# UNSAFE ACT AS THE RISK FACTORS OF ACCIDENTS IN USING MILL IN ROOF TILE INDUSTRY AT PEJATEN VILLAGE TABANAN REGENCY

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ABSTRACT

The use of mill and hand press machines had been increased the productivity of roof tile home industry at Pejaten Village Tabanan Regency. But the increased of productivity followed by increased of working accidents. Many effort had been done to reduced the accident such as equipped the mill machine with machine's cover, foot protective devices, and training to the new employees; but, the accident still happen. Although the incident of accident was lower but the disability was severed such as loss of hand, loss oh finger, or other physical defects of the body part. Such physical defects caused a serious effect on worker's daily lives and social activities. To find out the unsafe acts as the risk factors of accident, a retrospective study was done using interview and on the spot observation to the milling process. The results are found: there are three risk factors contributed to the accidents, namely: the human factor, the tools and the environment. The human factor contributed highest one for the accident. From human factors it was found that there are many unsafe acts, such as: careless, going up to the upper inlet of mill to push mixing raw material with foot or hand, moving the mill without turn off the machine, cleaning the mill without turn off the mill, taking out the stone which trapped the rollers using hand, operating the machine without guarding, working with tired condition, working without knowing the operation procedure, without training, improver lighting, working without personal protective devices, etc. The highest incidents come from pushing the raw materials on inlet of mill in order to speed-up the milling process. To solve the problems some actions must be done such as providing the mill with the appropriate equipments; by doing so, the operator can push the material safely to speed-up the mill process, turn off the machine before cleaning, appropriate training before operating of mill, using the personal protective devices, and doing good house keeping and inspection, regularly.

Key word: mill, roof tile industry, accident, unsafe acts.

## INTRODUCTION

In Indonesia the use of machines and mechanical tools has been widely adopted in all economic activities and in Bali including the small-sized roof tile industry in Pejaten Village. Since 1980 hand press and mills have been introduced to the industry in that village. The mill is used for mixing and crushing clay and sandstone. The use of mill and hand press machines had been increased the productivity of roof tile home industry at Pejaten Village Tabanan Regency. But the increased of productivity followed by increased of the working accidents (Sutjana, 2000). Many effort had been done to reduced the accident such as completed the mill machine with machine's cover, foot protective, and training to the new employees, but the accident from year to year still happen. The are three factors as a cause of accidents namely human factors, tools or equipments and environment ( Garndjean, 1993; Manuaba,1989; Veerasingam, 2005). Human factors such as the unsafe behavior or unsafe acts most often cause of accident (Smith, 2005). In this paper are presented the incident of accident and the unsafe acts as the risk factors of accident during using the mill in roof tile production process.

## SUBJECT AND METHOD

Subject of this study were:

Owners of mill machine and mill operators. There are 27 persons were involved voluntarily ( 7 of mill owner and 20 mill operators)

Method : during the study there were two methods applied, namely:

- interview (retrospective study to the working accident the last three years period)
- observation was focused on the workstations, work environment and workers behaviors during work.

## RESULT AND DISCUSSION

### 1. Type of mills

There are two kinds of mills, namely a stationary-type mill with a 20 HP diesel engine used in large factories (Fig.1), and a mobile-type mill with an 18 HP diesel engine and wheels (Fig.2) (Sutjana, 2000).

Figure 1: static mill

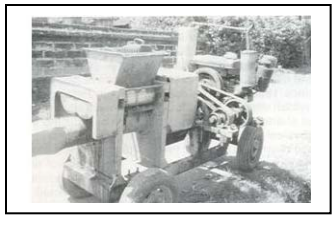

Figure 2: mobile mill

2. The accidents cases

Retrospective recollections for three years period (2001 to 2004) of accident cases from the mill operators who got injured, other roof tile workers and mill owner. The accident cases varied from minor injuries to very severe ones. The incidents of accidents in this village published by Sutjana (2000) compared with the incidents of accidents the last three year which were nearly constant. Table 1 illustrated details of accidents cases during 2001 to 2004 period.

Table1. The incidents of accidents during using mill in roof tile production during 2001 to 2004 period.

| NO | BODY PARTS | NUMBER OF ACCIDENTS | CAUSED OF ACCIDENTS |
|---|---|---|---|
| 1 | HAND | 3 | ROLLERS |
| 2 | FINGERS | 5 | ROLLERS |
| 3 | FOOT | 2 | ROLLERS |
| 4 | TOMB | 1 | GEAR |
| 5 | INDEKS | 3 | GEAR |
| 6 | SKIN OF STOMAC | 1 | Pulley belt |

Although the incident of accident was small but the injuries were severe such as loss of fingers, loss of hand, or other physical defects (Fig.3). Such physical defects caused a serious effect on worker's daily lives and social activities.

