The PI System in Product Genealogy and Machine Learning

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Agenda

- Business Challenges to tackle
- The PI System for Continuous Slab Casting
- Using Machine Learning with Haul Trucks
- Conclusion

Integrated Steel Mill

Continuous Steel Casting

Problems/Reason

Tracking product quality is challenging due to variable speed of the caster. Huge savings by identifying issues and preventing equipment failure (e.g. caster breakout).

Specific Capabilities

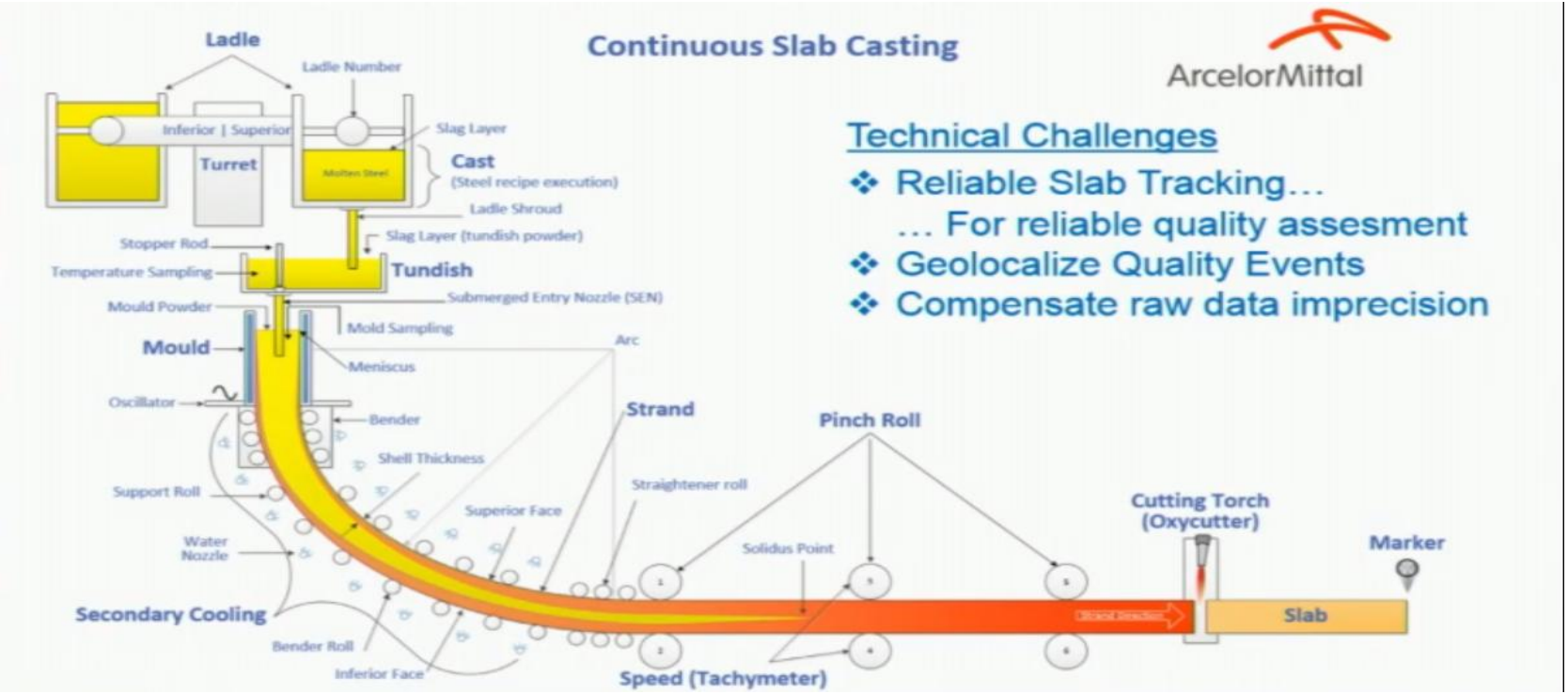
1) Tracking product through the caster
2) Identifying important events
3) Quick and reliable visualization

