

Networking and Centralized Monitoring Station of Pot Tending Assembly

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Abstract



Availability and reliability of Pot Tending Machine or Assembly (PTM or PTA) is one of the key deciding factors of potline performance of any aluminium smelter. In the earlier generation design, without maintenance bay and gantry system, maintenance of PTM was a challenging job. The reliability of PTA plays a very vital role in on-time completion of operational activities like anode change, beam raising, pot preparation, etc. As the PTAs are not a stationary equipment, even predictive maintenance is very difficult. The objective of this paper is to demonstrate centralized monitoring station of PTA which is featured by wireless communication and networking of all PTAs. The networking is designed with wireless modules installed in individual PTMs, Unshielded Twisted Pair (UTP) cable, fibre optic link and various converter switches. All PTAs are connected to a centralized monitoring station where online simulation of every tool and its operation are visualized via SCADA server, real time access of PLC programming via engineering server, data backup, real time motor current, temperature trends and fault logging via historian server and automatic messaging system for fault generation. The implementation of this concept shows reduction in Mean Time To Repair (MTTR), manpower optimization, betterment in predictive maintenance and steady improvement in availability and reliability of PTAs.

Keywords: Pot Tending Assembly PTA, Predictive maintenance, SCADA, MTTR, Trends, Wireless communication.

1. Overview of Project

With 2 Potlines and 608 running pots for production, PTM plays a vital role in hot metal production. Each Potline has 4 rooms with each room has 4 PTMs. So, total number of PTMs available in operation is 16. The paper highlights the networking of all 16 PTMs to one common station.

2. Introduction

Pot Tending Machine (PTM), which is a specialized overhead crane designed for aluminium smelter to carry out the operational activities like anode change, bath covering, beam rising etc. PTM is considered as one of the most critical equipment in potline as it directly facilitates in quality of pot performance and so the hot metal production.

3. SCADA – An Overview

SCADA systems (Figure 1) are used by industrial organizations and companies in the public and private sectors to control and maintain efficiency, distribute data for smarter decisions, and communicate system issues to help mitigate downtime. SCADA systems work well in many different types of enterprises because they can range from simple configurations to large, complex installations. Virtually anywhere you look in today's world, there is some type of SCADA system running behind the scenes. Effective SCADA systems can result in significant savings of time and money. Modern SCADA systems allow real-time data from the plant floor to be accessed from anywhere in the world. The introduction of modern IT standards and practices such as SQL and web-based applications into SCADA software has greatly improved the efficiency, security, productivity, and

reliability of SCADA systems. SCADA software that uses the power of SQL databases provides huge advantages over antiquated SCADA software. One big advantage of using SQL databases with a SCADA system is that it makes it easier to integrate into existing MES and ERP systems, allowing data to flow seamlessly through an entire organization. Historical data from a SCADA system can also be logged in a SQL database, which allows for easier data analysis through data trending.

