant level, then the decision lies with the arbitration committee (comprising representatives of the employers, workers and one external industrial arbitrator). Its verdict is binding for the employers and the worker representatives.

Particularly bearing in mind that, in the past (and still today), many firms too seldom take the initiative to provide better protection against wood dust, the worker representation bodies must avail themselves of their participation rights and grasp their opportunities. The aim of the seminar was to equip them with the knowledge required for this purpose.

In our educational work we try to get as clear a picture as possible of the actual experiences of the participants at work and, building on this, work alongside the participants to come up with solutions.

- It was for this reason that the "wood dust seminar" also kicked off with an exchange of experiences about problems in the firms represented. The accounts given ranged from problems caused by woodworking processes, inadequate protective measures and lack of checking up on them, as well as a lack of know-how by both workers and supervisors. As the seminar proceeded, this information was referred to repeatedly.
- The dangers and effects of wood dust on the human body were considered in detail.
- With a view to further improving their specialist knowledge for the future activities of the works councils, the participants were shown ways of obtaining further information, also after the seminar, such as on the Internet.
- The next step was to examine some of the key health and safety provisions relevant to protecting against wood dust.
- This part of the seminar was rounded off with a detour to explore the information, consultation and participation rights of works councils in the sphere of health and safety. The Technical Regulation on Wood Dust (TRGS 553) referred to above was then scrutinised in more detail.

In the light of this information, there followed a discussion of what specific measures should now be demanded and implemented in the firms.

The overall assessment by the participants of the seminar and the matters covered, in conclusion, demonstrated clearly the substantial need for information about the dangers of wood dust. Most of them were unaware of just how dramatic these effects can be.

The documents, information and background material used at the seminar were distributed to all the participants. This will also allow them to pass on their new knowledge to other workers in their own firms. This is another aim of the seminar and should help ensure that the new Technical Regulation is actively applied by as many of those concerned as possible. The seminar organiser, IG Metall, will also be making itself available as external adviser for these activities.

For further information:

IG Metall-Bildungszentrum
Sprockhövel
Arbeits- und Gesundheitsschutz
Christina Flügge
Telefon: 02324 / 706-367
email: christina.fluegge@igmetall.de

3. Good housekeeping – less wood dust

By Ulrik SPANNOW, Health and Safety Policy Advisor, The Nordic Federation of Building and Wood Workers (NFBWW)

Good housekeeping is a concept that may be used by the social partners at company level to design prevention strategies aimed at reducing the exposure to wood dust. Cleaning is an integral part of good housekeeping. The article informs about wood dust prevention in Denmark.

Wood dust is a known inducer of cancer in the nasal cavity and wood dust is associated with a variety of respiratory symptoms including asthma, chronic bronchitis, and chronic impairment in lung function (Jacobsen 2007:21+29). For more than 10 years hard wood dust has been classified as carcinogenic by the European Union (Directive 1999/38/EC).

According to European regulation workers must be effectively protected from the risks of developing cancer and other diseases as a result of occupational exposure to wood dust. Prevention starts by conducting a risk assessment focusing on any risk of wood dust in the work place; including the hazardous properties; the level, type and duration of exposure; the effect of preventive measures to be taken etc.

The preventive measures may be adhered to the umbrella concept of "good housekeeping".

Good housekeeping is part of everyday production

During the last decade or more wood dust exposure has decreased substantially in the wood working industry in Denmark – thanks to effective preventive measures taken.

Two scientific studies of wood dust exposure running 6 years apart and summarized in 2007 has documented a high annual decrease in the concentration of wood dust in the furniture industry. The average wood dust exposure in 1997/98 was 0.94 mg/m^3 inhalable dust. At that time this level was seen as pretty low. But the follow up study showed that the exposure was reduced in 2003/2004 to an average of 0.60 mg/m^3 inhalable dust. The reduction corresponds to an annual 7 % fall and a total fall of 40% during the 6 years investigated. Among others the study showed positive improvements concerning the problematic sanding work stations as well as a clear reduction of cleaning with compressed air (for more details see Gitte Jacobsen 2007.)

Determinants found to increase wood dust exposure:

- Sanding, use of compressed air, use of full-automatic machines, manual work, cleaning of work pieces with compressed air, kitchen production factories and small factories (less than 20 employees).

Determinants found to decrease wood dust exposure:

- Manual assembly/packing, adequate exhaust ventilation, sanding with adequate exhaust ventilation, vacuum cleaning of machines and special cleaning staff

(***Source:*** *Gitte Jacobsen 2007:124-125)*

Full automatic machinery is associated with higher exposure as this type of machinery in general works with higher speed, and therefore generates more dust.

Working with wood and wood based materials entails a risk of contact with wood dust. Despite the relatively low levels of exposure in 2003/2004, the study does identify health problems connected to the respiratory system of workers. The identified health problems underline the fact that prevention is still a must.

The idea of good housekeeping

Wood dust generation has neither a positive meaning for the production of wooden products, nor for the health of the workers; wood dust may be seen as a negative factor to both production and workers. Wood dust which is not removed at the point of origin is distributed into the working environment. That way the same wood dust may continue to pollute the environment of the workers, as the dust is floating in the air and is being relocated onto the surfaces of the floor, machines and wooden elements.

Wood dust may be raised and redistributed in the working room again and again during movements caused by production, transport and the movement of persons and by cleaning with brooms and compressed air. Good housekeeping is to remove the wood dust at the point of origin. When this is not successful, good housekeeping is to remove the wood dust effectively as soon as possible. Good housekeeping is to have a continuous focus on wood dust reduction.

Effective local exhaust ventilation systems at all wood working machines are necessary and must be used to eliminate wood dust at the point of origin. Having effective local exhaust systems shall be considered when buying and installing new machinery. During wood processing the local exhaust ventilation system shall be placed in an optimal way and shall be checked continuously. The exhaust systems must be controlled and maintained properly. This is a part of good housekeeping.

It is important to be aware of the fact that exposure to wood dust is not only related to the mechanical processing of wood. Wood dust exposure is also related to manual handling of wooden objects, also in the storing and packaging departments of the company.

But it is also important to focus on cleaning methods when considering what good housekeeping is about. Cleaning with brooms and the use of compressed air (pressure above the atmosphere) must be avoided, as these “cleaning” methods are counterproductive as they move the dust into the air. Frequent cleaning with vacuum is an important way to remove wood dust effectively and safely. Employing special cleaning staff has proved to induce more effective cleaning in the work places.

Social dialogue at company level – a way to develop good housekeeping

Prevention is an obligation of the employer, but safety representatives and other workers do play an important role too in order to improve the working environment. Proper social dialogue at company level is a straightforward way to identify and execute good housekeeping. Actually, worker participation has proved to be a determinant of successful occupational health management and a major contributing factor in the reduction of the occupational diseases.

In a Danish wood dust study reported in 2001 (the first of the two studies 6 years apart) the existence of safety representatives were found to be associated with reduced levels of wood dust (safety representatives elected within the last 2 years were found to be a significant determinant of low wood dust exposure). In the follow up study 6 years later, this association was not found, probably because almost all workers at that time were employed in factories where election of safety representative had taken place within the last two years (see Vivi Schlünssen et al 2008).

Considering what good housekeeping is may be part of the social dialogue in the company. The social dialogue may include elements such as development of prevention guidelines, identification of problems (based on interviews, questionnaires and visual identification) caused by wood dust, training of colleagues and reporting breakdowns and lack of compliance. Social dialogue on wood dust prevention may be supported by advice from occupational health services.

Limiting the wood dust exposure

Currently, the occupational limit value of wood dust is of great interest. The present European wood dust limit value for hard wood dust (5 mg/m^3; see directive 1999/38) is a technical value not based on scientific evidence. For years, the European Commission has been supposed to come up with a proposal for an alternative limit value.

While we are waiting for the Commission's proposal for a more protective limit value, it is worth paying attention to the situation in Denmark, including the present levels of exposure (mentioned earlier in this article) and the Danish occupational limit value of 1 mg/m^3 (inhalable dust) which was set in 2007.

One has to take into consideration that values of measurements are also depending on the used method of measurement and the respective devices but however, the Danish situation indicates that it is possible to comply with quite low occupational limit values and by this to prevent occupational illnesses of woodworkers. By effective technical measures of prevention backed up with good housekeeping it is in fact possible to reduce the exposure of wood dust to almost zero.

The important factors for success are competent technical advice but also support from management, commitment from personnel and the trade unions and employer organisations of the sector. Reducing wood dust provides added value, better working environment, reduced cleaning time, better quality and more effective and profitable production.

Sources

- Directive 1999/38/EC amending Directive 90/394 on the protection of workers from the risks related to exposure to carcinogens at work
- Gitte Jacobsen, Respiratory diseases and exposure in the Danish Furniture Industry: A 6 year follow-up, 2007
- Vivi Schlünssen et al 2008 Ann. Occup. Hyg., Vol. 52, No. 4, pp. 227–238, 2008

4. Two solutions aimed at reducing wood dusts in the sector of the "wooden frameworks for sofas and armchairs"

By F. Nerozzi , N. Rosini, A. Innocenti, C. Ciapini, U.F. Prevenzione, Igiene e Sicurezza Luoghi di Lavoro U.S.L. 3 (Functional Office for Prevention, Health and Safety at Work - Local Health Unit) (Pistoia) – Region of Toscana, V.le Matteotti 19 – 51100 Pistoia

The reduction of the exposure to wood dusts in the carpenter's workshops active in the creation of frameworks for sofas (main structure of sofas and armchair) is a target that the U.F. PISLL of the USL 3 of Pistoia intends to achieve in cooperation with the trade associations, by completing a working program started long time ago. During some researches carried out in1990 and in 2001 very high levels of dust were detected, with a GM (Geometric Mean) of 5.2 mg/m^3 (GSD (Geometric Standard Deviation) 3.1). In 2002 a training activity was initiated, based on both technical measures (focused on the ventilation systems and on the requirements related to machines and equipments) and organisational - procedural measures (as regards working procedures, management of the plants, cleaning of the environments, waste disposal and personal health). Specifically, the attention was focused on the need to carry out the most dust-creating operations (such as finishing-polishing and working with the machines) in segregated areas, adequately fitted with dust extraction systems, compared with less dust-creating activities (assembly), in order to limit to the minimum the number of workers exposed. However, if, on one hand, working with the machines had already been rendered safe (by means of localised dust extraction systems), the finishing of the pieces, on the other hand, appeared to be more complex due to the fact that such activities may be performed only manually with compressed air tools. In addition, unlike what happens in the furniture industry (where the polishing is carried out prior to assembly), the finishing of the visible parts was performed on the assembled framework.