Change

Engineers can fix issues on the caster before a serious problem occurs

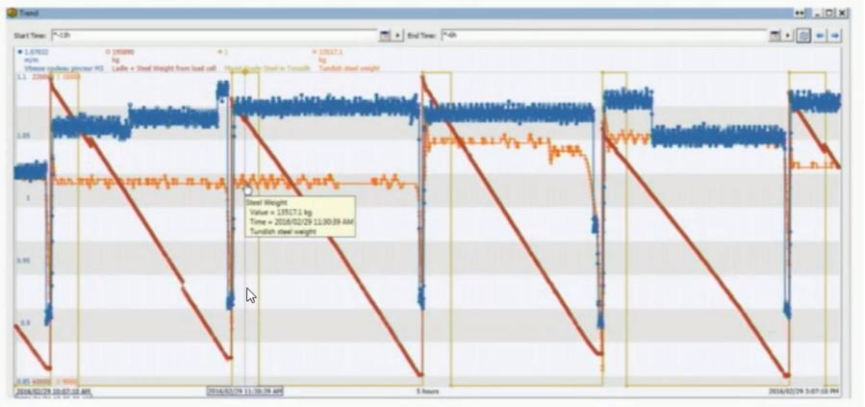
- Slow down to prevent breakout
- Potential to cut slab and sell before quality problem appears

Continuous Slab Casting .. challenges



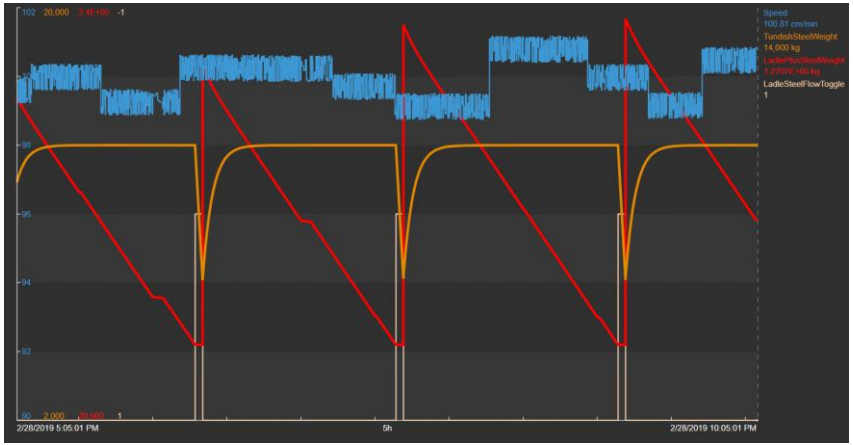
OSIsoft UC 2016 - Slab Casting Automation – Contextualize Raw Data into Operational Intelligence
https://www.osisoft.com/Presentations/Slab-Casting-Automation-%E2%80%93-Contextualize-Raw-Data-into-Operational-Intelligence/

