

Physical Ladle Tracking System

Physical ladle tracking is an **important** constraint in many steel-making facilities. AustralTek has developed a smart, simple, cost-effective, and very flexible PLT™ system that senses the position and status of **heavy equipment**, such as ladles, in key areas of the plant.

- ▶ **Minimum** time required for armor maintenance.
- ▶ **Quick** armor installation on a ladle.
- ▶ Fixed or interchangeable **armor options** for ladles.
- ▶ Heavy duty design for **industrial processes**
- ▶ Simple sensor exchange.
- ▶ Low-cost maintenance material.
- ▶ Very low cost of maintenance, which can be done without adding much time to ladles' normal maintenance process.



The hardware system consists of:

- **PLT tag** which is a passive RFID transponder that **withstands high temperatures** and functions over long distances. It possesses a unique non-repeated code that will be assigned to each ladle.
- **PLT armor** which is welded to the ladle wall and is **designed to protect** the tags from high temperatures and mechanical collisions.
- **PLT antennas** which are located at **strategic areas** such as tapping, LMF, vacuum or other areas where the ladles must be detected.
- **PLT reader**, a piece of equipment that detects RFID tags and sends time and location information about the ladle to the plant IT systems.
- **PLT hardware** can be used with any **existing tracking software** that has already been installed in the plant.

Benefits of the PLT™ System

- ▶ Determine **accurate** refractory contact time with hot steel.
- ▶ Recognize ladle number **without** operator input automatically.
- ▶ **Improve safety** - detect early ladle refractory deterioration.
- ▶ Maximize the life of the ladles.
- ▶ Calculate **heat loss** and reduce waiting times of full ladles.
- ▶ Determine the **best refractory** for a particular steel grade.
- ▶ Choose the **optimum** ladle practice.
- ▶ Optimize maintenance time and **reduce** ladle turnaround.
- ▶ **Define the best** ladle selection to use in the cycle.
- ▶ Compare different refractory suppliers and **optimize selection**.
- ▶ Use the system to monitor ladles in **real time**.
- ▶ **Optimize** ladle re-line schedule.
- ▶ Coordinate **efficient** timing for tapping and additions.
- ▶ Monitor ladles in service **more closely**.
- ▶ Track the heat number of each ladle **accurately**.
- ▶ **Monitor** the amount of time on each porous plug.



▶ TECHNICAL SUPPORT

Once the system is installed, our team will **always be available** to help with any technical questions about the system or new requirements. Spare parts are **always in stock** and can be in your plant on the next day.

▶ ZERO DOWNTIME

Hardware installation on ladles can be done in less than **25 minutes**, allowing maintenance personnel to easily install sensors during normal ladle maintenance practices. Readers and computers for the software portion of the system can be hooked to **existing Ethernet** networks without affecting production. **Wireless stations** are available if needed. When new sensors are added, they are automatically detected, allowing a fast replacement and simple ladle addition.

▶ TURNKEY SOLUTIONS

Our personnel will **supervise** the hardware installation and **install** the software on site. The system will be functional and detecting ladles the day it is installed.



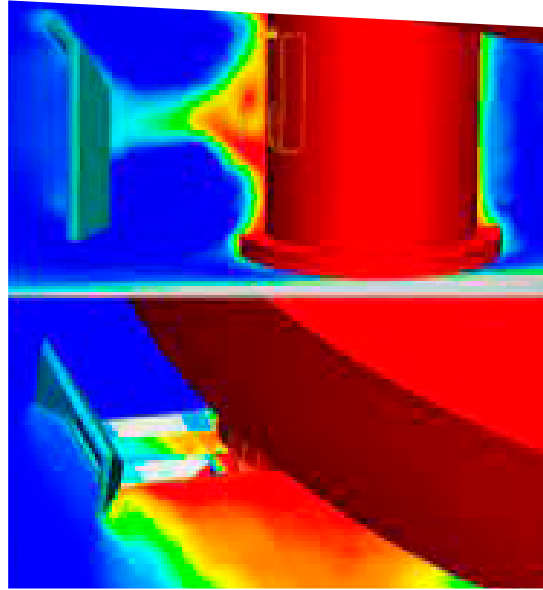
STANDARD SOFTWARE MODULE

Functions implemented:

- Production programming and ladle synchronization.
- **Tracking** of relationship between ladle/heat/processes.
- **Melt shop** layout mimic.
- Status of all **supervised** objects.
- Record of **alternate operations** such as reladling, slide gate clogging, and plug clogging.
- Collection of **information** for reports such as "Campaigns Report", "Heat Details", and "Average Process Times".

EXTENDED MODULES

- Ladle **Schedule** Module
- Ladle **Maintenance** Module
- Ladle **Thermal Condition** Module (Mathematical Model)
- **Crane Logistics** Module (additional hardware is required)
- **Corporate Level 3** and **Level 2** Integration Module
- **Thermal Ladle Vision** Module (additional hardware is required)



Computer-Designed Armor

- ▶ Parts designed and simulated with **Thermal Analysis Software**.
- ▶ Protection designed for **convective cooling**.
- ▶ Radiated heat resistance up to **1200°F**.
- ▶ Insulation up to **2300°F** from conductive heat.
- ▶ Very **strong steel** construction and special insulation material.
- ▶ In-plant testing with ladle surface temperatures of 780°F.
- ▶ Frontal and lateral shock resistant up to 400 pounds.
- ▶ Fast and simple **sensor replacement** in less than one minute.

Innovation Applied to Metals



System Design

The system is distributed in different areas of the plant, and **antennas** are installed in **specific spots** where the ladles are to be detected. Each antenna will detect the **RFID** sensor installed on the ladles and will send their location and **unique information** to the system server via Ethernet.

The sensors installed on the ladles can be detected up to a distance of **100 feet** if there is a clear view between sensor and reader or up to **60 feet in blocked areas**.



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