Gear Reducer Hazard

WorkSafeBC is currently conducting investigations into the two sawmill explosions that occurred earlier this year in Burns Lake and Prince George. In the course of these investigations, our officers have come to understand that gear reducers may overheat in certain circumstances and become potentially dangerous in wood processing environments.

The gear reducer examined was part of a waste conveyor motor-reducer set, which was driven by an electric motor and connected by a worm shaft on one end. This worm shaft extended out the opposite side of the gear reducer where a cooling fan was mounted. Cooling fans are typically secured to the worm shaft using a spring sleeve that is fitted within the bore of the fan body and tightened by friction onto the worm shaft. The cooling fan is protected by a fibreglass shroud which is equipped with a screened inspection-ventilation port.

Gear reducers, including those designed by Highfield, are commonly used in the sawmilling industry and many have operated effectively for years without inspection. WorkSafeBC officers have determined that the accumulation of gear oils and sawdust within the gear reducer may coat the ventilation screens, making a potential hazard difficult to see and hindering effective maintenance and inspection.

Hazard:

When a gear reducer leaks gear oils through or around the fan-side seal, the leaked oil lubricates the worm shaft and (along with the cyclical action of the reducer) compromises the securing of the spring sleeve. This results in metal fatigue and failure of the spring sleeve, which then permits the cooling fan to sit on the rotating worm shaft unsecured, instead of turning as intended. The cooling fan is then free to travel along the worm shaft where it can come into contact with the metal screen of the fibreglass shroud and become jammed.

Additionally, the constant rotation of the worm shaft within the bore of the stationary cooling fan may lead to excessive wear and friction resulting in measured temperatures of up to 577°C. In a sawmill environment, extreme temperatures such as these may provide an ignition source for fires or explosions if other factors are present.

What action must employers take to eliminate this hazard?

1. Employers must ensure that gear reducers in their workplace are properly maintained and that inspection protocols are followed.
2. Refer to Part 4 of the Occupational Health and Safety (OHS) Regulation: 4.3 Safe machinery and equipment.