Continuous Slab Casting .. challenges

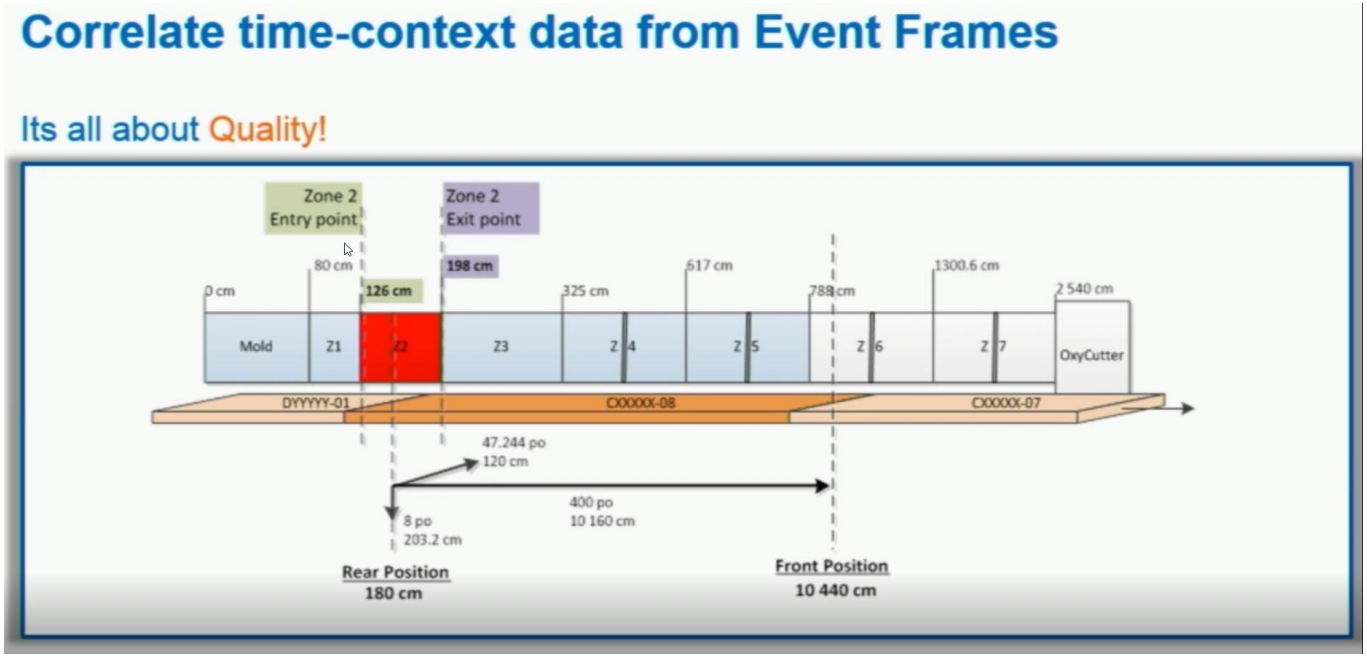


Screenshot from ArcelorMittal presentation

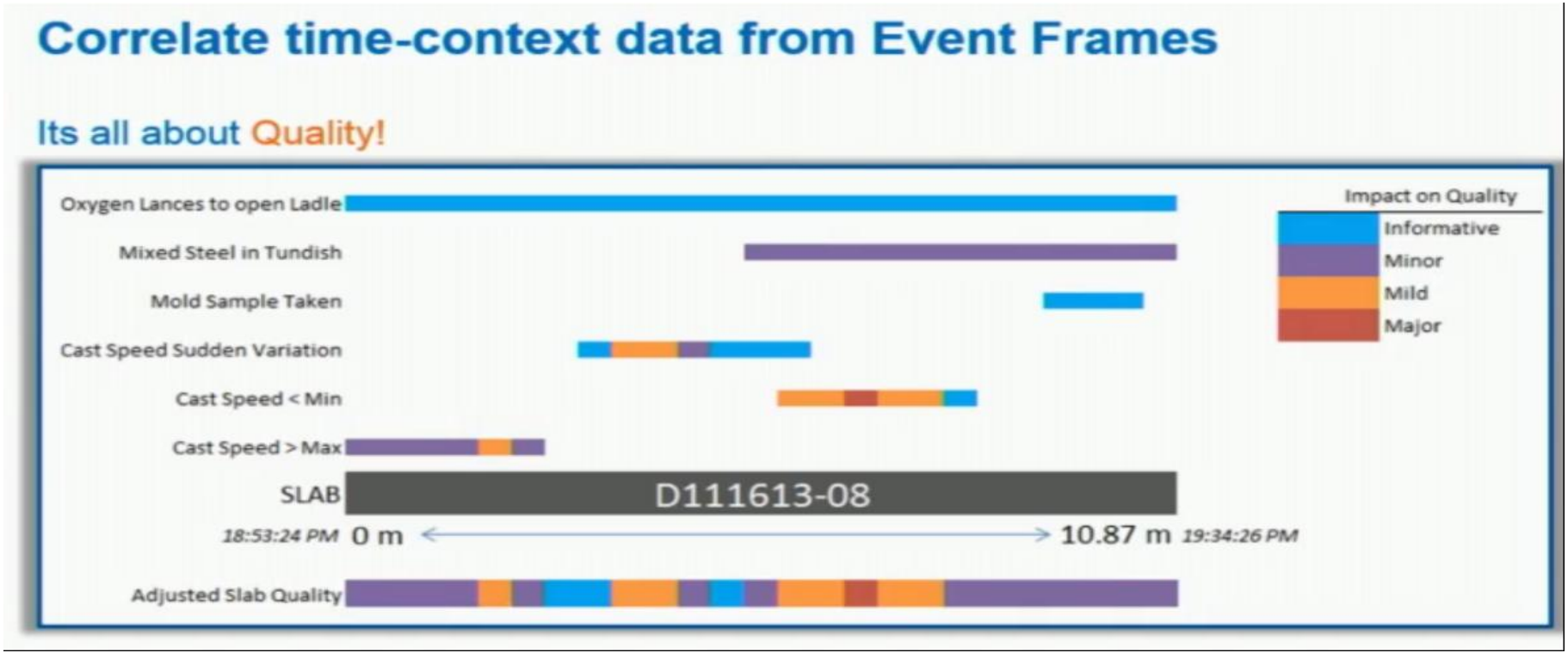
Raw data from our
Caster process simulation



Continuous Slab Casting .. Its all about Quality



Continuous Slab Casting .. Its all about Quality

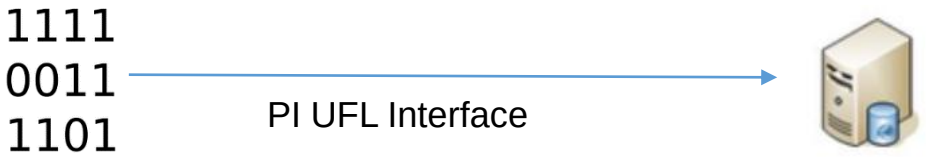


What is Predictive Maintenance?