In 2003-2004, some companies in the industry fitted some wall-mounted dust extraction systems, to be used in the finishing activities of the wooden frameworks, characterised by high extraction capacities with a low speed, and comprised of a

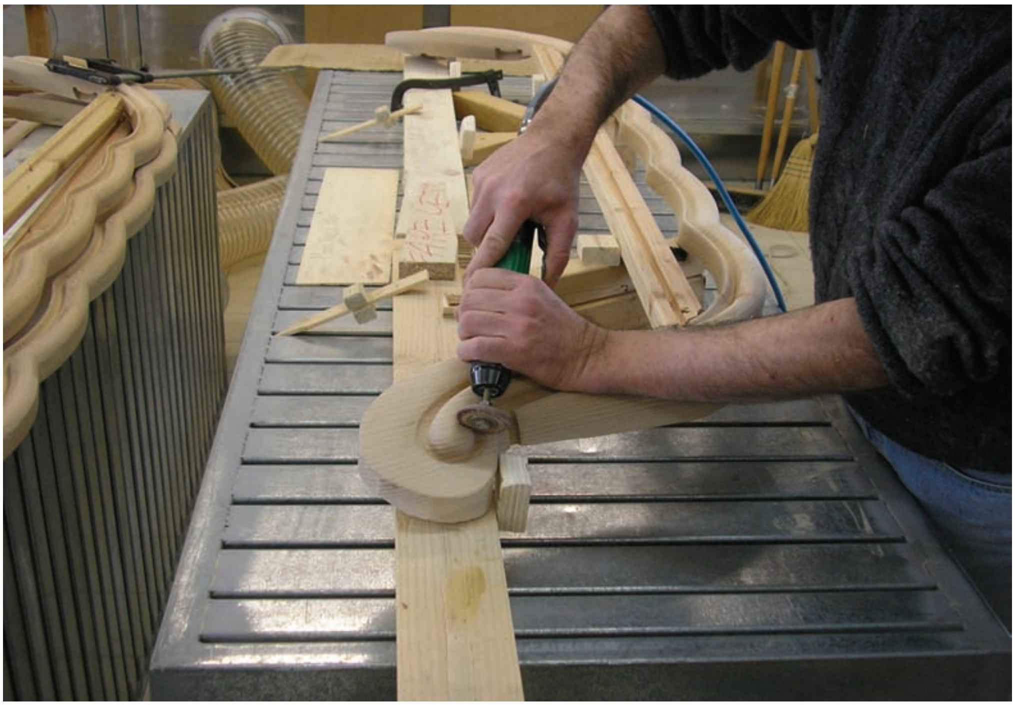
sucking surface in front of which the workers are supposed to carry out the finishing work on the wooden framework laying on the floor (3).

The results were highly positive compared with the outcome of the previous researches. In fact, the aggregate of the 13 samples evidenced a GM of 2.03 mg/m^3 , a GSD of 2.80 mg/m^3 with a lowest value of 0.48 mg/m^3 and a highest value of 16.37 mg/m^3, but of particular interest is the comparison of the values measured in the company for which the levels of pollution prior to the instalment of the cabin were available (table 1). As you can see, thanks to the new dust extraction systems and to the daily cleaning of the premises, machines and equipment, carried out at the end of the work shift with mechanical means fit with sucking devices - avoiding to use brooms and compressed air tools - the average presence of dusts was reduced to 1/3 (from 9 to 3 mg/m^3) and also the lowest and highest values showed similar or higher decreases. Unfortunately, the data related to the other company (where the value of 16.37 mg/m^3 was measured) are not available, since this company did not participate to the research in 2001.

Table 1 - Comparison of the data related to the level of dust in the environment (expressed in mg/m^3) measured in one company during two different researches (t di Student 5.36; 12 g.l; $p < 0.0005$).

	2001	2004
Number of samples	6	8
GM	9.17	2.28
GSD	2.43	2.34
Lowest value	3.85	0.48
Highest value	28.5	6.31

Notwithstanding their excellent performance in reducing the dusts in the environment, these systems, however, had drawbacks in the high cost and in the fact that they could be hardly tolerated by the workers in winter, in light of the high level of ventilation in the workplace.
To face this problem, other companies experimented different solutions by modifying the production lay-out and the different phases of the work: all of the finishing operations were carried out on the pieces prior to the assembly of the framework, using small extractor benches and achieving the same high level of dust reduction.



Traditional processing

Working with the machines → Assembly → Finishing

New work cycle

Working with the machines → Finishing → Assembly → (Finishing)

In 2007, the effectiveness of the new working procedures was verified in 3 companies, and the dusts were sampled (inhalable fraction) using the same procedure used in the previous samplings. The actual wood dust abatement capacity of the systems could

not be verified, since no sampling was carried out in these companies during the research in 2001.

Table 2 shows the results achieved in the 3 companies examined, which are highly encouraging: the values measured are, in aggregate, in line with the limit currently applicable (GM 3.94 and GSD 2.19 mg/m^3), even though some of the membranes show levels which are slightly higher than 5 mg/m^3, but, as highlighted above (3), it should be borne in mind that the dusts collected might have been overestimated due to the effect of a contamination from bulk dust, fragments and chips produced by the tools.
The solution adopted not only does not create the micro-climatic problems connected to the wide sucking surfaces of the wall mounted cabins, but it also offers an advantage compared with the previous solution, i.e. the impossibility for the worker to find himself between the piece being treated and the sucking surface.

Table 2 - Comparison of the data related to the level of dusts in the environment (in mg/m^3) measured in two companies after the changes in the lay-out made in 2007 with the data of the general research conducted in 2001

	2001	2007
Number of samples	49	14
median	7.48	3.57
Lowest value	1.05	1.34
Highest value	99.1	19.66

As regards the foregoing, some considerations must be made about the sampling techniques, also with reference to the excessively high values measured in this industry.

Currently, it may be assumed that some bulky particles, produced by the tools used in the finishing work on the wooden frameworks, might have been present on the filter, and this assumption appears to be supported by the fact that, during the years, there is no sign of an acceleration in the respiratory deterioration of the workers in charge of such activities (2). Indeed, this issue was raised long time ago (4) within the context of the European Committee for Standardisation (ECN) in the comparison of the efficiency of 8 types of samplers assessed in laboratory, with different air speeds and for different aerodynamic diameters: in particular, it was noted that overestimates and/or underestimates, to different extents, were possible and that the GSP sampler-"conetto" resulted to be the most accurate.

Some more recent studies related to wood dust exposure (1), specifically as regards the "bullet" particles, i.e. those particles with an aerodynamic diameter of over 100 µm (high weight) which may be thrown to considerable distances by the tools used, confirmed that the level of dusts measured might be distorted when inhalable fraction samplers are used, with wide frontal openings, such as the IOM, but also other samplers with smaller front surfaces are not completely free form the so called "bullet" particles.

This confirms, on one hand, that additional researches must be carried out in the carpenter's workshops in order to characterise the sampled wood dusts and, on the other hand, that other solutions must be implemented in order to achieve a further

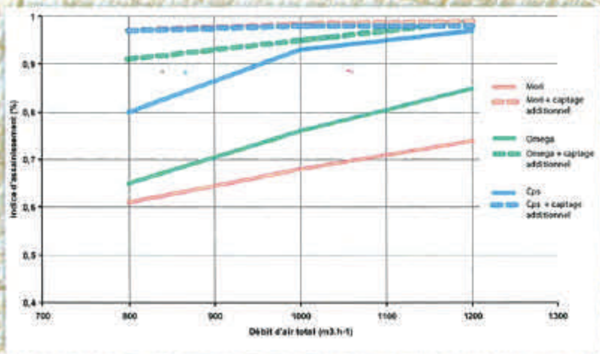
reduction of the exposure to wood dusts. One of the possible alternatives, where portable finishing tools are used, could be, obviously, the localised extraction on the tool itself (as is the case for electric sanders), but this is rather difficult to realise when rotating, compressed air tools are used on non-flat surfaces.

Sources:

1. HARPER M, MULLER BS: An evaluation of total and inhalable samplers for the collection of wood dust in three wood products industries. J Environ Monit 2002; 4: 648-656
2. INNOCENTI A: Effetti sulla salute delle polveri di legno (impact on health of wood dusts): la funzione respiratoria (respiratory function). "POLVERE DI LEGNO: SALUTE E SICUREZZA (WOOD DUSTS: HEALTH AND SAFETY)" – ed CIMAL – Milano 2008; 27-35
3. INNOCENTI A, CIAPINI C, NEROZZI F, BARBANI M, SELMI M: Cases of wood dust removal in the industry of wooden frameworks for sofas and armchairs. Minutes of the 68th Congress S.I.M.L.I.I. Parma 5-8/10/2005 – Monte Università Parma ed. pages 390-392
4. KENNY LC, AITKEN R, CHALMERS C, FABRIÈS JF, GONZALES-FERNANDEZ E, KROMHOUT H, LIDÉN G, MARK D, RIEDIGER G, PRODI V: A collaborative European study of personal inhalable aerosol sampler performance. Ann Occup Hyg 1997; 41: 135-153

5. Capture device for spindle vertical moulding machine

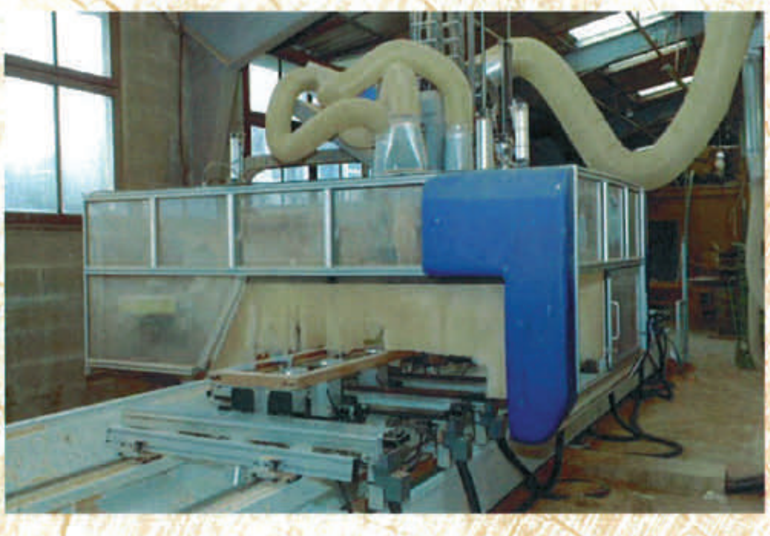
Tests show that whatever the protector used, a dust flow escapes at high speed. This is illustrated by low results of index criteria (EN 1093-11).



Therefore INRS designed an auxiliary capture device (see photos below) placed along the dust flow axis. This device is equipped with two curved brushes soft enough to allow the displacement of wood pieces while espousing their shape. Its function is to direct

the dust flow towards an integrated capture system. Tests show that an air flow rate of 100 to 200 m3.h-1 is sufficient. Dotted curves on the above figure shows the obtained gains when this auxiliary device is associated with different existing protectors.

6. Capture device for CNC 4 axes router machine



CNC router machines produce important wood cutting volumes. The conventional solution to limit dust emission will consist in enclosure them with a complete, costly cover which will annoy the operator and necessitate high air flow rate. The great variety of operations make difficult the chip capture. The dust generation point and projection direction vary according the tool type, rotation sense and work mode. Proposed solutions are inefficient because of the incomplete enclosure of the full projection area, or they do not take into account the projection direction.

Therefore INRS designed a mobile capture device whose position followed the chip projection direction. Its opening is continuously orientated facing the chip projection direction using a rotating device concentric to the machine tool axis. The capture performance raised up to 99% for an air flow rate of 700 m3/h. This performance enables to considerably reduced the air flow rate values usually met under industrial environment. This solution can be adapted on machines in use of the same type.

7. Example of financial support for Small and Very Small Enterprises providing access to prevention measures

"The prevention contract"

A. General background

The French Regional Sickness Insurance Funds (*Caisses Régionales d'Assurance Maladie*, CRAM) can advance funding to firms which sign up to the conditions of an agreement on objectives which have been approved beforehand by the National Sickness Insurance Fund (*Caisse Nationale d'Assurance Maladie*). These advances are not repayable if the objectives are achieved and therefore become grants.

For their part, the firms undertake to implement a prevention programme based on a prevention contract concluded directly between them and a Regional Sickness Insurance Fund.

The aim is to help small and medium-sized enterprises to invest in preventing occupational risks and improving working conditions.

