Ladle Tracking System

SHORT PRESENTATION OF THE SYSTEM

How the system works: 1 - Codes

- Each ladle has a welded code (Patented)
- The codes are designed to be robust
- Our 5x5 codes allow up to 46 ladles

How the system works: 2 - Cameras

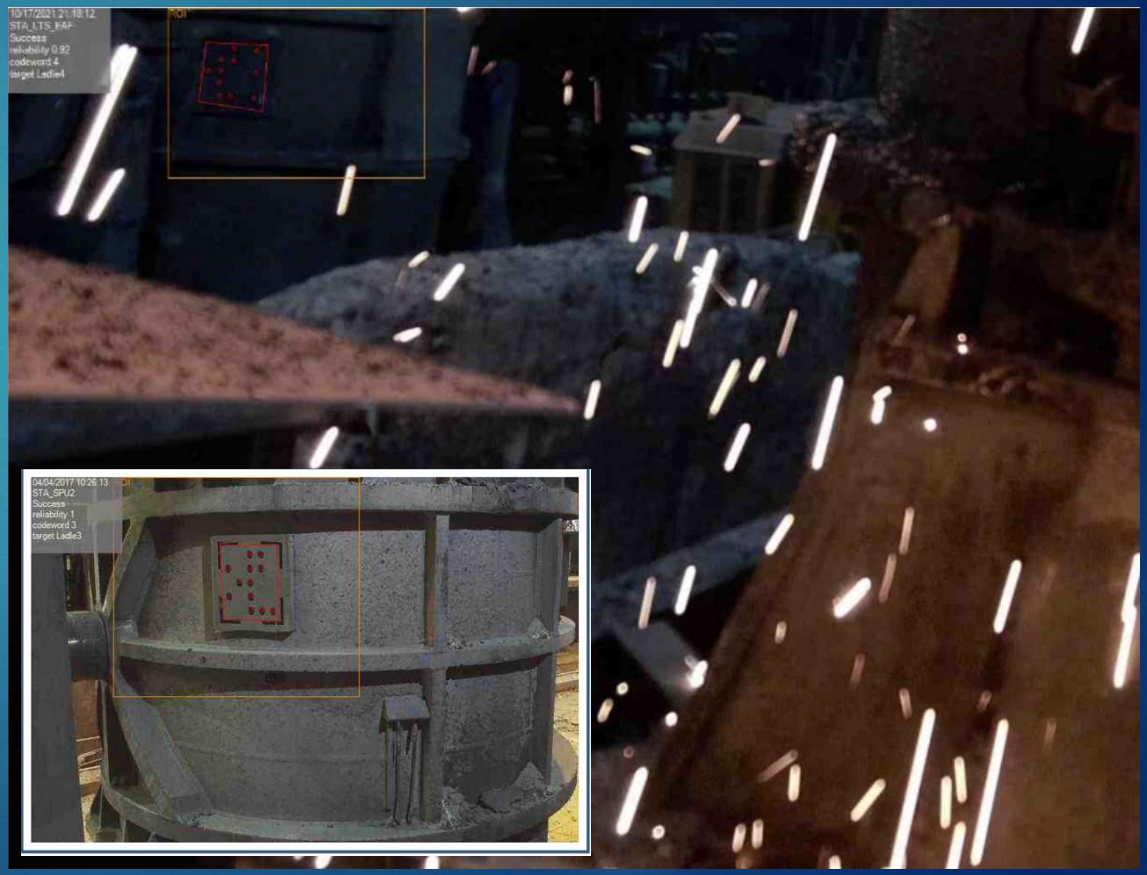
- With ethernet cameras mounted at the locations of interest we get frame of the ROI (Region Of Interest)
- Locations of interest can be EAF, LF, VOD, CCM, Preheating stations, etc..
- Video compression algorithms allow low bandwidth usage (H264/H265)

How the system works: 3 - Detection Service

- A Windows service retrieves images for each camera and searches for code in real time
- Detection Service is developed for optimization of memory usage and CPU consumption
- Example with 26 stations in a Intel Xeon 4310 2.1 GHz – 64GB
  - Average CPU 25%
  - Average bandwidth 420kb/s (with H265)
  - Average memory 1,5Gbyte