- Definition
  - A maintenance strategy driven by predictive analytics.
- Features
  - Maintenance frequency is kept to a minimum
  - Requires condition monitoring
- Advantages
  - Cost and Savings

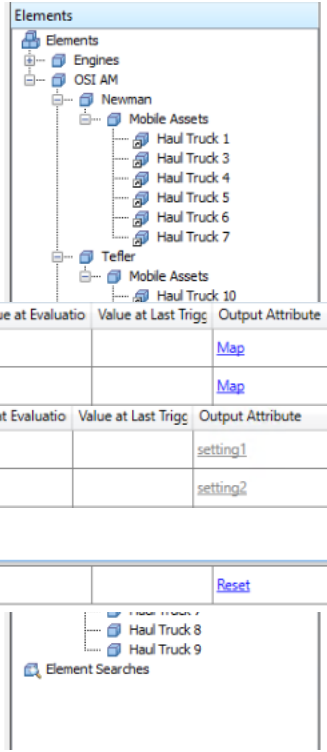
The Data

- 100 Engines
- 21 sensors



PI Asset Framework Hierarchy

- Modeled 12 Engines into Trucks
- Data Replay/Loop
- Event Frames



Name	Expression	Value at Evaluatio	Value at Last Trigg	Output Attribute
Now	Int('*')			Map
StartTime	Int('Start Time')			Map

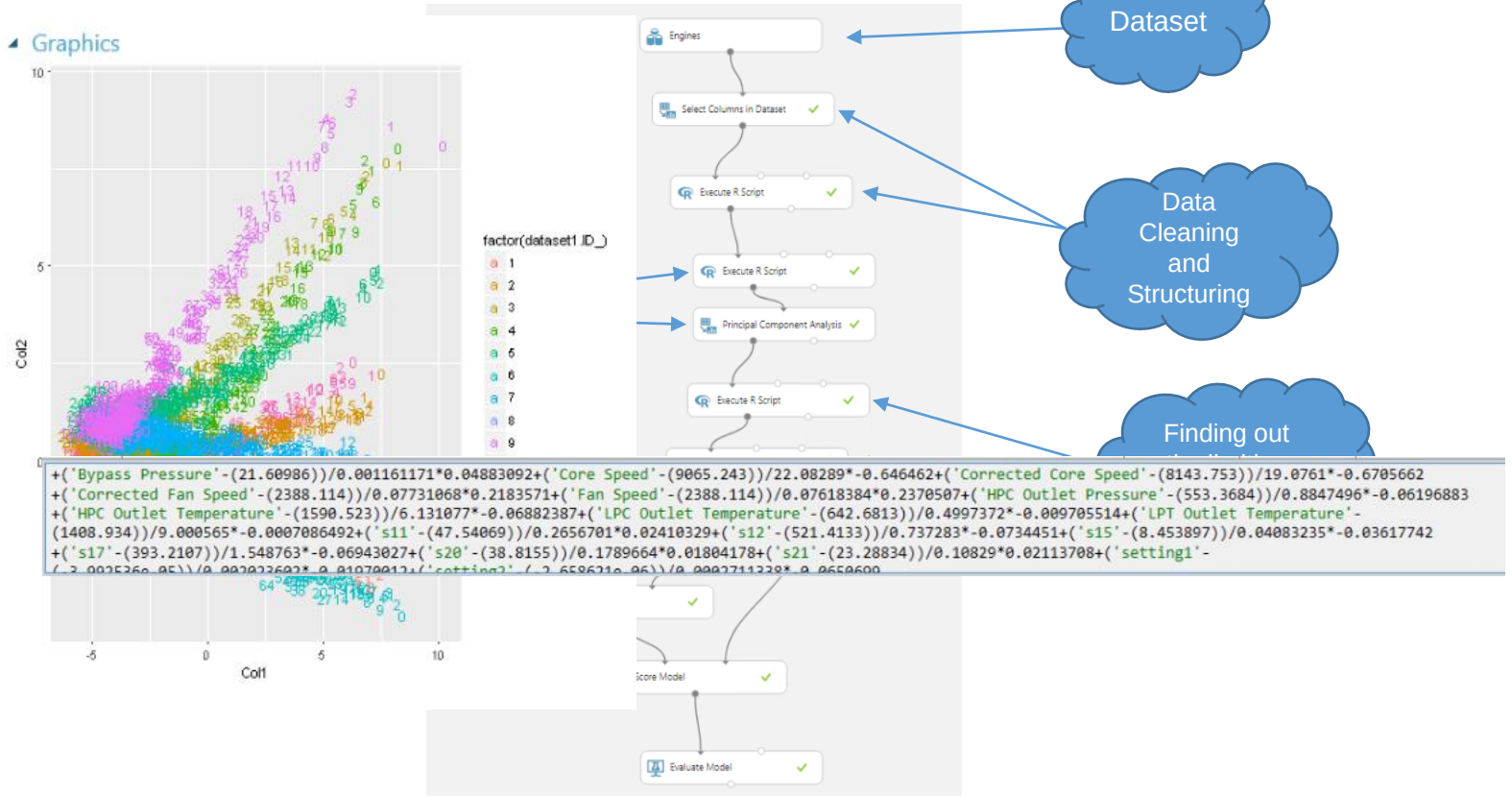
Name	Expression	Value at Evaluatio	Value at Last Trigg	Output Attribute
Variable1	PrevVal('setting1', Int('*')-'Time Difference'*86400)			setting1
Variable2	PrevVal('setting2', Int('*')-'Time Difference'*86400)			setting2

