

## Crane modernization raises production, reduces liability

To remain competitive, many companies are pushing their cranes beyond original specifications and paying a hefty cost that can be measured both in operation expense and potential liability exposure.

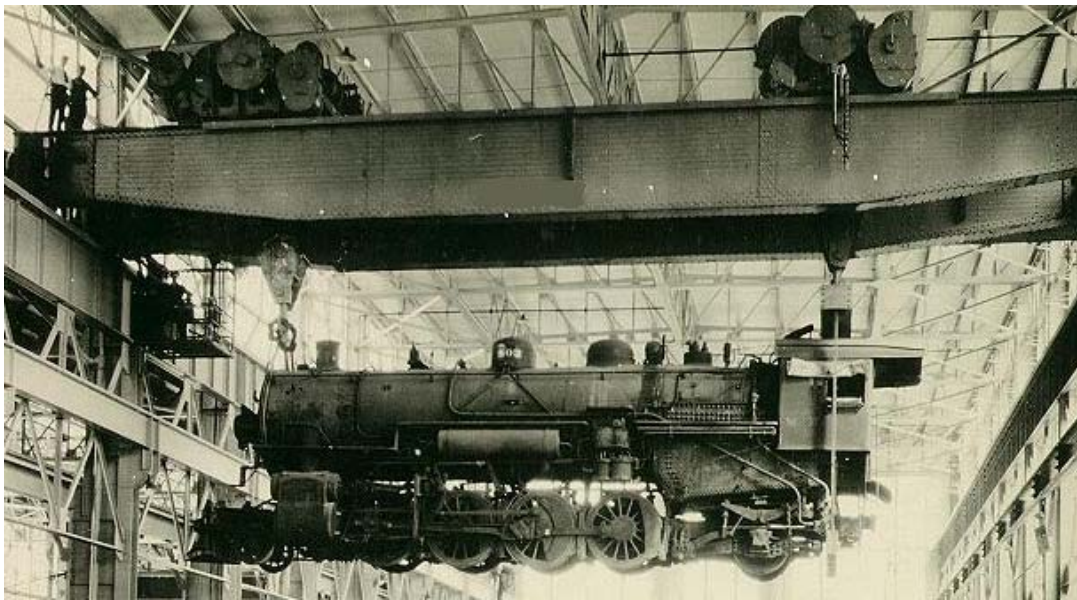


fig. 101

More than 50% of cranes in industry are projected to be operating beyond capacity. Cranes built 30 or more years ago are often inadequate to meet new process demands due to limited capacity or slow speeds. In Figure 101, the overhead crane lifts a 145 ton locomotive. This same crane is in use today, and the average locomotive weighs 205 tons. The crane is under higher stress and suffers more breakdowns.

As a result, owners have considered new overhead cranes - the natural solution to high maintenance costs and excessive downtime due to overhead crane failure. But, modernization is emerging as a cost-effective and efficient alternative that increases the life of the overhead crane and, if needed, significantly increases load capacity.

TRENDS. To maximize production efficiency, many overhead crane owners in the past have increased the amount of material in each load or increased the number of loads transported during each production interval. However, higher loadings and increased duty

can put a tremendous strain on overhead cranes--especially those 25 to 30 years old--which are usually required to handle 100% of the product.

Most 25-to 30-year-old overhead cranes were designed to handle a set amount of cycles. Today, many machines produce nearly twice as much. Increased tonnage has amplified the need for a larger load. It is now commonplace for loads that weigh more be lifted twice as frequently. This rate has increased the demands on overhead cranes and left many owners facing frequent crane breakdowns and expensive maintenance costs.

Demands for increased capacity are expected to continue. Overhead crane owners have asked for new overhead crane specifications. The new capacity is expected to keep pace with the boom in loading demand, anticipated to occur within the next few years. To meet this expected boom, owners are examining investments in overhead cranes. Companies also consider modernization in order to keep pace with increases in duty and capacity demands, and to extend the life of existing cranes.

