

## Hazards Associated with Processing in a Palm Oil Mill

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### INTRODUCTION

Millers are invited to take a second look at what they have implemented so far in their mills in terms of modernizing the thinking behind the safety features in the processing plant so that there shall have no accidents in the mill at any time. The right 'thinking' is relevant as safety measures employed must emanate from a caring mind rather than for the sake of satisfying regulations enforced by regulatory bodies. Millers may not even need to read regulations to implement good safety features in their mill if such a system is based on their own common sense rather than just some procedures contained in regulations as the regulations may miss out some important points.

If a person wants to throw a hammer from one end of the workshop to the other end for the purpose of passing it on to another person and in the process, someone else on the path gets hurt. Instances like this are common in palm oil mills mainly because the workers do not have a good education, refinement or a caring attitude. You may not find this specifically mentioned in regulations except like, "no person employed in a factory shall willfully and without reasonable cause do anything likely to endanger himself or others".

This article intends to highlight some of the causes of hazards that could be prevented if the management is a caring lot. Look at the following questionnaire and try to see whether your mill complies with them or not. They are not by any means complete by themselves but sufficient to give you a hint on what are expected of them.

- Do the workers follow all safety rules specifically tailored for all employees?
- Have they read in detail the safety rules and understood the content?
- Do they know exactly how to react when an accident occurs?
- Do they know that a new recruit has to be given formal training on the job he is expected to do and this has to be documented?
- Do they know that each machinery operator has to keep his work area clean?
- Do they know that they have to report all accidents to their direct supervisor?
- Do they know the procedure to follow when there is a fire?

In all honesty, most mills will not be able to say YES to many of the above. In some cases, the management may have implemented some of the above for the sake of

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mere documentation to satisfy authorities without really having any genuine concern to make them vibrant.

Hazards are created by humans and are the direct consequence of a non-caring management. All accidents can be avoided. Sounds harsh? But that is the truth. Let us review some of the avoidable hazards and how they can be prevented. They are given in the order of their frequency.

### **HANDLING AND LIFTING OF GOODS AND MATERIALS**

In palm oil mills, lifting of welding sets, press and digester parts, motors, pulleys, steel plates and sections of conveyors are some items that are regularly lifted up, the most common one being the welding set. They are lifted by pulley block or by the overhead hoist. There are a number of areas, where injuries can take place in this section. Ample training should be given to the concerned people with written procedures so that all are well trained to do the job safely. A new recruit may assist in the job for a period of say a minimum of six occasions before he is allowed to handle the job independently or as decided by the foreman or lead technician. There must be full documentation on the observations and the performance of the recruit. Apart from training, the management should not only provide adequate protective gear for the job but also ensure that they are used by all. The troublesome ones are the conveyors, which when handled by the pulley blocks can swing violently causing unexpected accidents unless they are constantly well-guided.

The best remedy is to have a few half-tonne overhead hoists in key areas like the press and the digester, centrifuge and workshop instead of pulley blocks which are troublesome, inconvenient and accident prone. The overhead hoists are relatively inexpensive and can be installed during the time of mill installation. The consulting engineer should decide where they should

be installed for maximum flexibility of operation. In addition, a number of permanent scaffolding and cat-walks would go a long way towards reducing potential accidents. If the mentioned facilities are in place, there are much to gain in terms of time and money saved for regular maintenance work.

### **ACCIDENTS INVOLVING MILL MACHINERY**

Accidents involving machinery are often serious with amputated fingers and arms arising mainly due to lack of an established system of procedure or sheer carelessness. One area where the accident can and must be prevented is the conveyors and to a lesser extent the sterilizers. When the welder is still on the job of welding the conveyor ribbon or the paddle arm, someone starts the conveyor unaware of the person working inside the conveyor. The consequences need not be mentioned here as they are quite obvious.

These types of situations can be easily prevented if there was a system in place for facilitating maintenance crew to carry out their work without having the fear of the operational staff switching on the machinery while they are still working on machines. A caring management would issue a permit to work (PTW) with the necessary cautions (detailed below) for the maintenance team to work on machinery before they commence their work.

The authorized person to issue the PTW can be the mill supervisor and it may be issued to the foreman. After issuing the PTW, he is personally required to do the following:

- isolate the electricity supply to the motor driving the machine;
- pull off the fuses if any and keep them safely away;
- wrap a chain around the switch gear; and

- hang a danger board on the switch gear.

