

Hazards in a traditional industry

## World at work: Manufacturing "Tatami" mats in China

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Exposure to dust may cause respiratory problems

Tatami matting produced from rush is used in almost all households in Japan. Now, most matting products are imported from China. Rush cultivation and processing began in the 1980s in China, being introduced from Japan. In 1999, the cultivation area had increased to 5980 hectares, and exports of matting to Japan were 45 000 metres in a local area of China. Chinese researchers have recently found some serious occupational hazards in the industry.

### TASKS OF THE JOB

To keep the colour of the mat, the raw rush mat has to be initially smeared with mud (fig 1), and then dried by heat flow before being processed into a mat. A growing number of casual workers are employed in the process, which includes drying, selecting, weaving, and other activities.

### HAZARDS OF THE JOB AND IN THE WORKPLACE

In the late 1990s, it was found that workers were heavily exposed to dust from the mud during the process in the rush matting enterprises in China (figs 2 and 3). The geometric mean (GM) of total dust concentration in the workplace was  $20.00 \text{ mg/m}^3$ , and that of respirable dust was  $8.22 \text{ mg/m}^3$ . The content of free silica in the worksite sedimentation dust was 25.6% on average. Exposure to crystalline silica can result in adverse pulmonary responses such as acute silicosis, accelerated silicosis, chronic silicosis, and conglomerate silicosis. Among 661 workers who underwent chest x ray examination, the prevalence of small opacities of profusion category  $\geq 1/0$  was 2.57%. The NIOSH recommended exposure limit is  $50 \text{ }\mu\text{g/m}^3$  for up to 10 h/day for a 40 hour working week. The Chinese maximum allowable concentration is  $2 \text{ mg/m}^3$  for total dust (10–50%  $\text{SiO}_2$ ), and  $1 \text{ mg/m}^3$  for respirable dust (10–50%  $\text{SiO}_2$ ). There is evidence that exposures routinely exceed the standards. Although it is well known that

smoking contributes to the development of pneumoconiosis, some workers still smoke during the operations (fig 4).



Figure 1 Raw rush being immersed in mud, and then dried.



Figure 2 Quality control by selecting and refining the dried mud.

### MEASURES TO PROTECT WORKERS

Many preventive measures have been recommended by the Municipal Agency for Public Health Inspection to help the enterprises to protect workers:

- Guiding the industry towards providing a healthy and safe workplace; production will not be allowed to continue without meeting the requirements.
- Conducting technological innovation (mechanical processes) and using industrial engineering to reduce dust levels close to national occupational exposure limits. Otherwise,

effective protective masks must be used.

- Using epidemiological investigations to collect basic data on the prevalence of pneumoconiosis. Enforcing worker health surveillance, especially chest x ray checks.

However, the process of controlling dust pollution and the elimination of pneumoconiosis is likely to be a long term struggle.

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**Figure 3** The refined and coloured rush being weaved into mats.



**Figure 4** A worker smoking during the rush selection operation.