**CRANE OVERLOAD PROBLEMS.** Safety and economics dictate when to make overhead crane improvements. Overloads can put employees at risk and result in violations of OSHA standards. Worse, continued operation at known overload can put owners at risk of "gross negligence" charges if employees are injured. In fact, insurance adjusters have identified overloaded cranes as a work-safety issue for today's factories.

Most managers are also keenly aware of the results of pushing old, marginal equipment to the limit of its capacity. Necessary repairs to these overstressed cranes can cause significant downtime with loses as much as \$20,000/hour, particularly when house cranes are unavailable to fill in for overhead cranes under repair. Additionally, new parts must be ordered to fit old crane machinery, which has already lost a significant portion of its life. Delivery may take as long as six to eight weeks.

The practice of improving overhead cranes part-by-part ("the wrong way") can cause a variety of side effects. For example, new gears installed in an old gearbox will have a shorter life than the original set. Maintenance costs will increase over time despite the investment in new parts.

MODERNIZATION SOLUTIONS. Modernization is an option to selective parts replacement. It avoids the disadvantages of a "Band-Aid" approach that provides some new parts but does not materially increase capacity, life, or reliability of the equipment.

Several issues need to be examined when evaluating modernization and its benefits over new overhead crane construction. In older plants where the facility has been expanded around the crane, crane removal can be difficult or cost-prohibitive. (see figure 102) Fortunately, the structural components of existing overhead cranes are usually sound because of conservative engineering during original construction. Even if this is not the case, frame reinforcements and structural modifications can be inexpensive. Dearborn Crane holds original plans for many cranes, obtained as the original contractor or through acquisition of other crane companies. Dearborn Crane can sometimes go directly to original blueprints for structural information rather than do expensive field research or make assumptions that could be inaccurate. If the crane has no prints available, as some don't, it is necessary to do a field study. Generally, the customer will be put in touch with a independent contract engineer so the customer owns the results of the survey.



Fig 102

Modernization, in most cases, can solve the problems associated with older overhead cranes operating at overcapacity for less than the cost of new equipment alone, with no removal costs. If the cost to disassemble and remove the old overhead crane is \$50,000, plus \$100,000 for the new overhead crane, the bottom-line cost of new equipment is actually \$150,000. This option costs significantly more than modernization, which can range from \$25,000 to \$75,000.

Modernization also has a quicker turnaround time. Actual downtime for modernization runs from three to five days, compared with as many as 10 days for old overhead crane removal and new crane installation/startup. Dearborn Crane has developed modules that can be preassembled in its shop and then dropped onto the overhead crane in place, further reducing downtime.

Upgrading 30-year-old worn parts with modern and improved counterparts is just one advantage to modernization. Technological advancements in engineering can also be added to create a modernized crane with an extended life cycle. Dearborn Crane recommends installation of gearing engineered to today's industry standard of AGMA Quality Level 11, with much closer tolerances, reduced vibration, less gear wear, lower maintenance, and notably quieter operation than overhead cranes with gears of Quality Level 6 common in most older overhead cranes.

A correct modernization also offers an opportunity to eliminate the use of high-maintenance, inefficient mechanical load brakes with many moving parts (see fig. 103). In older overhead cranes, the constant weight of a spreader or c-hook on the hoist mechanism can prevent proper cooling of the load brake by circulation of gearbox oil around the friction discs. About five years ago, the situation was made worse by the outlawing of asbestos, the material formerly used for friction discs. Newer disc materials must work harder and thus generate even more heat in the gearbox. The load brake is typically replaced as a secondary braking unit by a regenerative braking system that dissipates energy as heat, through a resistor grid with no moving parts (see fig. 104).

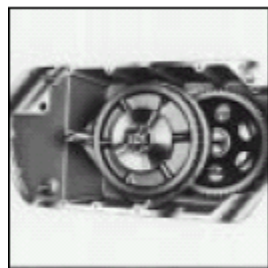


Fig. 103



Fig. 104

A modernized overhead crane frequently includes new hoist gearbox and drum, bearings, shafts, axles, brakes, and controls. Installed as a unit at the beginning of their wear life,

these components deliver years of low-maintenance operation. Many times the new hoisting equipment and lack of mechanical load brake mean the overhead crane trolley is significantly lighter. When replacing old trolleys (see figure 101 – they’re big!) with modern trolleys, capacity sometimes can be raised because the difference in trolley weight is so significant. When the crane is a lighter duty or smaller capacity, it’s best just to replace the hoist.