ResetCheck	If BadVal('Reset') Then 1 Else If 'Reset' = 1 Then 0 Else NoOutput()			Reset

Machine Learning

- Azure Machine Learning Studio
  - In house functions
  - R programming
- Principal Component Analysis
  - Definition: Dimension-reduction tool used to reduce a large set of variables to a smaller set that still contains most of the information.
  - 21 variables → 2 variables

Machine Learning

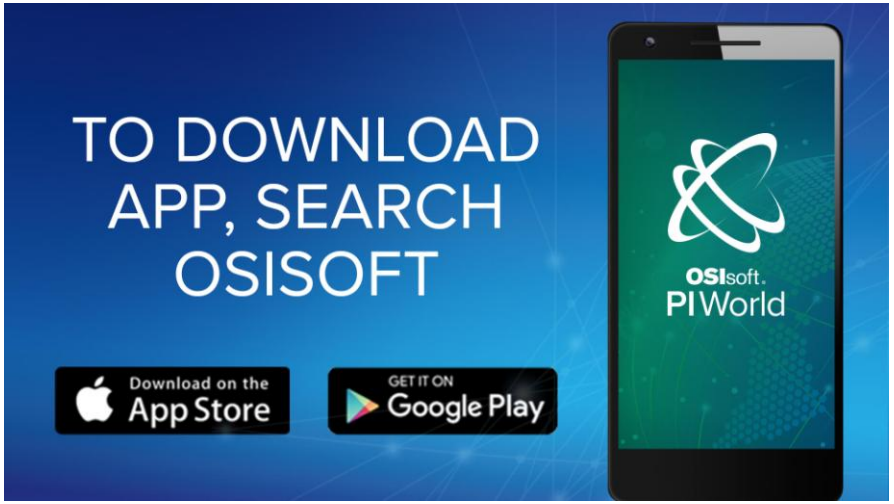


Questions?

Please wait for the **microphone**

State your **name & company**

Please remember



PARTNER & PRODUCT EXPO

Today’s Expo Hours

10:00 AM – 7:00 PM

Golden Gate and Yosemite

PARTNER & PRODUCT EXPO RECEPTION

5:00 – 7:00 PM
Located in both expo halls

Join us for appetizers and refreshments!

USER GROUP MEETINGS & INDUSTRY MEETUPS

taking place in most industry tracks at end of day

All are welcome!

Refer to mobile app for exact location and timing

GET READY FOR DAY 3 !

HILTON

- Opening Session & Product Track
- Best Practices Track
- Partner Marketplace Showcase

PARC 55

- Developer Track & Tech Talks
- PI Security Workshop – Not just for Security Gurus!

TRAINING LABS START TOMORROW

All labs require pre-registration

Check the back of your badge for room locations and visit the registration desk with any questions!