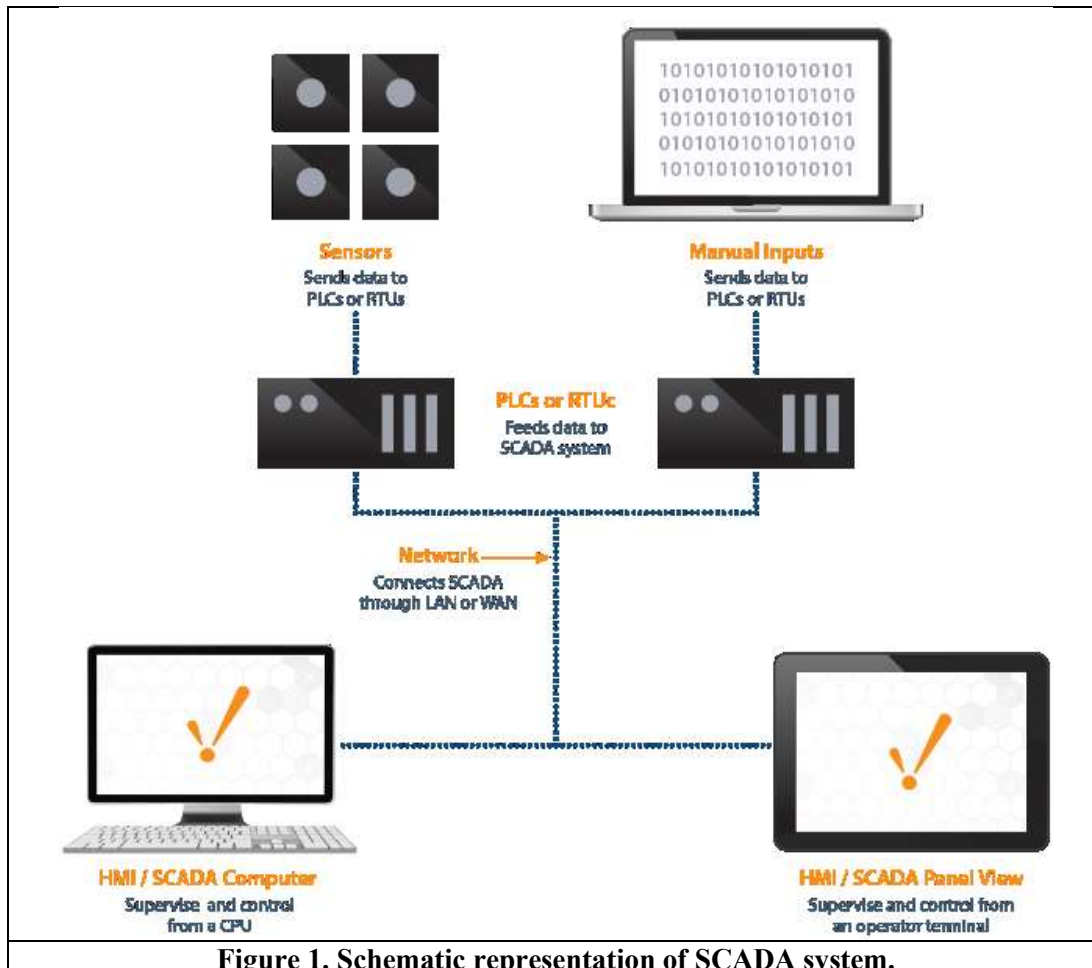


Figure 1. Schematic representation of SCADA system.

4. Necessity of SCADA in PTM

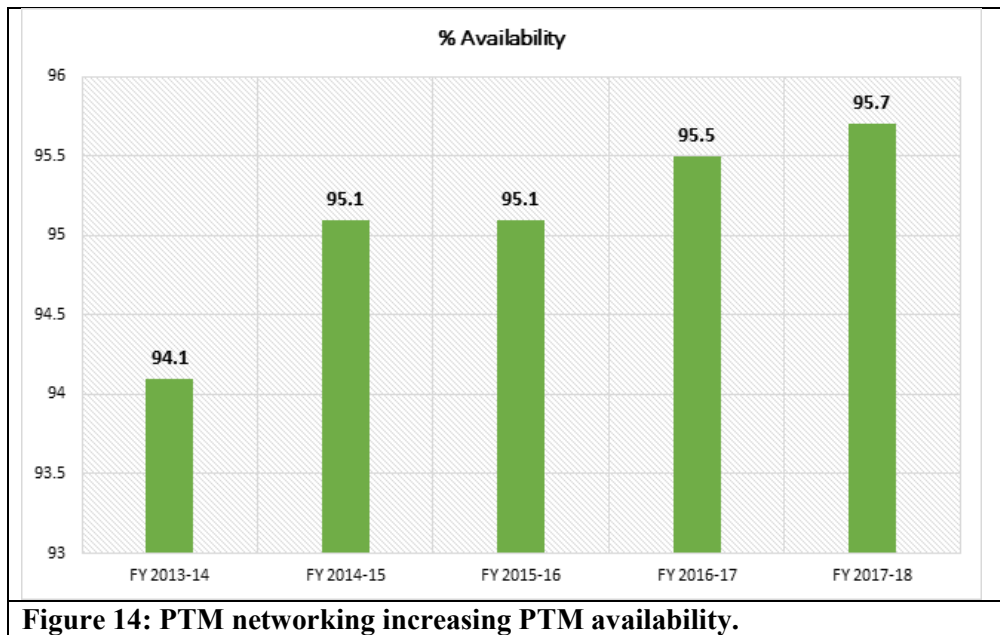
As PTMs are not a static equipment, the following proactive activities are quite impossible/very difficult in reliability maintenance point of view:

- Monitoring of various parameters like current, temperature, pressure etc.,
- Alarm indication,
- Forecasting of machine failure,
- Online access to PLC program,
- Predictive maintenance.

5. PTM Networking – Entire Layout

The layout of PTM networking (Figures 2 and 3) consists of the following components:

- Moving wireless access point
- Static wireless access point
- Ethernet to FO converter module
- Local FO trans-receiver module
- Central switch
- Primary SCADA server
- Secondary SCADA server



8. Conclusion

PTM networking system plays a major role in achieving the maintenance parameters. Without maintenance bay and gantry system, the reliability of PTA was really a big challenge for production unit. Networking of PTM enable us for predictive maintenance, ease of data analysis, equipment overhauling scheduling, ease in fault finding and so the reliability of entire equipment. The equipment availability increased from 92 % to 95.7 %. Any modification needs a change in programme logic, which is not an easy opportunity. PTM networking enables us to modify the programs as per various improvement project requirements and user necessities. The life changed from the mind-set of “Run to Failure” to “Predictive Maintenance”.