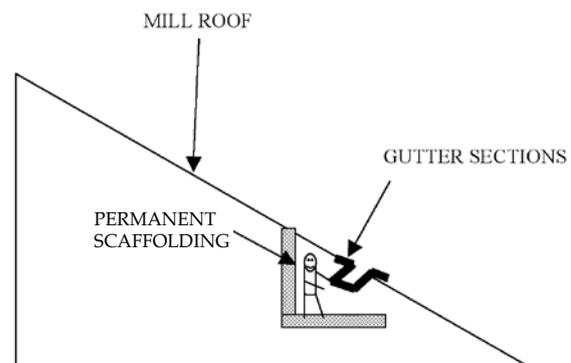
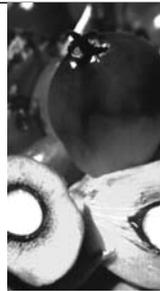
After the maintenance work has been completed, the foreman is required to return the PTW to the mill supervisor after certifying that the job has been completed and the PTW may be cancelled. Upon this certification, the mill supervisor will examine the machinery; normalize the plant and test run it to his satisfaction followed by cancellation of the PTW. The mill supervisor now will certify that the plant is safe to operate. Until this point, no one including the mill manager, is allowed to switch on the plant.

In the case of sterilizers, the person involved is invariably a process operator. He enters a sterilizer with great difficulty through the narrow hot space between cages and the sterilizer body in order to engage the inter-linking hook between cages. But the marshalling yard crew, being unaware that a person is still within the vessel, closes the sterilizer door and admits steam at 20 bar pressure. Do I need to describe the agony the person destined to have his life ending like this? Accidents of this type have happened sometime ago but have not recurred in recent times. But that does not mean that it will not take place again. Please do all that are possible to prevent such calamities. Very often the cause of accidents can be traced to a change in attitude springing from complacency that triggers mind to relax from the routine safety procedures. This can only be effectively dealt with if the safety procedures are religiously followed every single day.

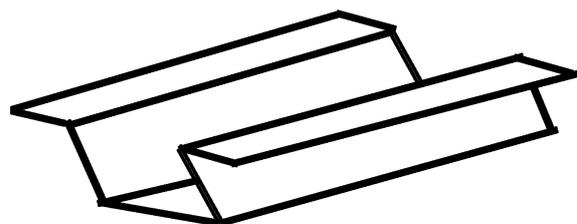
**PERSONS FALLING FROM HEIGHTS**

This is not a common occurrence in palm oil mills but cannot be ruled out as people in mills do work in dangerous areas. The common area is the rain gutter on the roof. Generally, this is contracted out but as human life is at stake, the mill management must ensure that the place is safe for the contract personnel to carry out their work. Many mill managers are satisfied with the

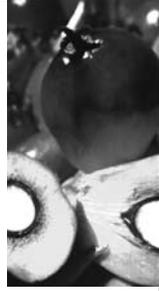
buying of insurance for the worker but that does not replace a lost life. The roof gutter in a palm mill needs replacement say every 10 years as it gets corroded resulting in sections being torn off. The collection of boiler ash and other particles deposit in the gutter causing the water to collect there resulting rapid corrosion of the gutter. Every miller probably is facing this problem but no one has found a solution for this. It is difficult to get a contractor to renew rain gutters and if you do get some one, the charges are bound to be exorbitant. A simple way to resolve the problem is to place the rain gutter, say 1 m before the roof edge as shown in *Figure 1*. During the mill construction itself, the 1 m long gutter sections with lips (*Figure 2*) can be slid into the gap between the roof edge section and the main section of the roof. This gutter must be located within the mill building so that permanent scaffolding can be erected under the gutter for carrying out its regular maintenance. This may not be a conventional system but there is great advantage in the system if it is incorporated



*Figure 1. New roof gutter design for easy installation and replacement.*



*Figure 2. Simple sliding type roof gutter ideal if made of 2 mm stainless steel.*



during mill construction. There may certainly be other better alternatives worth pursuing.

What is given here is to encourage mill engineers to deviate their thinking away from the routine and enter into the exciting world of innovation, which could be very fascinating and satisfying. Always remember that you only need to have a good idea. If the manufacturers find it has the potential, they will commercialize the idea and market the product and you will end up as a millionaire! Mill engineers have many opportunities for generating new ideas to improve processing or maintenance to make it on par with other food industries.