Definition and purpose
The prevention contract is concluded between the Regional Sickness Insurance Fund (CRAM) and the firm which has signed an agreement on objectives (national or regional). This agreement lays down the prevention priorities specific to the relevant sector, and wood dust is included in the priorities for the industrial sectors concerned.

These contracts define the objectives and means to which the firm is committed and the support, in particular financial, that the Regional Sickness Insurance Fund is contributing.

The advance payments are not repayable by the firm and are converted into grants provided the firm has met all its commitments.

They represent between 15 and 70 % of the investments made.

It is possible to sign a prevention contract on a single aspect (a single prevention measure), but in principle the contract is intended to promote overall improvements in the firm, and the Funds' prevention service generally ensures that aspects for which the firm is less motivated are included as conditions for signing the contracts.

B. Legal sources

Creation of the prevention contract by:
Law No. 87-39 of 27 January 1987 on various social measures (Art. 18)

- Article 18 supplements the system of financial incentives provided by Article L. 242-7 of the Social Security Code and the Decrees of 16 and 19 September 1997.
- New Article L. 422-5 on the advances in the Social Security Code: advances granted to SMEs with fewer than 200 employees and which have concluded an agreement on objectives establishing an action programme for their activity, based on the desire of the firm to apply a prevention policy. The conditions are defined by contract.

C. Assessment

The following points can be noted:

Advantages:
- the significant leverage effect on investment by SMEs
- the very high level of satisfaction among firms and their employees
- link between establishing risk and prevention advice for its management
- creates a long-term relationship of trust between the Fund and the firm
- geared to preventing deferred risks and improving working conditions
- conversion into a grant only when the risk is managed by a suitable prevention measure
- allows communication on innovative prevention measures.

The prevention contract is the most commonly used financial incentive tool used by the Funds' prevention services.

Experience has demonstrated the benefits of this tool, which has a significant knock-on effect on investment by the signatory firms as well as enhancing their prevention policy. It allows a continuous flow of advice to take place between the Funds' prevention services and the firms.

8. *Example of the French scheme introduced by the National and Regional Sickness Insurance Funds in partnership with the Industrial Sectors*

"The Simplified Financial Support Measures (AFS)"

A. General background

The National Regional Sickness Insurance Fund can arrange support for firms in the form of an advance or grant (Simplified Financial Support Measures, *Aides Financières Simplifiées* (AFS)).

This is a new financial support scheme (direct grants, reimbursements based on invoices) aimed at firms with fewer than 50 employees, **and more particularly firms with fewer than 20 employees.**

The aim is to help these small and medium-sized enterprises to invest in prevention measures for occupational risks and to improve working conditions. This scheme has been trialled as a companion piece to the basic framework of national agreements on objectives and the prevention contracts, which are less in tune with the needs of Very Small Enterprises, and to provide <u>a fast track way of meeting regional and national prevention policy priorities by means of a simple tool that can be deployed quickly and on a large scale.</u>

The wood dust question numbers among the objectives put forward by the sectors for priority implementation in favour of very small enterprises to improve prevention of this carcinogenic risk.

An experiment has been underway since the second half of 2008 and has undergone a final legal validation in order to be implemented with effect from 1 January 2010.

Definition and purpose:
The AFS are direct grants, arranged in the form of a simple contract between the Fund and the firm (establishment), or simply by producing invoices and documentary proof to demonstrate that the actions described in the document published by the Fund describing the conditions for awarding this grant have been carried out.

They represent between 15 and 70% of the investment made.

The financial support is capped at 25 000€, with a minimum of 1 000€ per enterprise.

The AFS are flexible measures for a limited period, allowing the investment by firms to be targeted at the prevention priorities for their particular activities.

Conditions for obtaining an AFS:
In order to receive an AFS, the firm must:

- fall within the scope of application of the AFS provided by the relevant Fund for the establishment concerned,
- have fewer than 50 employees altogether,
- not have an existing prevention contract or already have received an AFS during the experimental period.

B. Assessment

This is a recent scheme. The pace of its expansion indicates that during 2010 it is likely to become the second most commonly used financial incentive tool.

It should be noted that the smaller social security funds with relatively undeveloped prevention structures have been quick off the mark in conducting this experiment, which already represents a very significant proportion of their overall use of financial incentives.

The aim is to optimise the impact of financial incentives on national and regional prevention priorities and to encourage SMEs/VSMEs to channel more investment into prevention of occupational risk.

This new scheme is the subject of a measure included in the 2010 Finance and Social Security Act with a view to bringing it into general application on a legal basis.

It is therefore intended as a simplified measure compared with the existing prevention contracts.

The firm will invest in prevention and then receive financial support after producing documentary proof of payment. This support takes the form of direct grants, unlike the prevention contracts for which funds are advanced and the signature of a national agreement on objectives is required. In this case, a simplified agreement is signed between the regional fund and the firm.

The investments made in reducing exposure to wood dust will be a focus of priority action by the sectors with a view to spreading the word and highlighting their benefits among small and very small enterprises.

9. Primary requirements for filter and exhaust equipment

The following information is important for the design and explanation of installations:

- the volume of air required (capacity) per machine
- loss of pressure across the machine (indicated by machine supplier)
- operating time and frequency of each woodworking machine
- choice of system: central, group or individual connection
- sequence of machines in the extraction system
- filter capacity. Preferably no more than 100 m^3 air/hour per square metre of filter area
- type and capacity of filter unit and cleaning system
- heating (cold periods)
- recirculation factor (summer and winter valve)
- filtered recycled air may not contain more wood dust than 10% of the limit value
- required ducting (length, diameters, etc.)
- extraction after filtering to: sawdust store, container, silo, incineration, etc.
- the whole system must comply with the regulations on prevention of fire and explosion (ATEX)

Points requiring special attention:

1. Optimal dust capture at or near machines. Collection bins in dust stream.
2. Reduction of diameter at point of connection to machine
3. Correct variations in diameter and correct path of ducting. The variations in diameter and way in which it is divided up, and the ducting lay-out, often make the difference between good and bad extraction. People often think in terms of the theoretical division of air volumes while overlooking the losses in pressure.
4. No leakages. Connecting elements and slide valves with gaskets. No drop valves!
5. Joints can be problematic later on when modifications are installed.
6. No dust penetration of filter, also during cleaning. Residual dust emissions < 0.2 mg/m^3.
7. Filter units preferably installed outside or in a separate area with discharge outside.
8. All woodworking machines connected to a stationary extraction system. If a movable filter is required, then use a filter of negative pressure type. The ventilator is then placed in the clean area. Do not use a "balloon filter".
9. Consider possibly spreading over a number of ventilators. An installation for which the synchronicity factor is lower than the ventilator capacity calls for careful calculation. The number of workers is not the criterion for the synchronicity of use of woodworking machines, but at most a guide.
10. Connect manually operated machines where possible to a high vacuum system
11. Make it possible to remove dust and chips when cleaning machines (sucking, not blowing) and floors (sweeping machine).

10. *Net sanding by Mirka – The dust-free solution!*

Disclaimer:

The following article was written by MIRKA and is therefore very positive towards the products produced by the Finish company MIRKA.
The article does not necessarily reflect the view of the project partners, nor is it a good practice example in its original meaning.
Nevertheless, the project partners decided to include this contribution to the collection of good practice examples because of the strong engagement of MIRKA in the project and also because of the undeniable quality of the system MIRKA has developed.

Sanding wood produces a lot of dust which is not only messy but can also contain particles which are hazardous to human health. However, Mirka's revolutionary net sanding products solve the dust problem with a simple yet clever solution.

The net sanding secret

Mirka's patented net sanding construction consists of an even abrasive surface which contains literally thousands of holes that provide phenomenal dust extraction across the entire surface. Indeed, the maximum distance each dust particle is from the closest extraction hole is just 0.5 mm! Extensive tests show that net sanding products create a miniscule amount of dust compared to traditional abrasives with dust extraction.

There's also a long list of added advantages. The innovative construction allows net sanding products to maintain their aggressive sanding properties much longer than traditional materials, as well as avoiding age-old problems, such as the formation of 'dust pills' and clogging. Since dust can no longer collect in lumps on the sanding discs, it can't reduce sanding performance and create annoying grooves on the sanding surface. What's more, net sanding products are also known for their long lifespan which means they need changing less frequently, making them a cost effective option.

Abranet® - a test winner

Laboratory tests show that Mirka's first net sanding product, Abranet®, was the start of the revolution that's solved the dust problem. When machine sanding with Abranet®, the amount of dust in the air is 6,900 times less than when using traditional abrasives without dust extraction.

Compared to a traditional six-hole sanding disc with dust extraction system, Abranet® again proved its amazing superiority. Abranet's® maximum dust concentration of 0.15 mg/m^3 was radically less than the corresponding figure for a traditional sanding disc of 1.6 mg/m^3.

Besides the air being much cleaner, tests also showed that sanding with Abranet®, resulted in a much cleaner work environment which means considerable savings in cleaning time and cost.

Mirka net sanding – ideal for wood sanding

Net products are very well suited to efficiently and effectively sanding most types of wood. The aggressive abrasive performance makes them ideal for sanding hard wood, yet they are also perfect for soft wood types where the unique construction prevents clogging and dramatically increases lifespan. Sanding MDF and similar materials can produce an extraordinary amount of dust but now Mirka's net sanding products effectively solve this problem. For added versatility, they are also well suited to sanding putty, paint and lacquer.

Mirka net sanding – a complete solution

Converting to 'dust-free' net sanding requires no special equipment – naturally a well-functioning dust extraction system (central or individual units) is required. However, Mirka also offers a range of specially adapted tools and accessories to further increase performance. In 2009 Mirka introduced a revolutionary electric sander, CEROS, which is small but yet powerful. This machine fully supports the dust-free net sanding concept. Read more at www.mirkadustfreesanding.co.uk.

Although mainly used for machine sanding with discs and strips, net sanding products are also a great option for hand sanding with a hand sanding block. Dust free sanding gives the operator far better control over the job and improved end quality due to dramatically reducing the clogging and pilling issues which cause surface flaws. When sanding, other work can even be going on simultaneously in the same area and, of course, there's less clean up afterwards. Net sanding just makes work easier and the environment safer for the worker!

Mirka is continuously developing and expanding the net family with new products and accessories.

Why put the health of yourself and others at risk? Thanks to Mirka's net products, dust-free sanding is here! Read more at www.netsanding.com

Mirka - Your partner for a dust-free work environment and a perfect finish

KWH Mirka Ltd is a world leader in abrasive technology innovation. The cornerstone has been an intensive research & development program and the commitment of talented staff across all areas of the business. This has not only resulted in the development of revolutionary abrasive technology but also in the creation of ground-breaking new coatings production processes.
Mirka is a globally expanding company with subsidiaries located in Europe, North and South America and Asia. Headquarters and production are situated in Finland. More than 90% of Mirka products are exported and sold in more than 80 countries.
www.mirka.com

Standardisation and prevention

LESS DUST PROJECT: Introduction to prevention and standardisation; the added value of workers participation

By Fabio Strambi, Massimo Bartalini, *Az. USL (Local Health Unit) No. 7 of Siena – SPISLL –Alta Val d'Elsa Area* / Mauro Giannelli, *A. USL 10 of Florence – SPISLL – Chianti Fiorentino Area* / Claudio Stanzani, *SINDNOVA* / Stefano Boy, *ETUI.*

The European laws concerning risk prevention and the promotion of health in the work places are structured both in the so-called "Product-specific Directives", issued for the purpose of ensuring free circulation of the products within the European Community, and in the so called "Social Directives", aimed at safeguarding health and safety of workers in the workplaces.

