FROM PITTSBURGH TO PESQUERIA

The evolution of TENOVA very large EAFs

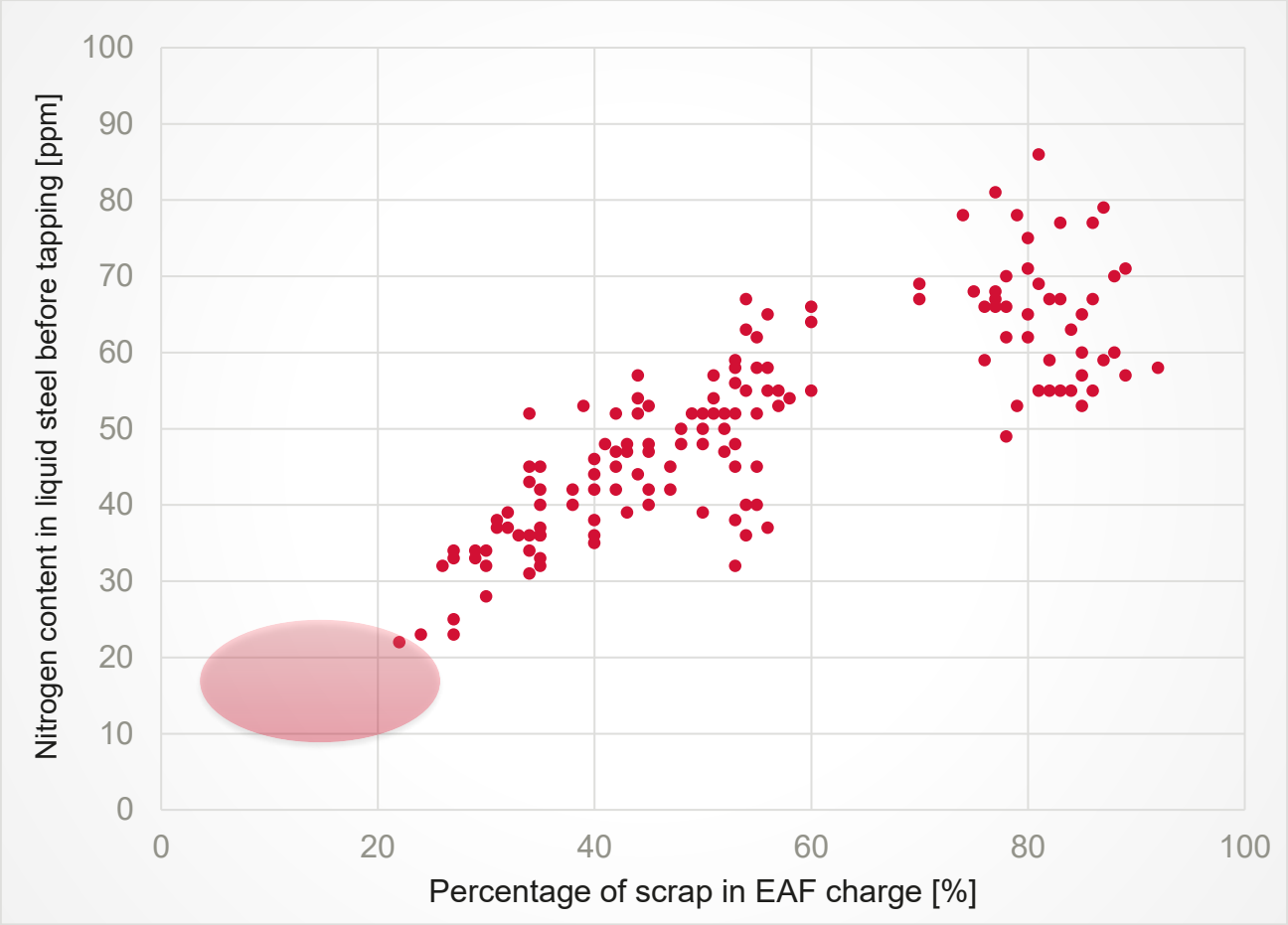
Paolo Stagnoli


Tenigal
Ternium

THE PROJECT

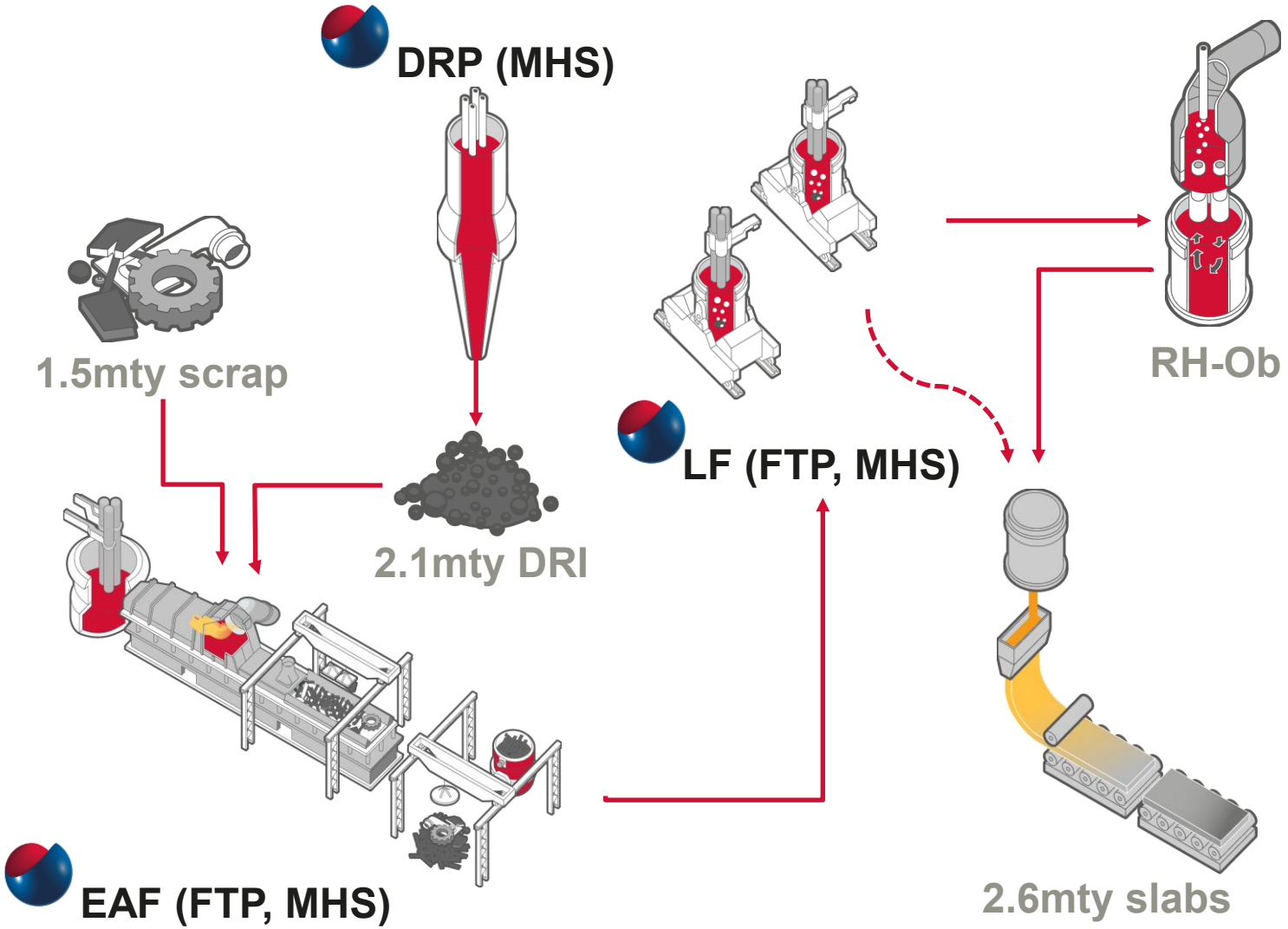
NITROGEN AND HIGH-QUALITY STEEL GRADES

Steel product	Maximum impurity fraction
IF steel	[C]≤30ppm, [N]≤40ppm, T.O.≤40ppm [4], [C]≤10ppm[5], [N]≤50ppm[6]
Automotive & deep-drawing Sheet	[C]≤30ppm, [N]≤30ppm [8]
Drawn and Ironed cans	[C]≤30ppm, [N]≤30ppm, T.O.≤20ppm [8]
Alloy steel for Pressure vessels	[P]≤70ppm[9]
Alloy steel bars	[H]≤2ppm, [N]≤10-20ppm, T.O.≤10ppm [10]
HIC resistant steel (sour gas tubes)	[P]≤50ppm, [S]≤10ppm[9, 11]
Line pipe	[S]≤30ppm [9], [N]≤35ppm, T.O.≤30ppm [10], [N]≤50ppm[6]
Sheet for continuous annealing	[N]≤20ppm[9]
Plate for welding	[H]≤1.5ppm[9]
Ball Bearings	T.O.≤10ppm[9, 12]
Tire cord	[H]≤2ppm, [N]≤40ppm, T.O.≤15ppm[10]
Non-grain-orientated Magnetic Sheet	[N]≤30ppm [6]
Heavy plate steel	[H]≤2ppm, [N]30-40ppm, T.O.≤20ppm[10]
Wire	[N]≤60ppm, T.O.≤30ppm[10]



