Can ILoT Help Optimize Your Material Handling Conveying System?

Part 1: Equipment Failures are a Process Not an Event.

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION
Written by Charles Ritinski, Adam Soder and Kevin Blount, Sumitomo Machinery Corp.
Contributions by Mike Stegmann, Boston Gear/Bauer Gear Motor USA and Ron Wagner, Honeywell Intelligrated

It is essential that we recognize that equipment failure is an unavoidable process and not an event. By using the IIOT, what we are really referring to is embracing condition-monitoring programs for selected conveying machinery. By using these tools, it will be possible to detect equipment distress earlier in the Product Failure (P-F) Curve:

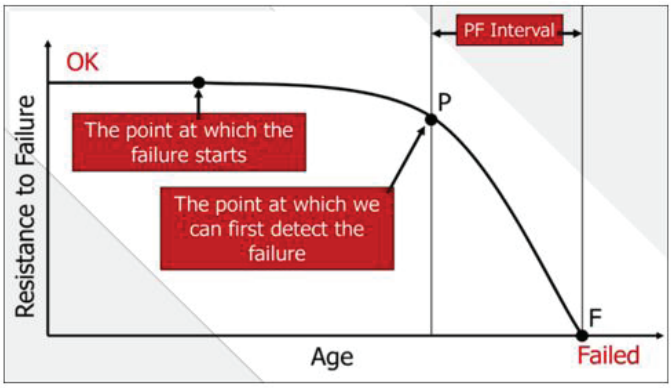

Figure 1: Typical Product Failure (P-F) Curve

There are many common electromechanical components that are integral to conveyors such as, gearboxes, motors, mounted bearings (commonly referred to as pillow or flange blocks), and in some cases troughing idlers.

Figures 2 and 3: A typical belt conveyor with a close up of the motor and gear drive assemblies

All of these components are potential candidates for monitoring. Once the system is commissioned and all components have reached their operating temperature equilibrium, these devices will perform at a very consistent level (assuming constant load, ambient temperature and solar radiation). When loads vary, system performance will vary, which can be accounted for by tracking the appropriate parameters. Simply stated, Condition Monitoring is the science of specifically observing and tracking changes in the selected parameters. The changes are then used to optimize the operation of the system, schedules, maintenance, and maximize productivity at all ranges.

Background:

The downward price trends of electronic diagnostic equipment in conjunction with increased performance has created the new techniques of diagnostic maintenance. This includes continuously monitoring the condition of the conveyor and/or other pieces of machinery in operation, then performing maintenance proactively as needed. Typically, a series of sensors are strategically deployed in or on a given asset within the system i.e. gearbox, motor and/or mounted bearings. Because these mechanical power transmitting machines are common in industry, the failure modes are well known, but without extensive experience, difficult to accurately assess. Typically, these devices do not fail catastrophically; rather, they degrade over time. By consciously tracking their behavior, it is possible to assess when their failure is imminent.

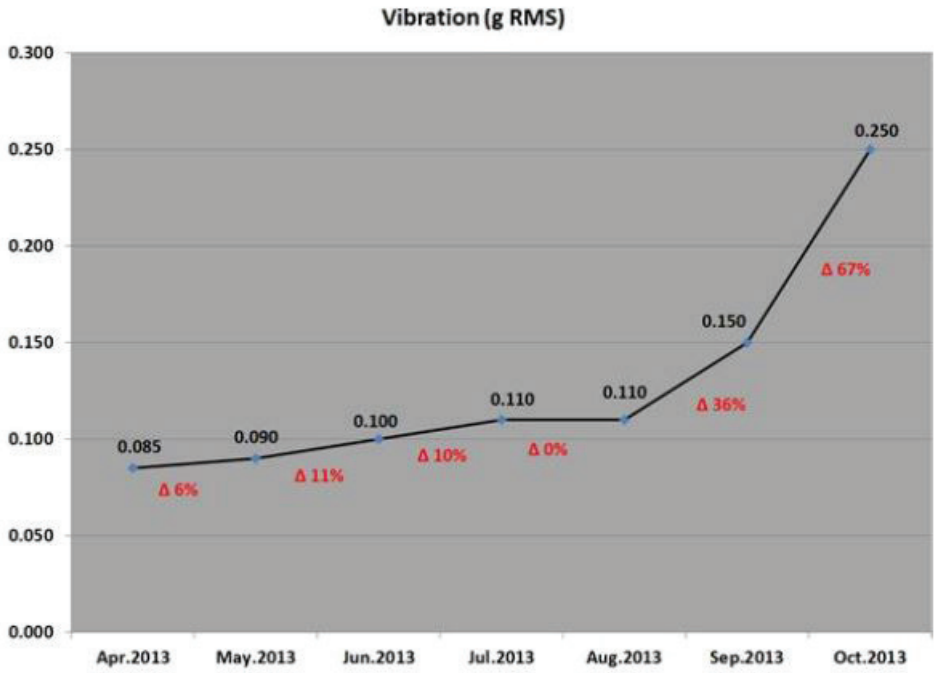

Figure 4: Example of an Upward Vibration Trend in a Gearbox

Examples of the types of data commonly collected includes; operating temperature (always in combination with ambient temperature), power draw, vibration levels & frequency, noise level, torque produced, and oil condition. An increasing operating temperature, may be an indication of a low oil level in a reducer, as an example. A key action required for this approach to be successful is to establish a baseline when the system is new and operating normally. By setting a baseline, any trends in the data can be analyzed to optimize the decision making process.