Loss Analysis in a Manufacturing Plant: How PlantConnect® SFactory helped in OEE improvement

EXECUTIVE SUMMARY

Customer

Sigma Electric Manufacturing Corp., a leading manufacturer of electrical fittings and other precision engineered solutions.

Installation in Sigma Electric plant in Chakan, Pune, India

Various losses occurring in a manufacturing plant have direct bearing on reduced productivity and increased costs. Though some losses like asset failure can be measured using traditional methods, advance systems are required for root cause analysis. Then there are many miniscule losses which are very difficult to measure. Their frequency of occurrence can be high and hence their cumulative effect significant. These are referred to as 'minor stoppages'. Yet other types of losses occur due to lack of coordination between various departments.

This case study demonstrates how PlantConnect SFactory, a Smart Factory solution from Ascent Intellimation tracks and analyzes all types of losses and helps in eliminating some losses and reducing others. The installation is done in. Overall business requirements of customer are:

- Loss analysis
- OEE improvement
- Just-In-Time Maintenance (not discussed in this case study)

THE CHALLENGE

Losses can occur in a manufacturing plant due to many reasons like asset failure, setup time, unavailability of raw material, operator inefficiency and many more. They impact Availability (A) and/or Performance (P) and/or Quality (Q) of production. In other words losses impact Overall Equipment Effectiveness (OEE). Image 1 shows how losses affect OEE.

It is very difficult to accurately track and analyze losses using conventional methods. For some losses like minor stoppages, it is almost impossible.

Scenario was no different in Sigma Electric plant near Pune, India.
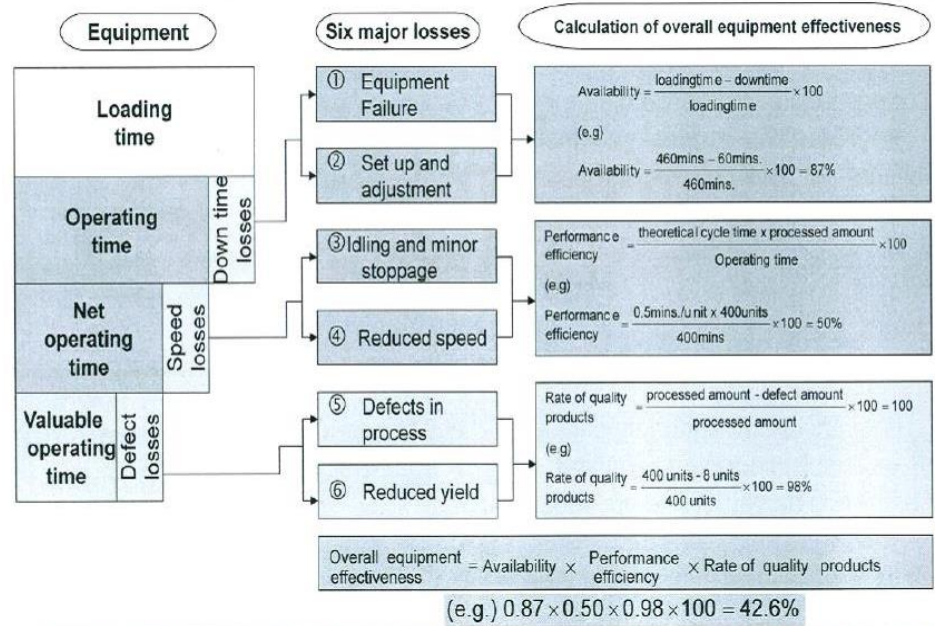

Image 1: Impact of losses on OEE

*"Anything that hinders a plant from achieving 100% OEE is a **Loss**. Thus analysis of losses and finding solutions is the most important step for improvement in OEE"*
- *Sr. VP, Manufacturing Excellence*

THE SOLUTION

PlantConnect SFactory with integrated Loss Analysis Module was deployed.

Losses are categorized as
- availability losses
- performance losses
- quality losses

A 3-level hierarchy is created for losses

Loss Area (A / P / Q) → Loss category → Loss reason

For example;

Loss Area: P (performance) → Loss category: Minor Stoppages → Loss reason: Screw Feed 2 fault

Following major categories of losses are measured and analyzed in this installation:
- Minor Stoppages or Speed Losses (Performance loss)
- Setup Losses:
  - machine setup(Availability loss)
  - Trial / dummy production (Quality loss)
- Unplanned Downtime / failure Losses (Availability loss)
- Rejections (Quality loss)
- Resource (material / tool / operator) unavailability (Availability loss)

Particularly tricky was measurement and analysis of minor stoppages or speed losses. For this machine status (running / idle / off) was accurately tracked in the Edge Device and minor stoppage reasons were acquired by installing additional sensors on machines.

RESULTS

The installation is in 'Analysis Stage' as of Jan 2018. See an example of analysis in Image 2. It shows Top 5 losses in 1 week. Incidentally these are all minor stoppage which they were not able to measure before PlantConnect SFactory was deployed.

The 'Improve Stage' will involve following activities:
- Raise Maintenance tickets automatically thru SFactory
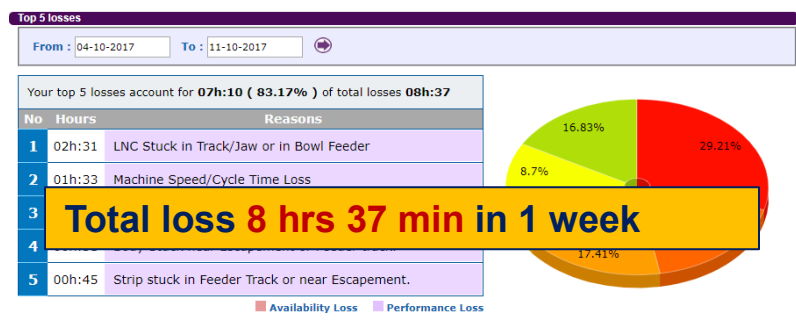- Process changes
- Training
- Inputs to design

Image 2: Top 5 Losses in 1 week

ABOUT ASCENT INTELLIMATION

Ascent Intellimation Pvt. Ltd. (AIPL) is a leading solution provider of Industrial IoT (IIoT) solutions. AIPL has created an Edge to Cloud IIoT platform PlantConnect® (www.plantconnect.net). Following solutions are currently offered on PlantConnect platform to address specific business needs / verticals. These solutions are successfully deployed in over 1000 installations across India and abroad.

> PlantConnect SFactory – Smart factory solution
> PlantConnect RAMS – Remote asset management solution for OEMs
> PlantConnect Insights – Historian and reporting solution for process plants
> EnviroConnect – Environment data monitoring for stacks, ETP/STP output, ambient air

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Ascent Intellimation is a member of the Industrial Internet Consortium. The Industrial Internet Consortium is a global, member supported organization of over 250 members that promotes the accelerated growth of the Industrial Internet of Things by coordinating ecosystem initiatives to securely connect, control and integrate assets and systems of assets with people, processes and data using common architectures, interoperability and open standards to deliver transformational business and societal outcomes across industries and public infrastructure. Founded by AT&T, Cisco, General Electric, IBM and Intel in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the Industrial Internet. Visit www.iiconsortium.org.

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