Crane companies with divisions dedicated to modernization may have patented or proprietary options to improve long-term performance and reduce maintenance costs. This should be a consideration when selecting a modernization firm. Longer life, decreased operating costs, and improved productivity are results mill owners can expect to see with overhead crane modernization. But the real difference may be in what they hear. The quiet operation of a overhead crane meshing precision AGMA Level 11 gears is a sharp, sometimes startling, contrast to the raucous grind of old machinery trying to keep up with today's production demands.



Fig. 105

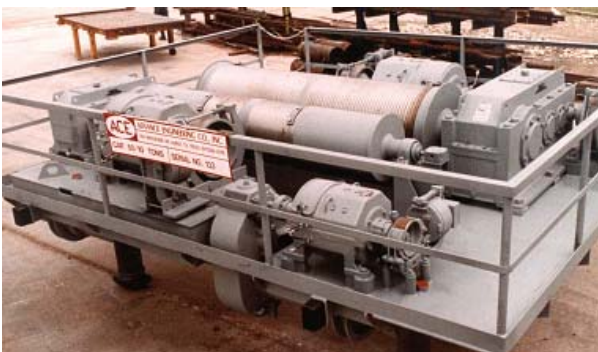


Fig. 106

Figure 105 and 106 show before-and-after including new motors, brakes, drums, gearbox, and controls.

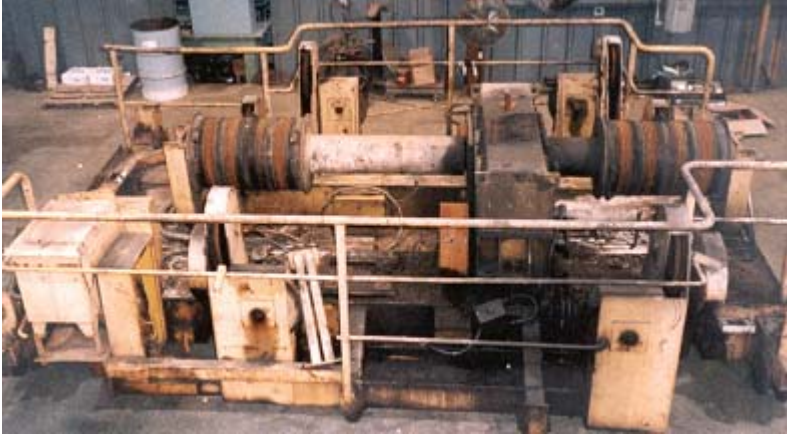


Fig. 107

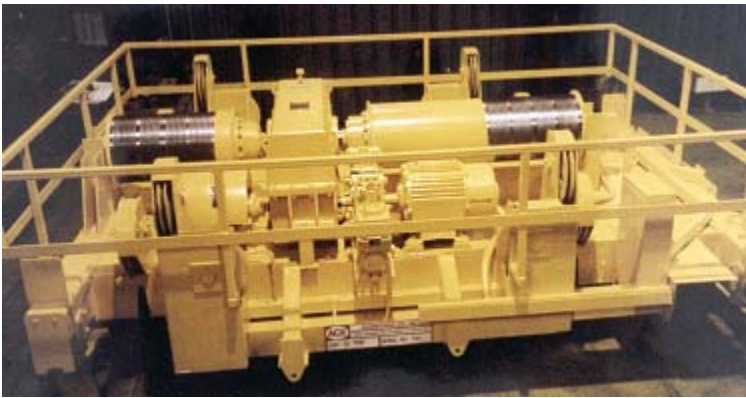


Fig. 108

Figures 107 and 108 show before-and-after including new drum, brakes, and motors.