The product-specific directives include the so called "Machine Directives" (89/392/EC, 2006/42/EC) which, from time to time, defined the administrative procedures and the key safety requirements that every manufacturer must take into consideration in designing, manufacturing, (CE) marking and releasing to the European market machineries of a variety of types. These rules may not be modified by the laws of the individual countries, and the key safety requirements must be complied with by every manufacturer; no member state may issue product regulations which impede the free circulation of goods.

In order to facilitate the manufacturers in complying with the key requirements provided for in the directive, CEN and CENELEC, upon appointment from the European Commission, defined certain standards (harmonised technical regulations) divided both by family and individual type of machine. These are voluntary regulations, and the manufacturers who intend to adopt different options in their projects must, in any case, comply at least with the safety requirements provided for in the standards.

These standards are structured into three different hierarchy levels:
- type A) regulations refer to the main safety concepts. Type A) regulations include, for instance, the EN ISO 12100 regulation, which refers to the general safety concepts related to the designing phase;
- type B) regulations, which provide safety standards divided by general categories: B1) related to particular aspects (such as, for instance, EN ISO 13857:2008 – safety distances); B2) related to specific safety equipments (such as, for instance, EN 953 which refers to the general characteristics of repairs)
- type C) regulations, applicable to specific types of machines (for instance, EN 1870 - safety in woodworking machines - circular saws).

Compliance with type C) standards by the manufacturers implies the presumption of compliance with the General Directive.
The use of the harmonised technical regulations is, therefore, an important issue for the circulation of increasingly safe machines within the European Community.

The "Social Directives" (89/391/CE - 99/38/CE - 2009/104/CE) identify, as regards both general aspects and specific risk situations, the minimum measures that must be guaranteed, in the legislation of the member states, in order to protect the health of

the workers.
The laws of the individual states may provide for higher protection, in line with the social laws already in force.
These two elements, the Product-specific Directives and the Social Directives, represent the main pillars of risk prevention in the workplaces and of the protection of the health and safety of the workers.
Actually, as regards the machines and their use, the manufacturer of such machines, prior to affixing the "CE" mark, is required to:
1. comply with the key safety requirements in designing and manufacturing the product;
2. reduce the risks at source (including the risks of an improper use of the machine which might be reasonably expected);
3. declare any residual risks not eliminated in the designing phase and provide appropriate instructions for the safe use of the machine.

and the employer using these machines in its daily activities is required to:
4. follow the instructions of the manufacturer in the installation of the machine, preparing appropriate spaces, equipments and ancillary equipment to lodge the machine;
5. prevent the residual risks reported by the manufacturer and any additional risks connected to the features of the environment and work organisation of the place where the machine will be implemented;
6. define appropriate work procedures and provide adequate training/information to the workers who will use the machine.
7. carry out the required maintenance works on the machine and enhance its safety according to the technical-scientific progresses.

This set of regulations, thus, provides for a series of actions that should ensure a sufficient protection of the users of the machines.

This might not always be achieved at the highest level and, of course, it depends on two conditions:
- adequacy of the standards, especially of those of the C) Type, and their suitability for the real conditions of use of the machines in the workplaces;
- installation, use and maintenance of the machine in compliance with the directions provided by the manufacturer.

As regards the second point, it is important that the individual employer-user and the workers who actually use the machine are diligent and aware when operating the machine.
As regards the first point, an important objective issue is the periodic review of the standards, generally to be performed every five years, the purpose of which is to adjust such standards to the technical enhancements and scientific knowledge available.

An important source of information regarding the use of the machine comes from the experience of its users. Who better than an expert and conscious worker, who uses a machine every day, knows its limits and risks, and the systems to prevent them.

The Machine Directive, starting from its first releases, recommends to the member states that the social partners participate in (and influence) the definition and monitoring of the standards; in fact the regulations related to the designing of the machines (EN 614) and of the work environment (ISO 6385) actually require the

involvement of the workers and the gathering of their experiences.

European trade unions and, in particular, their technical bureaus (the BTS, at that time), proposed, already in 1997, that a research be conducted with the purpose of defining a method to involve expert users, so that their suggestions could be gathered as regards how the safety of the machines could be improved, focusing in particular on the woodworking machines.

This research was conducted by doctors and technicians of the AZ. USL no. 7 in Siena, with the participation of SINDNOVA, and the results were published in a book several years later, and circulated. This experience focused on the two most popular and dangerous woodworking machines: circular saws (EN 1870-1) and moulding machines known as "toupie" (EN 848-1)
Thus, a method capable of gathering the experiences of the users is defined, in order to enhance the standard of the machines and make them safer to use.

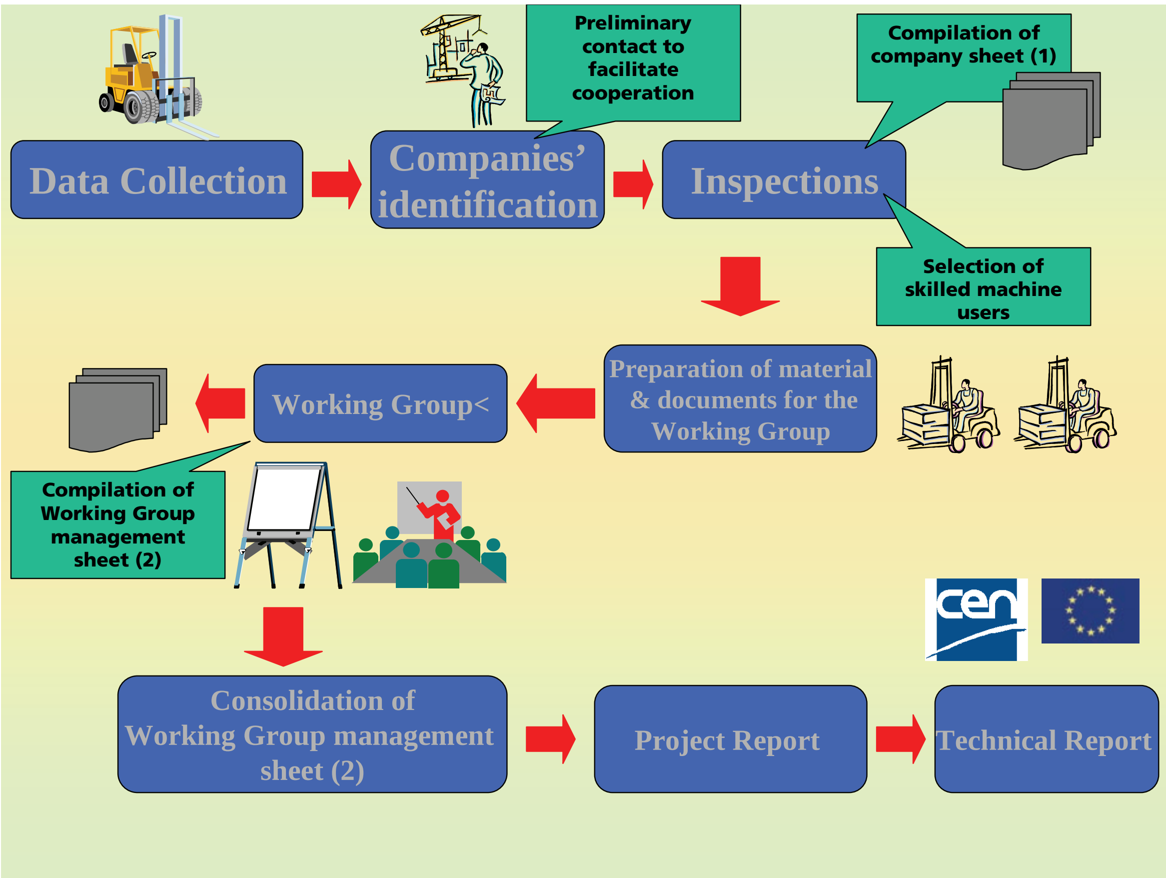
The key elements required in the definition of the method, hereinafter referred to as "Feedback", derive directly from the method used in the ergonomic analysis of the organisational structure of the work, identification of critical issues and drafting of suggestions and solutions, method which was prepared and tested within the context of the researches and safety campaigns conducted by the European Coal and Steel Community in the '80; specifically, the safety campaign conducted in the Travertine quarries of Rapolano and Asciano proved the usefulness and inalienability of the contribution and involvement of the technicians and workers, for a real understanding of the "work", of its structure and critical elements, and for an active search of prevention measures.
This method, defined as the "feedback" method by its authors, has been tested, in the following years, on other types of machines: fork lifts, telehandlers, angle grinders and, lately, combine harvesters. Important information was gathered during all of these experiences as regards the enhancement of the ergonomic features and safety of the machines.

The "Feedback" method is comprised of the operational phases summarised in Fig. 1:

- gathering of the technical documentation and information related to the underlying machine. Purpose of this introductory phase is to obtain information on: the machine, drawbacks of design and construction, permitted and forbidden use, any residual risks. Other useful information relate to the spreading of the machine within the different production environments on the territory, also with reference to the different models and/or fittings available. The data concerning accidents at work and inspection requests related to market oversight are also gathered;
- Identification of the companies to cooperate with in the research activities and related inspections. During this phase, it is useful, not to say essential, to consult the Trade Unions and the Associations of the Employers in order to achieve a broad cooperation from the social partners involved. Furthermore, during this phase the information regarding the subjective valuations from the workers are also gathered. Finally, the workers expert in the use of the machine in process are identified and will be involved within the working groups.
- Implementation of the working group with the expert workers where, through the reconstruction of the different working phases and relevant elementary tasks, the competences required for the proper performance of the task are identified, together with the risks involved and any suggestions provided by the workers for the mitigation/elimination of such risks.

- Drafting of the technical summary containing the prevention indications resulting from the research.

Fig. 1: Flow chart of the “Feedback” method



An important element of this method is represented by the working group with the expert users, where, through the reconstruction of real working situations in which the machine is used, the problems inherent any tasks are detected, together with the relevant suggestions for prevention and enhancement.

As regards the report with the indications received from the working group, the form shown in fig.2 will be used for each phase of the work.

Fig. 2: form used by the group with the expert users.

Workgroups management sheet

Feedback

Work phase:______________________

Order of tasks	**Procedure**	**Competence**	**Hazards/Risks**	**Suggestions for prevention**
	Description of the procedure for carrying out the tasks listed with information on the **equipment** used, **safety devices** and **personal protective equipment (PPE).**	Information about the competence required for optimum execution of task (use of **equipment, materials, procedure** etc. and information about the instruction handbook).	Factors that represent a hazard as regards the machinery itself, equipment, safety devices, surrounding conditions (e.g. microclimate, dust, lighting or layout), fatigue and organisational factors (frequency, shifts etc.).	Notes on how to prevent the hazards identified and information on **training, the instruction handbook, safety devices, procedure, PPE**, etc.

The experience made on the woodworking machines and, in particular, with reference to the removing the wood dusts from the machines, evidenced the problems summarised in Fig. 3.

Fig. 3: Summary of the report on the works of the group of the users of circular saws as regards the cleaning of the machine.

	Operating Procedure	Knowledge Base	Risk Factors	Suggestion for Injury Prevention
Maintenance and cleaning	………………… Periodic cleaning of the work floor and underlying area	……………….. Knowledge of the best cleaning systems.	………………… Risk of undue exposure to projections of minute materials (use of compressed air for cleaning) and excessive dust	Equip the machinery with aspirators to perform the cleaning, designed in such a way as to reach the dust accumulation points. Instructions on ways to check the effectiveness and efficiency of the aspiration installation. Prohibit the use of compressed air for cleaning purposes.

