

## **Recommended Industry Safety Practice**

An ISRI Safety Council Recommendation

Adopted by ISRI Board on April 7, 2008

### **Pulleys, Shafts, Flywheels & Belts**

#### **Introduction**

Pulley, shafts, flywheels and belts pose a wide range of potential risks during normal operation, both to the equipment operator and to others nearby. Severe, even fatal, injury is likely when a person comes in contact with any of these moving parts.

#### **Primary Hazards**

Pinch points  
Protruding metal  
Entrapment  
Entanglement  
Nip points

#### **Primary Safety Solutions**

Machine & component guarding  
Effective emergency shut-down  
Lock-Out/Tag-Out procedures  
Safe work practices  
Pre-operation inspection  
Personal protective equipment  
Installation of effective interlocks  
Physical distance separation  
Employee training

#### **Machine and Component Guarding**

All pulleys, rotating shafts, belts, pinch points, nip points and other moving components must be guarded in such a way that contact with the parts is physically impossible when such parts are less than 7 feet above a walking or working surface. (NOTE: The allowable height measurement is made from the nearest working surface, not from the ground. For example, if a belt drive pulley is 12 feet above the ground however only five feet above the surface of a walkway, it must be guarded.) Equipment may not be

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operated if any component of the machine guarding system is either missing or damaged in a way that compromises its effectiveness. This is especially important for shafts. They may only protrude a distance of ½ the diameter of the shaft past the race that holds it in place.

### **Emergency Shut-Down of Equipment**

Equipment should be fitted with a single-action emergency shut-down mechanisms, the activation of which will immediately stop all movement of the pulleys, shafts, flywheels, and belts. ISRI recommends that such emergency shut-off devices be readily accessible from multiple points on equipment and any point along the length of conveyor belt. Single-action emergency shut-down mechanisms may take many different forms such as light curtains, push buttons, electric eyes, pull cables or other forms.

### **Lock-Out/Tag-Out Procedures**

Absolute compliance with lock-out/tag-out procedures must be utilized and enforced whenever a machine guard is missing or removed and when maintenance or troubleshooting work commences.

### **Safe Work Practice**

Injuries involving loose clothing being snagged by moving and rotating machinery parts such as shafts, flywheels, etc., that pull workers into the moving machinery, must be controlled or avoided. Loose clothing or jewelry is prohibited for wear within 6 feet of pulleys, shafts flywheels and belts, unless they are de-energized and locked out.

Workers must never touch pulleys, shafts, flywheels and belts while moving, and never attempt to penetrate a guard on this type of equipment unless it is properly locked out before hand.

Machine operators and mechanics must be aware of the movement of others in and around pulleys, shafts flywheels and belts, and shut the equipment down when anyone approaches a danger zone.

Operators and mechanics must always be aware of the sources of energy that drive pulleys, shafts flywheels and belts on the equipment they operate or maintain.

### **Pre-Operational Inspection**

At the beginning of each shift or prior to starting up machinery, and periodically thereafter, the equipment containing pulleys, shafts, flywheels and belts, and its surrounding areas, must be inspected for hazards, and where hazards exist, they must be removed before operation. At a minimum, this pre-operational inspection must insure that:

- All applicable guards are in place and soundly affixed;

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- Emergency stops and all other controls and safety devices are working properly;
- No one is working on the equipment containing pulleys, shafts flywheels and belts;
- All pulleys, shafts flywheels and belts are free from obvious defects;
- No material is caught between the pulleys, shafts flywheels and belts that would cause or create a dangerous situation.

### **Personal Protective Equipment**

At a minimum, employees working near pulleys, shafts, flywheels and belts in a scrap processing environment must wear the following protective gear:

- Hard hat;
- Eye/face protection suitable to the hazard;
- Well-fitting cut-resistant gloves
- Steel toed foot wear

Where unique hazards exist, each employer must evaluate the need for additional personal protective equipment and provide it accordingly.

### **Worker / Employee Training**

Prior to being exposed to potential hazards involving pulleys, shafts, flywheels and belts, workers must be trained on the specific safety requirements of their jobs or required duties. This training must be presented in a language the worker understands, and the effectiveness of this training should be confirmed via some form of documented testing, visual observation and demonstration.