THE PROJECT

2,6MTY SLABS WITH 0,8T OF CO2 PER T



20+ years of very large EAFs

2004
Wheeling Pitts USA
(now **JSW Ohio**)
225+100 tls
140 MVA
Scrap, PI
- OPERATING -

2006
Acciaierie Arvedi
Italy
250+100 tls
190+10% MVA
Scrap, HBI, PI, BI
- REPLACED -

2010
Jiangsu Feida Grp.
PRC
220+110 tls
155 MVA
Scrap, PI, skulls
- OPERATING -

2018
Acciaierie Arvedi
Italy
300+150 tls
210+10% MVA
Scrap, HBI
- OPERATING

EMS by ABB

2023
POSCO Gwangyang
South Korea
280+150 tons
280 MVA
Scrap, HBI, HM
- RAMPING UP -

2024
TERNIUM Pesqueria
Mexico
300+160tls
240+12,5% MVA
Scrap, HDRI
(launch: 2026)

EMS by ABB

EMS by ABB

2024
TATA St. Port Talbot
UK
320+160 tons
270 MVA
Scrap, HBI
(launch: 2027)

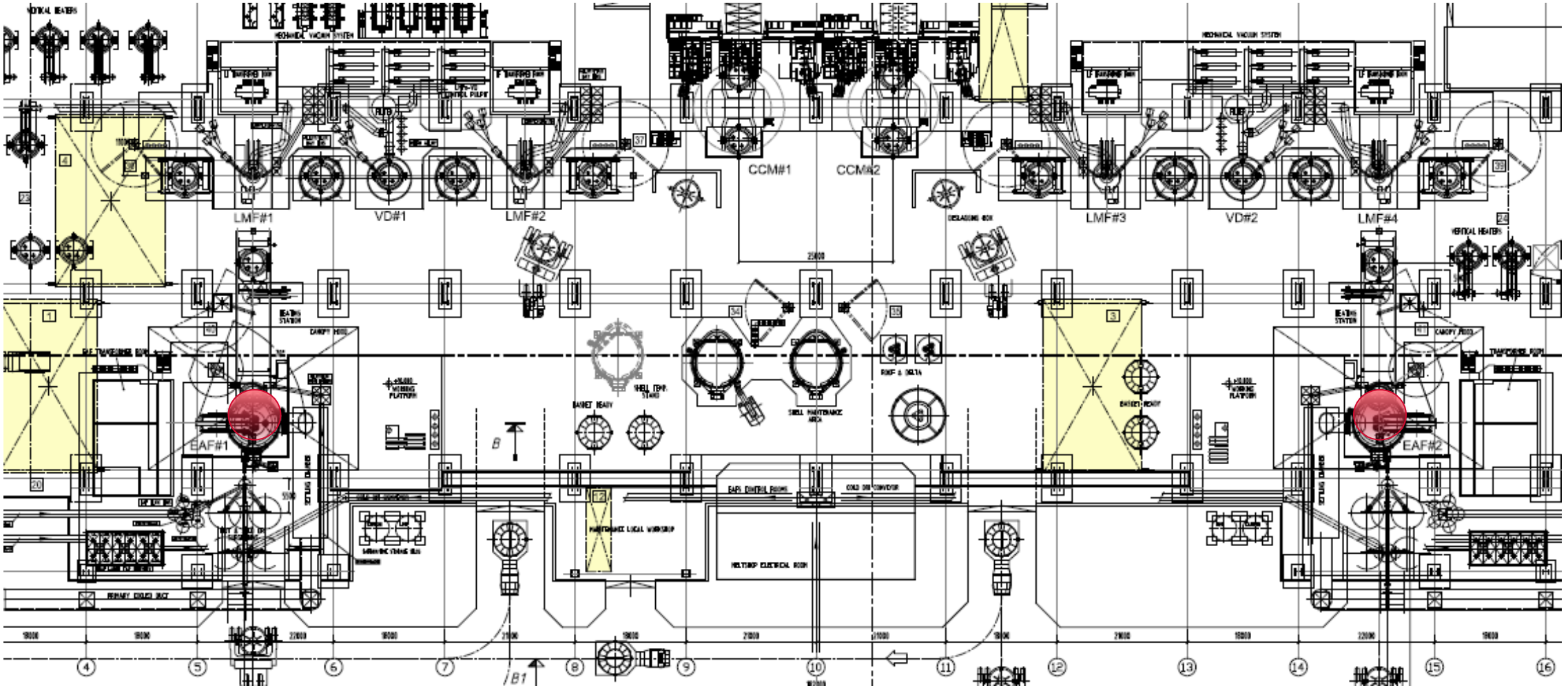
2025
(***confidential***)
Japan
340+160tls
2x180 MVA
Scrap, HBI
(launch: 2030)