The form evidences the need to remove from the machine and from the worktop any remaining wood dust not removed by the extraction system, and which may represent an undue exposure of the workers to potential carcinogenic agents (hardwood dusts were already classified, also in Europe, as carcinogenic since 2000) unless the activity is carried out with the due care. The use of compressed air is lamented because, even though it removes the dust from the machine, it spreads them in the environment thus creating an additional exposure for all the workers.

The suggestions gathered by applying the "Feedback" method are summarised below:

Suggestion	Addressed to:
• To provide, in type "C" standards, for the mandatory design of appropriate extraction systems to clean and remove all of the accumulated dust • To provide directions on the procedures to verify the efficiency and effectiveness of the extraction system • To supply the machines with devices to signal any deficiencies in the extraction system installed,	Standards, designers and manufacturers
• To provide the machine with the extraction systems required by the manufacturer. • To keep the extraction systems installed efficient and in good working order. • To inform/train the workers on the procedures to be adopted when using the machine and to clean it	Employers users
• To follow the procedures and use the cleaning tools provided • To inform the employer of any breakdowns or malfunctions. (including, without limitation, accumulation off dusts or dirty pieces).	Workers

The design and implementation of appropriate systems depends on:

- the correct directions provided by the manufacturers of the machines about the features of the system to be connected to the machine
- the realisation and connection to the machine of an adequate vacuum system having the features specified by the manufacturer of the machine.

The users, in the working group, suggest that the manufacturers (and the standard-makers) provide, already in the designing of the machines, the features of the extraction system to be connected to the machines and the procedures for the safe execution of the cleaning activities.
In addition, it is also requested that, for each specific machine, the procedures to verify the effectiveness and efficiency of the installed extraction system be identified, since the wear and tear, in time, of the machine tools, as well as the features of the extraction system, may change and determine unforeseeable situations of risk.
It is, therefore, necessary to take into account, in the standards for the woodworking machines, the high level of noxiousness of the dusts created, and therefore specific regulations should be introduced for the protection of the workers from this potentially carcinogenic pollutant.

The foregoing is, clearly, designed to assist the employers users in their duty to guarantee that the exposure to such pollutants is kept at the lowest possible level.

If we analyse the standards for the woodworking machines adopted by UNI (Fig. 4), we note that none of such standards provides for specific directions regarding wood dusts.

They generically specify two conditions:
- the machines must be provided of outlets for the removal of the dusts, which must comply with specific technical requirements;
- the workers must be supplied with adequate personal protection equipments against dusts, and must be instructed to switch the vacuum system on prior to use the machine.

Elenco norme armonizzate pubblicate da UNI - Italia

Safety of woodworking machines

EN 848- 1,2,3	Moulding machines and Numerically controlled (NC) boring and routing machines.
EN 859	Hand fed surface planing machines
EN 860	One side thickness planing machines
EN 861	Surface planing and thicknessing machines
EN 940	Combined woodworking machines
EN 1218- 1,2,3,4,5	Tenoning machines
EN 1807	Band sawing machines
EN 1870-1,2,3,4,5,6 …17	Circular sawing machines

Fig. 4

These conditions are, in the opinion of the users, completely inadequate to guarantee the complete removal of all dusts created in the different uses of the machine envisaged by the manufacturers. No indication is provided as regards the procedures for a safe cleaning of the machine and of the work environment.
Standard EN 12779/2004 (“Safety of woodworking machines. Chip and dust extraction systems with fixed installation. Safety related performances and safety requirements”) itself seems to adopt these indications when, under point 5.4.3, states as follows: “Note 1: Emission caused by incomplete capturing of chips and dust by the woodworking machines, extraction hoods etc. is covered by the relevant machine standard.”
A review of the standards is thus required as regards the woodworking machines, also for this issue.

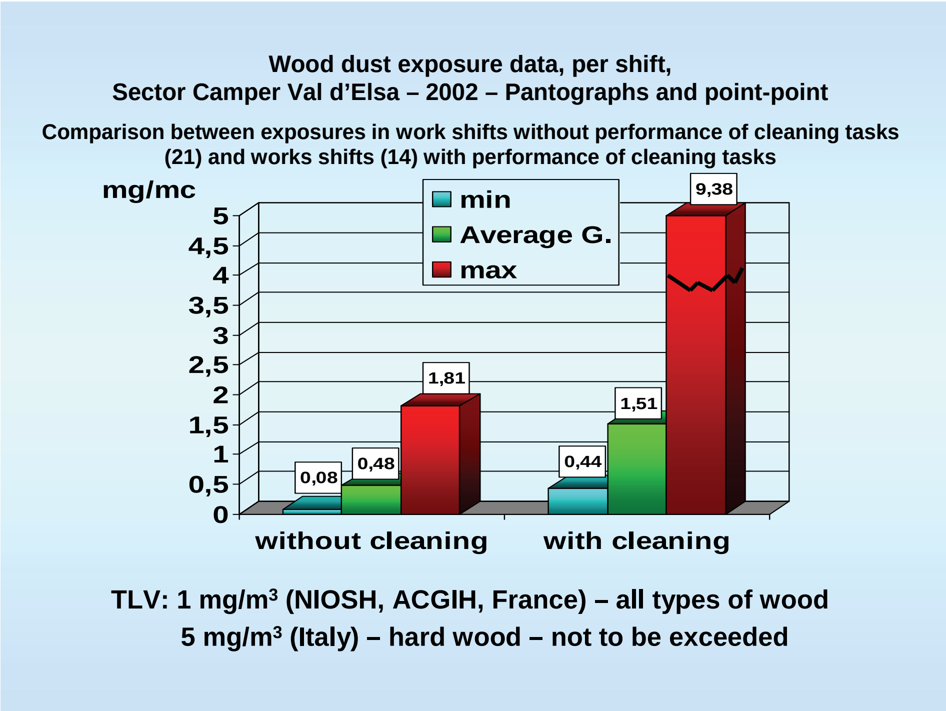
The new Machine Directive" (2006/42/EC), substantially amending the previous version, includes, amongst the essential safety requirements, the following:
*“1.5.13. **Emission of hazardous materials and substances***
The machine must be designed and manufactured so as to prevent any risks of inhalation, ingestion, contact with skin, eyes and mucosa, and of penetration through the skin of any hazardous materials and substances produced.
Should it be impossible to eliminate the hazard, the machine must be equipped so that the hazardous materials and substances may be captured, extracted, settled through water vaporisation, filtered or treated with a similarly efficient method.
If the process is not completed during the regular functioning of the machine, the devices for capturing and/or extracting the dusts must be located so as to produce the maximum effect.”;

furthermore, as regards the cleaning of the internal parts:
*"1.6.5. **Cleaning of the internal parts***
The machine must be designed and manufactured in a way that allows the cleaning of the internal parts of the machine which contained hazardous substances or preparations without penetrating in such internal parts; the same applies to full draining (where required)), which must be carried our from the outside. Should it be impossible to avoid to penetrate it, the machine must be designed and manufactured so as to allow the safe performance of the cleaning operations."

Therefore, concepts are included which are fully compatible with the directions provided by the working group of circular saw users:
- the machine must be designed and manufactured so as to avoid any inhalation risks…
- the capturing devices must be located so as to produce the maximum effect…
- the machine must be designed and manufactured so as to allow the safe performance of cleaning operations.

The issues identified are in fact present in the work places, and represent situations where the exposure to wood dusts may be relevant.
Fig. 5 below shows that, in the exposure of the users of such machines (automatic numeric control pantographs provided with adequate extraction systems) to wood dusts, a considerably higher exposure occurs for those who, during the work shift, took care of cleaning the machine compared with those who did not.

Fig. 5.



In the workplaces, in fact, there are cases where, even if the machines are relatively new and have extraction systems with good extraction capacities and flows, the dusts and the fine chips remain on the pieces and on the worktop. Fig. 6 and 7 below show such cases.

Fig. 6: Dusts and chips not removed on the pieces and workstations.

Fig. 7: dusts and chips on the processed pieces and use of compressed air in cleaning

It is therefore clear that not only it is important to install adequate extraction systems and to use the woodworking machines in compliance with the directions provided by the manufacturers, but the construction standards of such machines should also require, more incisively, a study and design of the machines capable of guaranteeing the conditions for the lowest possible level of dusts emission, also by providing for appropriate systems for the final cleaning of the piece and the operating area of the machine.

The involvement of workers who are expert in the use of the machines, together with the use of codified procedures, may allow to gather their experiences and important suggestions to enhance the health and safety conditions in the workplaces and to verify the effectiveness of the adoption of the standards in the construction of new machines.

Report from the two workshops

Introduction

As part of the project, two one-day workshops were held in Brussels. The thinking behind the organisation of these workshops was that prevention is a complex process with people concerned at various levels. Without communication between these different tiers, important information is always liable to get lost. For that reason, the aim was to bring together manufacturers and users of machinery at the workshop. More specifically, the participants were engineers or representatives from manufacturers, employers, workers and worker representatives from user firms and prevention experts. Admittedly, the prevention system encompasses additional actors and levels, but already the fact that this list of people has been brought around one table has gone far beyond customary practice when it comes to communication.

The manner in which both workshops proceeded in our view justifies the whole exercise and we anticipate that much good will come out of these two meetings and the conference taking place under this project as well as useful contacts made which will lead to valuable cooperation after the project is completed.

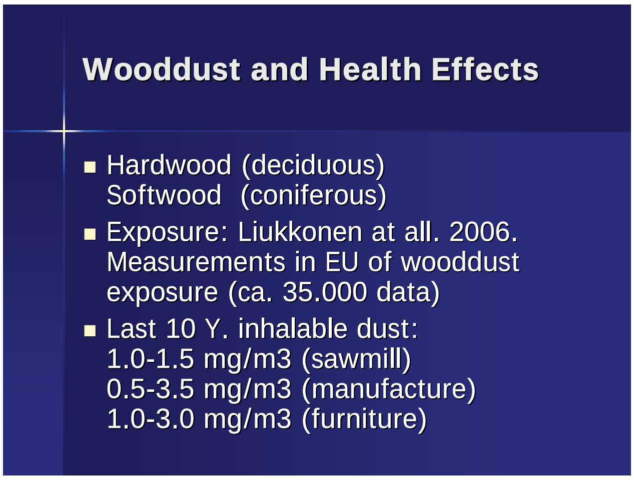
The proceedings of both workshops are described below. Parts of the presentations made there are also included. All the presentations at both workshops which were made available electronically can be consulted on the website of the EFBWW www.efbh.org.

I. Workshop on stationary machines and CNC equipment

The first workshop looked at stationary machines for different work processes and at CNC equipment. A special focus of this event was also on standardisation questions.

The workshop kicked off, however, with an introduction to the European social dialogue and, more specifically, the workings of the sectoral Social Dialogue Wood. The fundamental aims of the European social partner project on Less Dust were then outlined, together with the specific role of the workshop in this project.

As a second step, Mr Wim Tiessink from the Netherlands painted an overall picture of the wood dust problem. In so doing, he ranged over questions about the risks associated with different types of wood dust as well as problems with measuring wood dust exposure and the actual wood dust concentrations for different types of work. In addition, approaches and experiences from the sphere of prevention practice were described, with reference to specific types of work or machines.

