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10 Golden Rules for Dust Control

Rule 2: Use low-dust materials

Before using protective measures that are often technically complex, it is worth checking the application of low-dust materials or of substitutes with a lower hazard potential already at the start of the production process. In some cases this can also be associated with a change to the work method. What at first glance appears to be onerous and difficult can nevertheless be worthwhile: the use of substitutes generally leads to considerable cost savings if, as a result, the costs for extraction and ventilation systems, energy and personal protective equipment are reduced or even made dispensable.

Enquiring with the manufacturer is worthwhile

As early as at the planning stage of the equipment the spots where dry bulk materials that tend to create dust are used or created as intermediate or end products are to be checked. Typical process steps associated with formation of dust are:

- drying of bulk materials in air flow
- pouring procedures
- mixing procedures of dry bulk materials
- pneumatic transportation.

The potential for the generation of dust is, however, also dependent on the properties of the material used itself. An important role is played by

- the chemical composition
- the distribution of grain size
- the bulk density and
- the moisture content ("product moisture").

As a result of pelletisation, the use of binding agents, the elution of the fine dust fraction and the micro-encapsulation of particles, the release of dust is often sustainably reduced. **Manufacturers and suppliers are the appropriate contact persons concerning the selection of low-dust materials.** In many cases they also have the required product in store in a dust-reduced form, for example as slurry or pellets.

Slurry, pastes, pellets …

By using moist raw materials or raw materials mixed as slurry the dust formation of dry bulk materials is considerably reduced. Moreover, for slurries or suspensions, after sedimentation of the solid a very high packing density occurs which is difficult to achieve by mechanical pressing procedures. A distinctly reduced storage volume is the consequence. Many manufacturers today offer suitable material suspensions particularly in the area of additives (pigments, glazes, engobes etc.).
The less the individual particles in the dry bulk materials are enveloped with air, the less they tend to create dust. By reducing the proportion of air in the material, the formation of a dust-air mixture (aero-suspension) is reduced. **In order to achieve this, dusty materials are sometimes provided as pellets or as granulate. If possible these forms of use should be reverted to.**

Even low quantities of additives can positively influence the relative forces between the particles and thus the development of dust. An example is the addition of stabilisers and pigments in the production of polymeric solids.

Substitutes

Top priority even before considerations on the use of low-dust materials, is of course the question for substitute substances: **Can toxic dusts or dusts that are hazardous to health be replaced by substances with less dangerous properties?** In this case it is necessary to cooperate closely with the suppliers or manufacturers and to examine all technical possibilities. Even for dusty materials this route is onerous and only rewarded with success in rare cases – technology and material properties remain the focus.

In spite of this, there is a number of positive examples and approaches:

- the silica content in abrasives, in grinding and polishing agents is minimised or even prohibited in some EU member states. Substitute materials are available.

- there are also alternatives for silica-containing grit used as firing auxilliaries in the furnaces of the ceramic industry (e.g. corundum).

- in the majority of cases, glazes containing a high level of lead can be replaced by lead-free or at least lead-reduced glazes.

- Today, an entire series of substitutes for ceramic fibres classified as carcinogenic is available (details e.g. in the German TRGS 619 [Technical rules for hazardous substances] under www.baua.de).

- In Europe, the chromate content of cement has been restricted since 2005 to 2 mg/kg in order to prevent the so-called allergic cement eczema.

Fig. 1: Dusty material in pelletised form

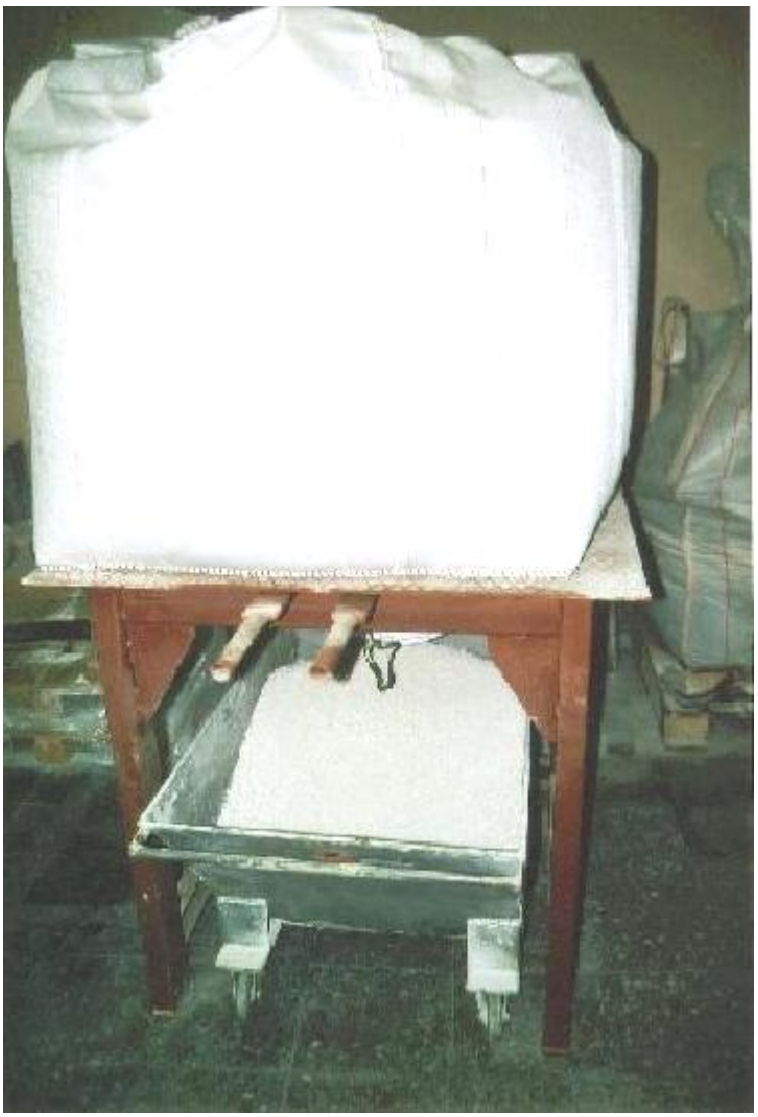

Fig. 2: Low-dust workplace as a result of using granulate