A B C

Figure 3 Physical defects from mill accidents. A. hand crushed by roller or gear, B. fingers cut by roller, C. plantar foot crushed by rollers

3.Accident analysis

From ergonomic point of view the work accidents can be occur due to 3 factors: human, tools and environment factors (Manuaba, 1989; Grandjean, 1993). The cause of accident mostly from the human factors, as well as mill operator or other person who helped the operator during milling process. But some time any person such as the children played around the operated mill got an accident. Accident from tools or environment not yet

found. From human factors there are many unsafe acts were done by the mill operators during mill process.

4. Unsafe act as a risk factor of accident

The owner of roof tile material (clay and sandstone) need to accelerate the milling process so that they do some tasks without aware to the risk of accident. The unsafe acts as the risk of accident during milling process are as follows:

a. Careless. During milling process some time the operator work with talking to the other worker, so careless with their task. In that case part of his body enter to the dangerous part of the mill such as rollers, gears and crushed it.
b. To push the row material using foot or hand. To speed up the mill process, the operators went up to the in let of the mill and push the raw material with his foot or hand (Fig.4). The machine had no proper protective device, his toes or heel or plantar foot or his fingers might enter the rollers, and at that time crushed by the roller. This unsafe act was the highest cause of accident.

Figure 4 The mill operator push the raw material using their foot or hand

c. Take the small stone which are trapped between the rollers. During milling process some time the small stone trapped between the mill rollers and resulted the mill stopped. If the operator removed the stone using hand without protection, after the stone the mill roller rolling again and his hand was crushed between the rollers (Fig.5).

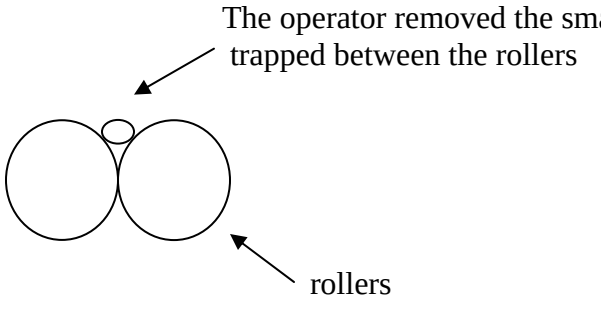


Figure 5 The operator removed the small stone trapped between the rollers

d. Cleaning the mill. After finishing of milling process the operator clean all part of mill including the rollers (Fig.6). Before start to cleaning they did not turn off the machine. During cleaning the mill some time their hand or fingers enter the roller or gears and crush their finger or their hand.

Figure 6 the operator clean the mill

e. Moving the mill. If the operators need moving the mill to the other place, they push the mill, helped by other person (Fig. 7). During moving the mill some time the machine still on and the mill gears did not cover properly. At that time the hand or finger of the pusher some time enter the gear and crush it.

Figure 7 Moving the mill to other place

f. Pulley belts. Pulley belts of the stationary-type mill were running at high speed without any safety covers, which was dangerous for an ignorant operator (Fig.8). Because the working space not to large during operation the pulley belts might be crushed any body pass there.

Figure 8 Pulley belts without appropriate safety protective

g. Any body around the mill operated. Some time during mill operated any body such as children played around the mill, and the children without awareness by the operator take the mill gears and crushed their hand or fingers. This accident was happen because the gears not cover properly during operation, so any body might be touch it.
h. Lack of knowledge. All parts of the mill can easily cause the accident when it is on, but unfortunately worker's knowledge on the safe machine operation was not enough to avoid the high risk of accidents. It is due to lack of training and

education. Consequently new employees were the dominant victims of mill accidents.

i. Long working hours. Some time the operators working from early morning until late afternoon, so they work although they feel fatigued. Fatigued workers very easy to get accidents. It is due to their attentions and awareness reduced (Manuaba, 1989; Biman, 1990) after long working hours.

From all of the unsafe acts stated showed that the safety behavior of the worker still very low. So that the incident of accident during use of mill in roof tile production were nearly constant from year to year.

## CONCLUSSION

From this study the conclusion had been drawn: 1) the incidence of the accidents during use of mill in roof tile production were nearly constant from year to year, 2) Although the incidents of accidents were low, but the physical defects resulted a serious effect on worker's daily lives and social activities, 3) Major causes of the accidents are unsafe acts from the operators or other person around the mill operated. Therefore, the followings are recommended: 1) training and supervision of the workers must be continuously informed, especially for the new employees, 2) the mills should be provided with safety devices and use it properly, 3) the role of work and rest pause must be implemented to the mill operators, 4) Turn off the machine during clean or take any thing which are trapped the rollers, 5) Work always with attention and awareness.

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