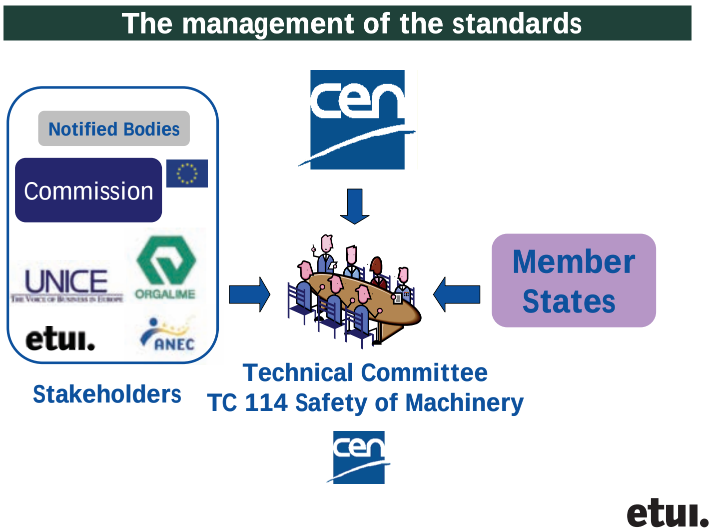


These aspects and assessments also tied in with the problems experienced by workers in Austria and the Netherlands, who described the specific dust problems associated with particular types of machine and what steps have been taken at plant level. Various shortcomings in machine design were also addressed in this connection, which have the consequence of increasing avoidable dust exposure in practice. Technical approaches to dust reduction measures were then discussed in the light of these contributions. A number of approaches were proposed and their advantages as well as their drawbacks discussed. On this subject, see also the contribution below by engineer Mai Issakson, in which for each of the machine types covered at the workshop design solutions were proposed for reducing dust exposure.

Another focus of the workshop was the question as to what role the standardisation process plays in exposure to dust from woodworking machines and how this can be influenced. On this question there were two contributions. In the first contribution, Mr F. Strambi from Italy outlined an approach for improving the standardisation process with the aid and input of workers and their experiences. (See also the chapter "Standardisation and prevention")

This approach has already been trialled in Italy as well as in European projects and has led to the practical experiences of workers being incorporated at an early stage in the discussions of the technical committees of the standardisation organisations. Problems connected with using the machines, from the conditions of use and conditions of the surroundings (e.g. on the building site) and which may not be obvious to the engineers, were in this way identified early on and taken on board.

In a second contribution by Mr S. Boy, the approach by Mr F. Strambi was taken up and transferred to the European level. The contribution described in detail the function of the European standardisation organisations and identified the points in the standardisation process at which it is possible to exert influence.



One of the agreements then reached was that efforts should be made:

- to publish the findings of the workshop and also make them available to the relevant CEN committees;
- to see whether a working party could be set up within the relevant CEN committees which has a similar composition to the current workshop.

Advanced capture devices

Written by and for further information:
Ing. Mai Isakson
MIMoS Mogatan 41.
SE-564 35 BANKERYD, Sweden.
E-mail: mai@mimos.se

In the following, we present in more detail the contribution of Mrs. Isakson focussing on capture devices for different types of machinery which were presented at the workshop. Her presentation based on a research project which was carried out by Trätek and the Swedish Federation of the Wood and Furniture Industry, TMF and the Swedish Union of the Wood industry, GS supported the different projects

At Trätek a large number of machines existing in the market were rebuilt with excellent results. Results from different projects showed that with proper construction and design of the hood on the machine the result was that almost no dust was detected outside the machine. This trial also showed that an airspeed of 20 m/s was enough to transport chips and dust to a filter or silo. At higher speeds the energy consumption goes up. Experience also shows that it is possible to transport about 350 g chips and dust in each m^3 air without a problem.

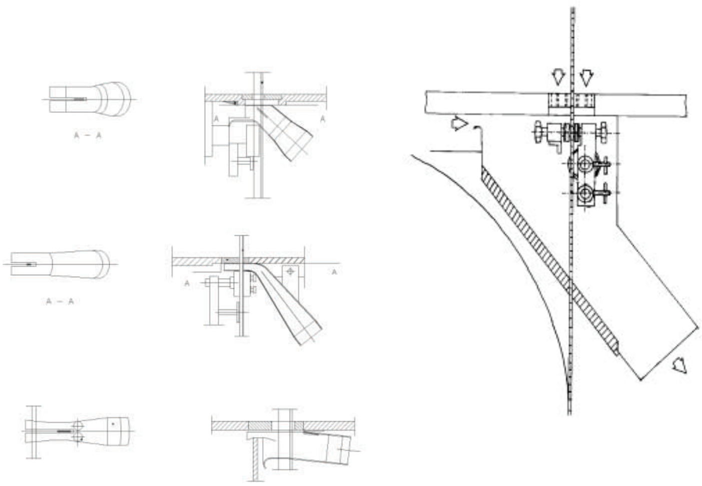
The results from the research project were then implemented in different company machines and experience has shown that the principles of the solutions are correct. The most important thing that I have seen when working in the field is that it is not possible to make any crosscut because of space in the machine or other problems may arise.

Another thing I have seen is that the development of new machines and new tools has moved very fast, but my experience is that the tool is very good for different special production work when tested without any hood but in the machine the good result disappears because the chips and dust are not removed.

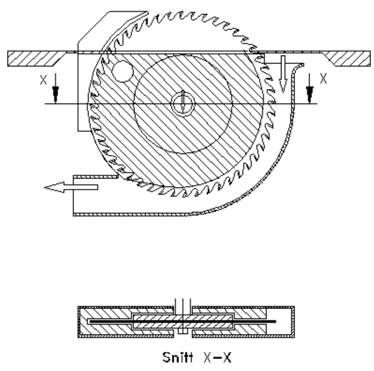
The tool must be seen as a fan and, in the right circumstances, this fan can transport chips and dust to the connection to the dust extraction system which takes it to the filter or silo.

Band saws

For the capture device of a band saw to be effective it must be placed directly under the table. If the capture device is placed further away there will be a problem due to the fan effect of the driving wheel. (The drawing is an example of a rebuild of various old machines in Sweden)

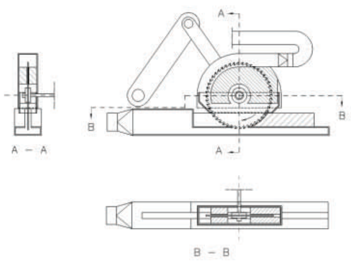


Circular saws



This is a solution that has been tested on many different saws. It gives a very good result but it is important that the principle is followed all the way and the saw blade has the function as a fan and the hood is constructed in a way that makes it possible to guide the chips and dust to the dust extraction connection.

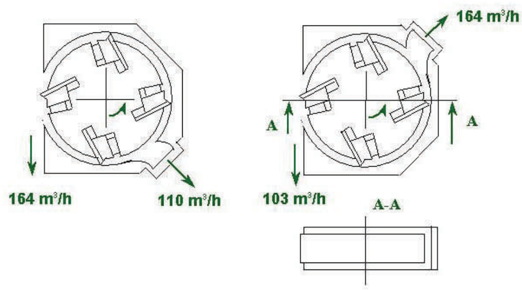
It is important to have a connection to the dust extraction system both above and under the point of chip creation.



In the project we have chosen a diameter of 80 mm for the hood under the table and a connection of 60 mm for the saw blade hood.

If circular saws are constructed according to these principles there will be almost no dust created by this machines

Moulding machines



With this type of machine my experience has been that it is possible to solve the dust problem only if the tool is used to help get the dust and chips into the hood. When the chips and dust are in the hood the most important thing is to also get the airflow into the hood in the correct way. This means that the air must come into the hood together with the chips and dust, not under or over. The opening in the hood should preferably not be bigger than the tool size. In all cases the most important thing is to be sure that enough air will be available from some other inlet close to the place where the chips and dust are created.

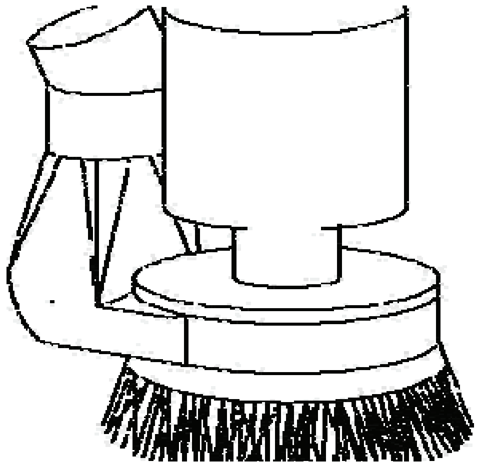
If this not is possible, a vacuum may be created and the chips stay in the hood and create risk of fire. The further the outlet is away from the point where chips and dust are produced, the better the chances of removing the dust. The figures in the picture show how much air only the tool creates from inlet to outlet.

If there is a connection to the dust extraction system both over and under the table there could be a risk that the connections create problems for each other and the chips stay in the hood.

CNC Routers

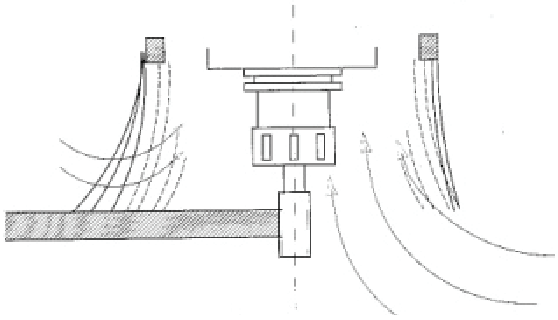
The source of the particle emissions is mobile and the direction of ejection is different during the work process. In Sweden we have conducted various projects to test solutions for different capture devices.

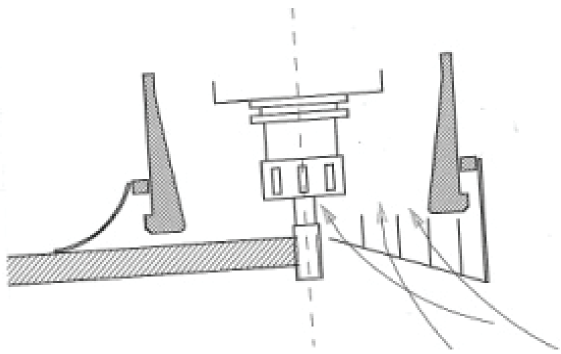
This is the solution that we have found to be good for the production of flat products. The hood must be round and the connection to the dust extraction system is situated close to the surface. It does not matter if the production is one way or the other. The hood is round and the chips and dust follow the hood to the outlet. This basic solution can be used for level surfaces but when the production needs to work on the edges this solution needs further measures.



With curtains the air is guided and comes from below but with brushes a lot of air goes through the brushes and cannot stop the dust going outside the hood.

With a curtain, produced from aramid fibres or a similar approved material, according to the Machine Directive, (*curtains made of PVC are not longer allowed*), the dust and chips will be stopped and the airflow from beneath collects and transports them to the extraction system together with help from the tool.





The reason for this is that when the hood is situated outside the material the opening will become too big and together with the tool speed there is no extraction system that is able to catch the dust and take it away in a correct way.

A conclusion from knowhow in Sweden is that if it is possible to change old machines with good results it must also be possible to build new machines in the same way and probably even better. This experience is about 20 years old – why have the results not been used?

The latest experience from my work in the field is that if the hood is 100% and the tool is working together with the hood construction we don't have any dust or chips outside the machine and dust extraction system will not be needed, only a conveying belt.