### **STEPPING ON SLIPPERY FLOOR OR STRIKING AGAINST OBJECTS**

The mill floor should be safe to walk without slipping as falling into the drain carrying the hot sludge water could be disastrous. This is a common occurrence especially when the sludge gets into the shoes. So we have to devise a method to prevent this. The author would like to share his experience in this nasty accident in a palm oil mill way back in 1975. The situation with regard to the slippery floors has not undergone any drastic change since then and accidents arising from it are likely to be common in mills.

Many millers probably believe that the floor of the clarification station must have oil splashed all over it. Otherwise the clarification station is not performing its duties. There is no necessity for the clarification tank or any other tank to overflow at all. If for any reason, the clarification tank overflows it can be contained in an annular chamber built around the edge of the tank. The overflow can be channeled to a collection tank.

In the choice of floor tile selection, careful consideration is required in the selection of the right type of tiles that will last and at

the same time are non-slippery. There are so many options available in the market and it is worth spending some time to get the most suitable tiles. Some millers prefer to use timber floor which probably is the best in terms of accidents and it is also a convenient floor for placing dismantled separator parts during routine maintenance.

In some mills, objects can be seen lying everywhere on the floor. Some workshops are so messy that workers cannot move around without climbing over objects that could be sharp and dangerous. The workshop foreman could be a disorganized person to allow this non-conducive and unsafe environment. This could even be a culture carefully preserved for good luck!

All mill workers are provided with safety shoes and this to a certain extent can protect the tip of the foot. It is questionable whether the safety shoes can fully protect one's foot if an object like a press screw falls partly on the leg and partly on the foot when hoisted by a pulley block. We cannot expect a long object like the press screw to land exactly on the tip of the safety shoe, where it is reinforced by the stainless steel shield.

### **STRUCK BY FALLING OBJECTS**

The falling objects in palm oil mill that has reasonable significance in accidents may be narrowed down to perhaps; the fresh fruit bunches (FFB). This can inflict bodily damage if it falls on workers because it is covered with spikes. The potential site is the hopper and when bunches are tipped unguided from a lorry or a trailer tipper, bunches gather momentum and scatter on a wide circle hitting many workers who are exposed to them. The damage can be serious and painful if bunches fall on a worker and the spikes pierce the body. The easiest remedy for this is to keep away from the area but this is not often possible as some workers on the hopper apron might be engaged in other activities like crop quality inspection while FFB consignment is un-

loaded into hoppers. Another remedy is the wearing of protective gears that can prevent major injury to those exposed to accidents.

### **IMPACT BY VEHICLES OR CAGES**

The accidents arising from the impact of vehicles or cages also can be significant if taken lightly. Most mills now have installed alarm systems on their vehicles to warn people of their movement. This has reduced the incidence of this type of accident involving vehicles but the same cannot be said of cages as no such consideration is given to accidents related to cages. A person standing in front of a charge of cages with his back facing the cages can not see when it begins to move. Simultaneously, the person operating the pusher like the tractor also cannot see that there is a person standing in front of the cages. Here, during the initial movement of the cages, the person in front cannot only be knocked down but also be dragged along with it. By the time the incident is detected, it could have been too late to save the person's life.

### **USE OF HAND TOOLS**

The common tools involved are hammers, hand drills and perhaps chisels. It is not uncommon to use the hammer on the finger or thumb by mistake. Most of the accidents can be avoided if the use of hand gloves is made mandatory when using hand tools.

### **ELECTRIC SHOCK**

This can be dangerous if the electric shock happened at line voltage (440 v). Generally, the supply switch board would indicate the

supply voltage. Prevention of accidents can be enforced if the workers are aware of the dangers involved in working with electrical circuits operating at line voltages (440 v). All electric cables should have good insulations and rubber mats must be provided in front of the electrical control panels so that operators can stand on it while switching on electric motors. Generally, if there is an earth leakage in the motor control circuit, the earth fault relay will be energized to close the circuit. In Malaysia, motors used in the industry generally have proper starter gears and hence, the incidences of electric shock arising from improper installation are not significant.

Let us now consider whether mills are equipped with emergencies associated with electric shocks. There is some weakness here. When an accident occurs, no one really knows what action to take in the absence of training. For some reason, this is given the least priority. In palm oil mills, the training for electric shocks is almost nil and all effort should be taken to ensure that every worker knows how to handle a real situation during emergency. The mobile telephone numbers of the management staff and the emergency phone number of the hospital should be available and prominently displayed at the mill premises within easy reach.

What happens if the hospital is far away and the hospital assistant is on leave? Someone within the mill should be able to carry out some life saving procedures on the person who was subjected to electric shock. This training must be given to a few mill staff if the mill management values human life.