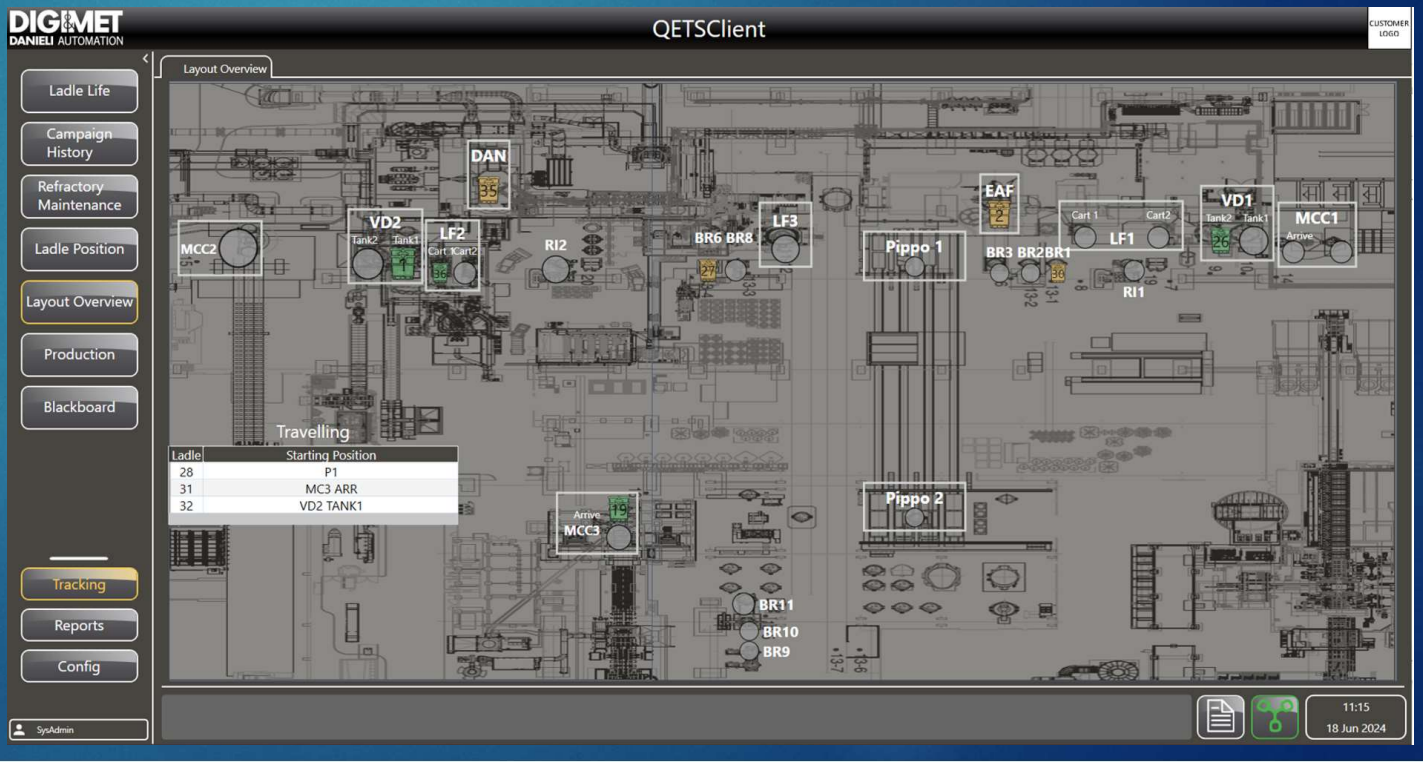
Code Detection

- When the ladle passes in front of the camera, the code is identified
- On detection, we send a message to the middleware (Level 2 of the plant)
- Detection proved robust even in hard conditions (Last Plant Errors < 0,5%)



Tracking System

- A tracking service stores the status of the entire steel plant calculated according to the messages received from each area
- The picture shows the interface of the Danieli software for displaying the plant status



UP1

Danieli System

- Danieli has developed a series of software interfaced with our system that allows to keep track of the status of the life of each ladle with related info
  - Current Position
  - Current general state (in use, maintenance, idled)
  - Current heat and grade (if applicable)
  - Number of heats to date since full relining
  - Current slide gate ID
  - Actual Contact Time for current Heat
  - Number of heats for all mounted ladle equipments
  - Alarms for exceeding life limits
  - Preheating time, temperature and consumption (if available)