II. Workshop on manually-operated machinery

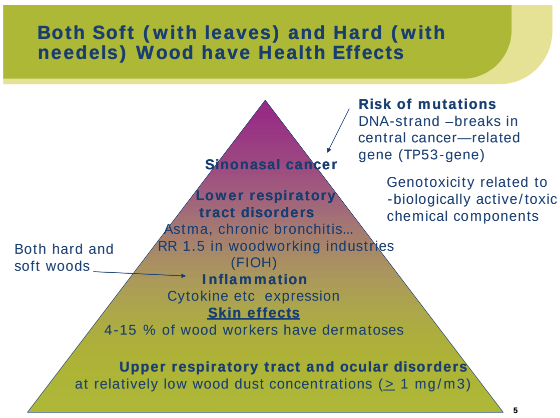
This second workshop focused on manually-operated machinery for different work processes. Alongside presentations by manufacturers, the workers and the general risk situation, prevention approaches and, once again, questions about the role of standards and the influence of the standardisation process were central to this event. Those attending the workshop came from the social partners' organisations, the sphere of prevention and from manufacturing firms.

As at the beginning of the first workshop, a presentation was given on the Social Dialogue Wood and the aims of the Less Dust project as well as the specific role of the workshop in the context of the project described.

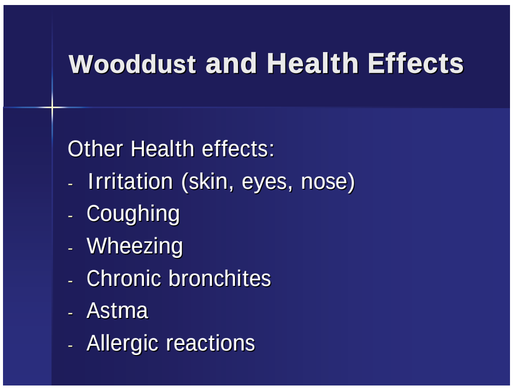
There followed a presentation by Mrs Irma Welling from Finland with the following information and data:

- on wood dust exposure in the different European countries
- on the scientific debate on the health risks of wood dust
- on the relationship between length of exposure and incidence of disease
- on questions of methodology for measuring wood dust exposure and on the question of what effective technical solutions exist.

A more comprehensive explanation of the two last mentioned aspects of her presentation you will find at the end of this report. One of the conclusions of the discussion on this presentation was that despite the attempts to apply technical solutions and possibilities of doing so, in broad swathes of the industry exposure levels are still too high. In addition to these aspects and assessments were also the problems described by worker representatives from the Netherlands and Finland. These colleagues, who work for the industry's trade unions in these countries, reported on the sectoral activities which had successfully brought down dust exposure levels in the participating firms.

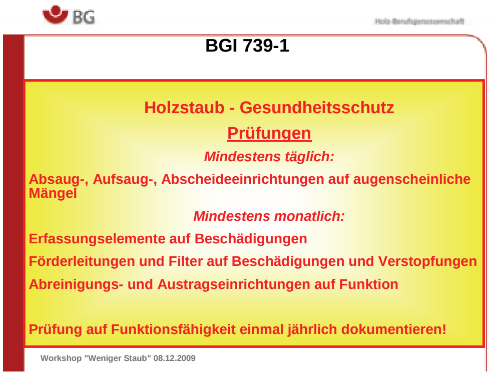


The approach whereby preventive measures in the plants are promoted at sectoral or regional level was also taken up by Mr Tiessink from the Netherlands in his presentation. He reported on the efforts made to bring state-of-the-art technologies for dust reduction down to the shopfloor. In this connection, he also touched on the problem that the highly specific

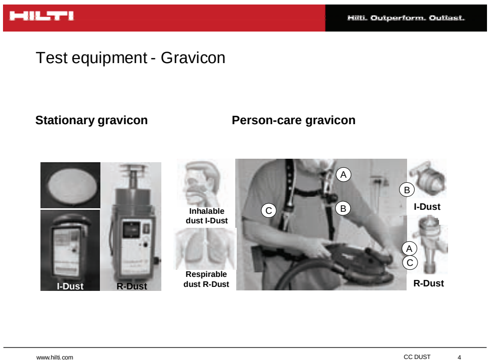


conditions existing in each individual plant do not always allow general technical solutions to be applied on a one-size-fits-all basis.

The central planks of the contribution by Mr Schulze from the German employer's liability insurance association (Holz-Berufsgenossen-schaft) for the wood industry concerned approaches to ways of implementing "state-of-the-art" technology and determining the specific requirements for firms in Germany. The discussions here focused increasingly on the question of the state of technology for exhaust equipment, and the associated question of aerodynamics.
As already discussed at the first workshop, this second event also discussed standardisation.



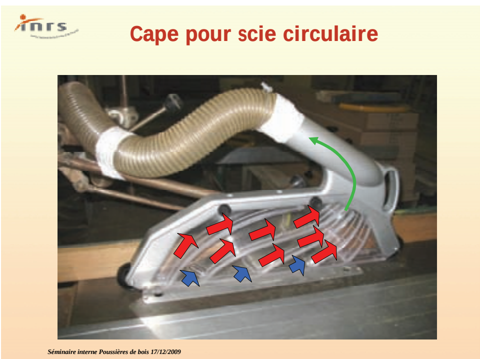
Mr. Biczó from the firm Hilti gave a presentation on the operation of the standardisation system in connection with the measurement methodology for dust.



Mr. Biczó gave a second presentation on the method used by the firm Hilti for reducing dust emissions. This is a general technical method, which is not focused on woodworking machines, but in particular is also employed on machines used in the construction sector.

A second method was presented by Mr Lassus and Mrs Nyman and which has been developed by the firm MIRKA in Finland. (See also the practical example n°10 in this booklet)

Mr Cosset, in a further contribution reported on the activities of the national French institute for prevention (INRS) and its concepts of dust-reduction for different type of machinery. (See also examples n° 5 and 6) The institute pays especially attention to put on board research results, practitioners and technicians experience and from the design area. Therefore, all results are clear and easily applicable in practice.



In the following, we are giving a more detailed explanation of two aspects from the presentation of Mrs Welling to which we referred earlier.

Handling Dust Exposure

Written by and for further information:
Ph. D. Irma Welling
Laserkatu 6.
FI-53850 Lappeenranta, Finland
E-mail: irma.welling@ttl.fi

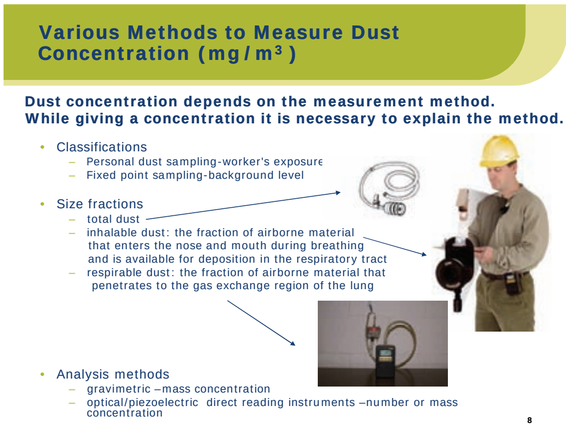
1.1 Dust exposure sampling

The hazard potential of airborne dust is dependent on the mass concentration as well as the particle size. Particle size determines the deposition site within the respiratory tract and the subsequent health effects.

Three particle size distributions relevant to different capture areas of the human respiratory tract are distinguished:

- Inhalable fraction: The mass fraction of total airborne particles which is inhaled through the nose and mouth. The inhaled fraction depends on the speed and direction of the air movement, on breathing rate and other factors.
- Thoracic fraction: The mass fraction of inhaled particles penetrating beyond the larynx.
- Respirable /alveolar fraction: The mass fraction of inhaled particles penetrating to the alveolar airways.

Inhalable dust is chosen for the most appropriate size fraction for the mass effects of exposure to wood dust and most occupational exposure limit values for wood dust are expressed as inhalable dust. Previously total dust was used and valid conversion ratios from total dust to an inhalable dust level have been set. The available data suggest that a numerical value of an occupational exposure limit expressed as inhalable dust may be set at approximately twice the numerical value for the corresponding limit value for total dust.



1.2 Occupational exposure to wood dust in European Union

Wood dust is created when machines are used to cut or shape wood materials. Significant contribution to wood dust exposure is also the use of compressed air for cleaning dust off from equipment and surfaces.

Occupational exposure to inhalable wood dust has been estimated by country, industry and the level of exposure in 25 member states of the European Union (EU-25) in WOOD-RISK-project (Figures 1 and 2, www.ttl.fi/woodrisk).
In 2000-2003, about 3.6 million workers (2.0% of the employed EU-25 population) were occupationally exposed to inhalable wood dust. Of those, construction employed 1.2 million exposed workers (33%), mostly construction carpenters. Due to limited exposure data there was considerable uncertainty in the estimates concerning construction woodworkers. The number of exposed workers were 700 000 (20%) in the furniture industry, 300 000 (9%) in the manufacture of builders' carpentry, 200 000 (5%) in sawmilling and 150 000 (4%) in forestry. About 560 000 workers (16% of the exposed) were assessed to be exposed to a level exceeding 5 mg/m3 . The highest exposure levels were estimated to occur in the construction sector and furniture industry.

Fig. 1: Level of wood dust exposure by industry and the level of exposure in 25 member states of the European Union (www.ttl.fi/woodrisk).

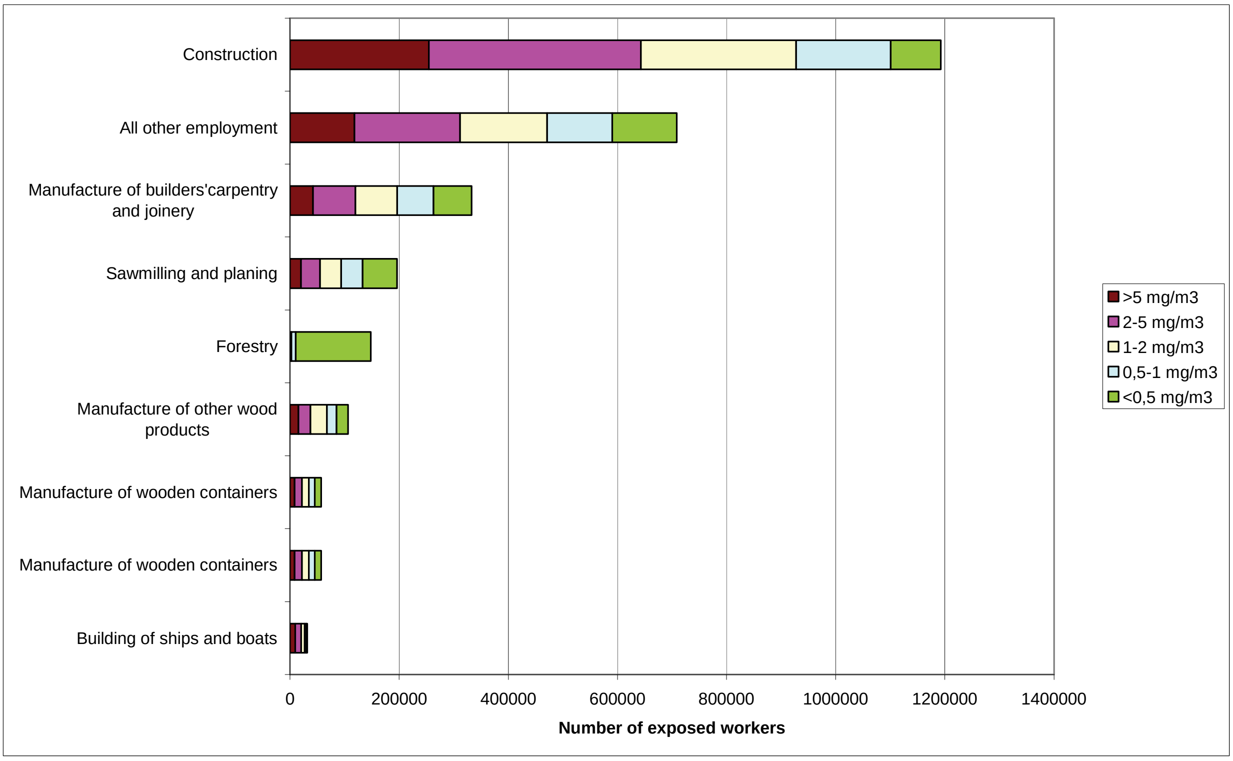
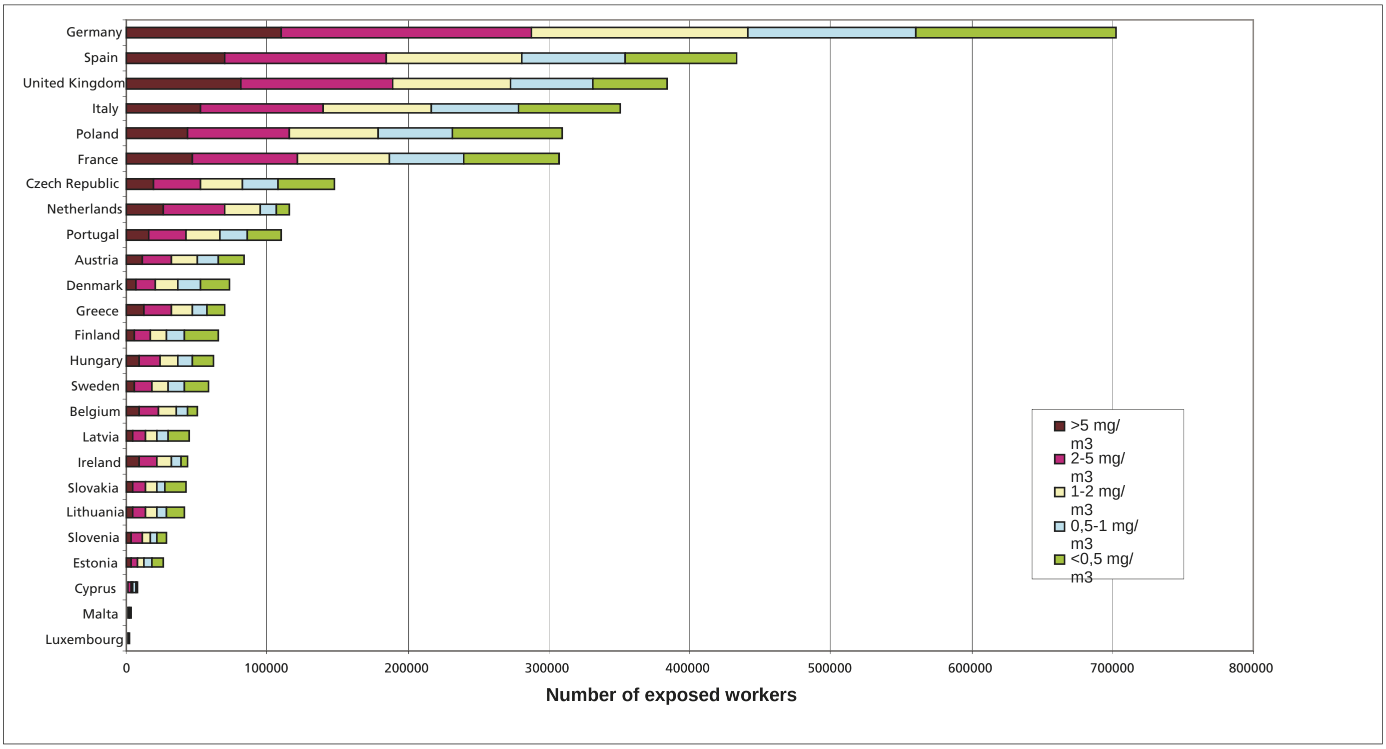


Fig. 2: Level of wood dust exposure by country and the level of exposure in 25 member states of the European Union (www.ttl.fi/woodrisk).



2. Dust control strategies

The most preferable means of control is to minimise dust at its source, because it prevents dust to be distributed around. In milling of wood material the airborne dust emission increases strongly when chip thickness is low (< 0.05 mm). The percentage fraction of airborne dust mass is directly proportional to the traverse rate (speed of the tool) and inversely proportional to the feed rate (of the material).

Methods that are effective in controlling exposures to wood dust are as follows:

- process enclosures
- local exhaust ventilation
- general dilution ventilation
- personal protective equipment

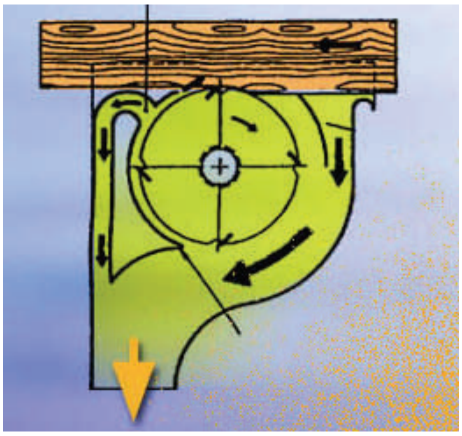
2.1 Design principles for exhaust hoods

A great challenge for the design of exhaust hoods is the rotating motion of the tool, which creates a fan effect. In the case of rotating circular saw blades, air is drawn in along the axes of the saw blade and thrown outwards, sideways and upwards. The spinning saw blade also induces an air flow, which follows the blade and flows up from the back of the rotating saw blade. When a saw blade guard is added, the air flows are contained and irrigate towards the saw operator.

Points to consider in the design of exhaust hoods for woodworking machines are:

1. The greater the degree of enclosure of the source, the better will be the control.
2. All moving parts of machines should be enclosed as much as possible in order to minimise stray air flows.
3. Capture hoods should be as close as possible to the point of dust generation.
4. Capture hoods should be positioned to capture the dust laden air stream.
5. The addition of flanges around the exhaust inlet will improve the capture efficiency.
6. The airflow from the tool should work together with the airflow in the extraction hood as long as possible.
7. The use of extraction guide vanes will reduce air flows following the tool and direct them to the exhaust (Figure 3).
8. The use of feedback to the exhaust duct just before outflow will reduce flows and dust dispersion towards the operator (Figure 3).

Fig. 3: The feedback just before outflow and guide vane will reduce the outflow from the hood towards the operator.



Joint Declaration between CEI-Bois, EFBWW and A. USL 7, Tuscany Region, on Working Conditions and Wood Dust

Between May 2009 and April 2010 the European Confederation of Woodworking Industries, the European Federation of Building and Woodworkers and the Azienda Usl7 de Siena have been running a joint project on the practical reduction of workers exposure to wood dust.

The project was called Less Dust (Better working conditions by reducing wood dust emissions) and was built up on the long-lasting joint activities in the European Social Dialogue for the woodworking industries. The improvement of working conditions and well-being at work is one of the focal points of the European Social Partner activities, which are gratefully supported by the European Commission. To promote well-being at work is, of course, vital for workers but also a core factor for a successful economy in general.

Wood and the variety of species are a wonderful, natural, versatile and excellent working material. In previous statements, declarations and activities we have already pointed to the advantages of using wood due to its excellent properties and carbon neutrality.

EU policies and regulations in the area of working conditions over the last decades have contributed to numerous initiatives for improving and upward harmonizing working conditions at all levels, thus creating a level playing field. Formal regulation creates the necessary incentives for companies to adopt the best prevention practices as presented in the brochure of the Less Dust project.

Considering that occupational exposure to wood dust has some adverse health effects, including carcinogenic effects and respiratory effects, the social partners underline the need for every company to conduct a risk assessment and limit the wood dust exposure.
The Social Partners call upon those involved to report all occupational health diseases related to wood dust exposure in order to improve the prevention of exposure and the treatment of affected workers.

In the search for the best solutions for existing problems, it is vital that workers are given an active role, especially in prevention measures (that has to be the first priority in accordance to the European Framework Directive and its sub-directives). Using professional advice and expertise will thereby be an advantage to create tailor-made solutions in line with the agreed standards, independent on whether they are laid down in law, in collective agreements or at company level.

One of the priorities of the project was to arrange the communication between the different stakeholders. Thus a dialogue between producers and users of wood processing machinery was considered vital and was initialized. Therefore, two workshops have been organized, one focusing on hand-held machinery and the other one on stationary and CNC-machinery and extracting systems.

The project partners like to underline that those workshops have been very fruitful. Representatives from machinery producing companies have been very interested in getting first-hand information regarding the needs of the users of their machinery. The advantages and disadvantages of existing technical solutions have been discussed and also the role of standardisation, and whether the results of this project could contribute to the discussion of European standardisation.

In the scope of the project the project partners found the following approaches of high value:

- A comprehensive risk assessment to discover all aspects of possible improvements of working conditions;
- Technical solutions to eliminate or reduce the dust emission at their source;
- Prevention through design of new machines, equipment, as well as local and general ventilation systems;
- Better work organisation, processes and facilities to separate dusty working activities;
- Training of workers, designers, engineers, machinery and equipment manufacturers, health and safety professionals;
- "Good housekeeping" in the sense of a proper cleaning of the workplace;
- Sector activities with financial incentives for small companies;
- Health surveillance and prevention with regard to specific exposure risks.

The undersigned Project Partners are convinced that information, strategies, practical knowledge and material is existing at the European level for a successful further reduction of wood dust emission and exposure at the different workplaces. By taking into use the necessary best practices, exposure of workers to wood dust can be very cost-effectively reduced to levels required from companies in those Member States with the strictest requirements on wood dust exposure.

The Project Partners call upon the European Commission to install and facilitate a continued dialogue between producers of woodworking machinery and the social partners. Such a dialogue could very much contribute to practical solutions based on the experience and knowledge of woodworking machinery users as shown during the project.

The results from this dialogue can then be used to support the standardization work within CEN/TC 142 "Woodworking machines – Safety", and lead to the installation of a specific CEN/TC 142 working group

Florence, 11th March 2010

Filip De Jaeger Secretary General CEI-Bois	Sam Hägglund General Secretary EFBWW	Fabio Strambi Director of OHS A.USL7, Siena - Regione Toscana

Information on the project partners

European Federation of Building and Woodworkers (EFBWW)
Rue Royale 45/3
B – 1000 Brussels

Tel.: +32/2/227 10 40
Fax: +32/2/219 82 28
E-mail: info@efbh.be

CEI-Bois
Rue Montoyer 24/box 20
B - 1000 Brussels

Tel.: +32/2/556 25 85
Fax: +32/2/287 08 75
E-mail: info@cei-bois.org

Azienda USL 7 di Siena
U.F. PISLL Zona Alta Val d'Elsa
Via G. Carducci, 4
I - 53026 Poggibonsi (SI)

Tel. +39/0577994927-22
Fax +39/0577994935
E-mail: f.strambi@usl7.toscana.it

Steering group members:

Aleksi Kuusisto (Puuliitto - Finland)
Coen van der Veer (FNV Bouw - Netherlands)
Rolf Gehring (EFBWW - Belgium)

Frederik Lauwaert (CEI-Bois - Belgium)
Filip De Jaeger (CEI-Bois - Belgium)
Michel Astier (FNBOIS - France)

Fabio Strambi (A. Usl7 Siena - Italy)

Irma Welling (Finnish Institute of Occupational Health - Finland)
Wim Tiessink (SKH - Netherlands)