EMS by ABB

DirectFeed by GE

HOW IT BEGAN

ORIGINAL CONCEPT



Plant concept by TERNIUM (2016): **two Top-Charge EAF, DC, tapping 180tls**

OUR EXPERIENCE WITH SCRAP AND DRI

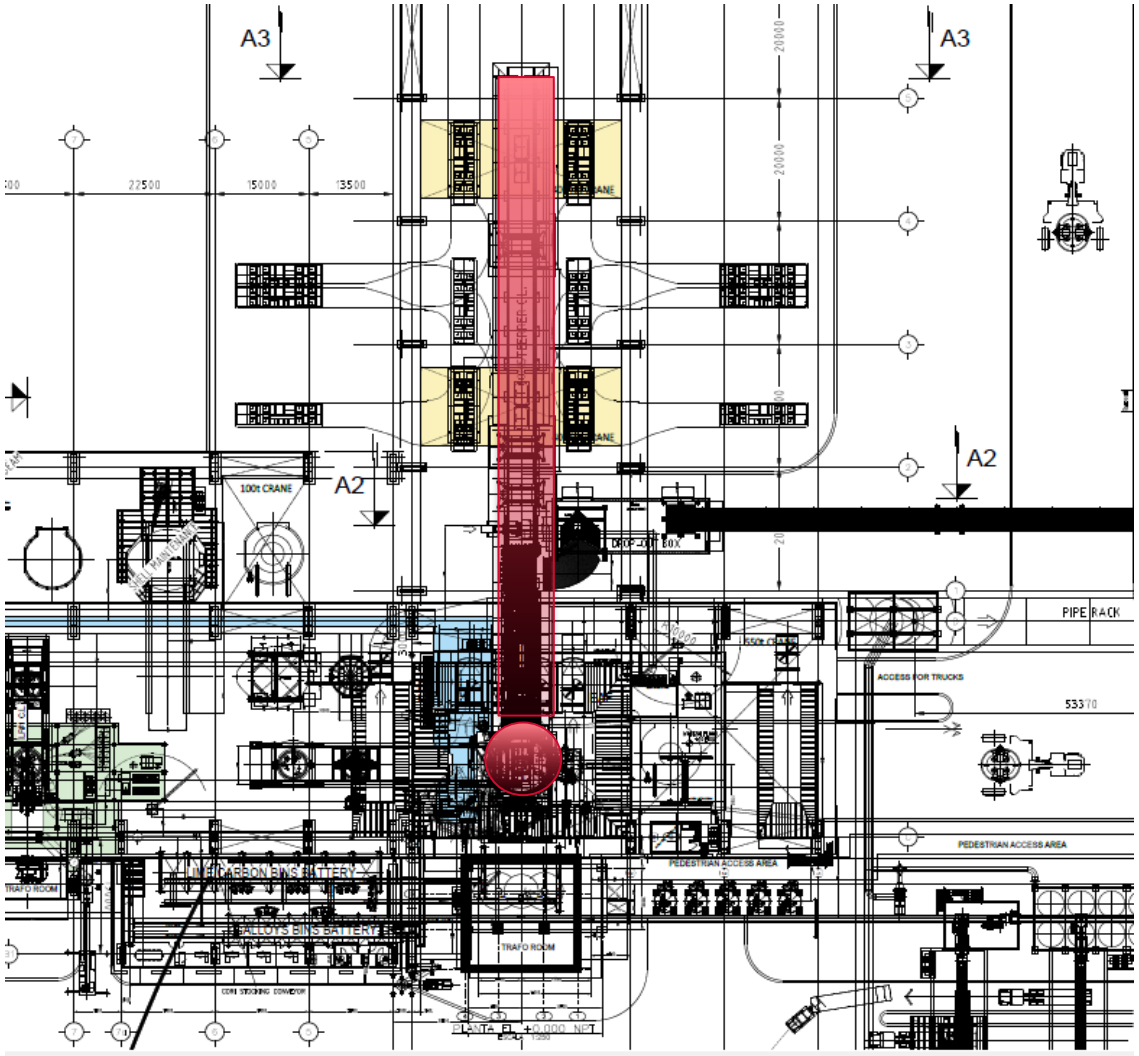
OUR COLLECTIVE PRIDE: THE MOST PRODUCTIVE EAFS IN OPERATION

Tosyali Algérie (2019 and 2023)
100% HDRI/CDRI

Acciaierie Arvedi (2018)
70% scrap, 30% VIU

HOW IT BECAME

300 T CONSTEEL EAF – BIGGER IS BETTER



Reference sources:

- **Acciaieria Arvedi** plant (70% Scrap +30% HBI, up to 100% scrap)
- **Tosyali Algerie** plant (100%Hot and Cold DRI)

Different charge mixes:

- **Scrap** through **Consteel®**
- **Cold/Hot DRI** through EAF roof by **two (2) rotating chutes**.

Single 300 t CONSTEEL® AC EAF

THE EAF WAY: BRUTE FORCE

TECHNOLOGICAL PATH TO TACKLE THE CHALLENGES

Low residuals

+

Low Nitrogen

BOF-like TTT

+

BOF-like tap size

High VIU%in metallic charge

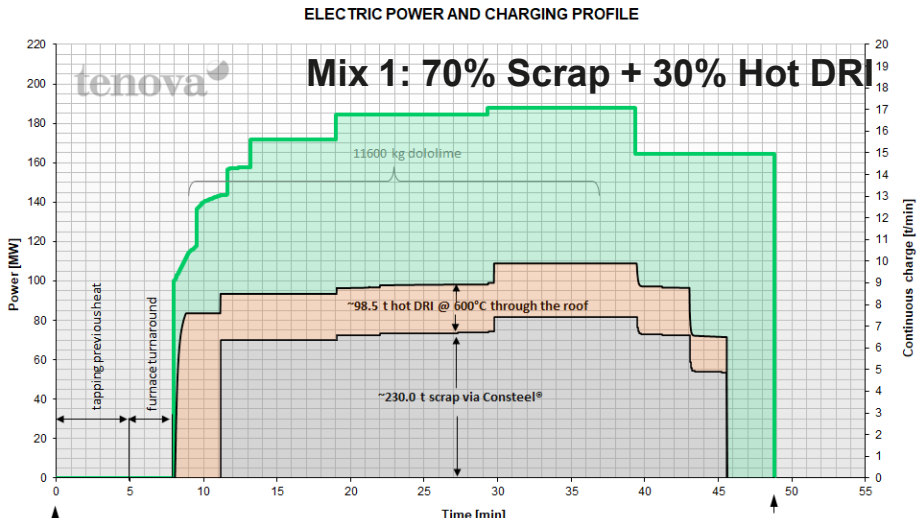
EXTREMELY HIGH POWER

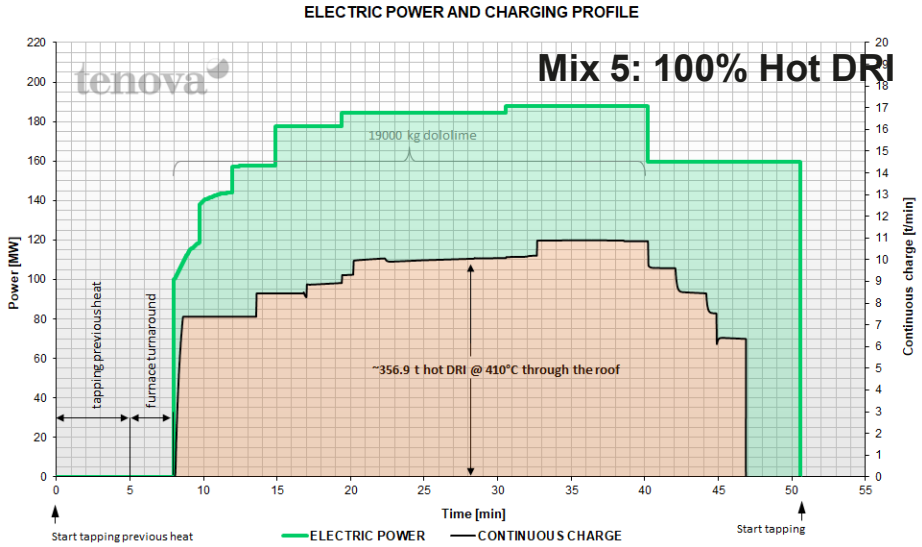
GRID COMPATIBILITY

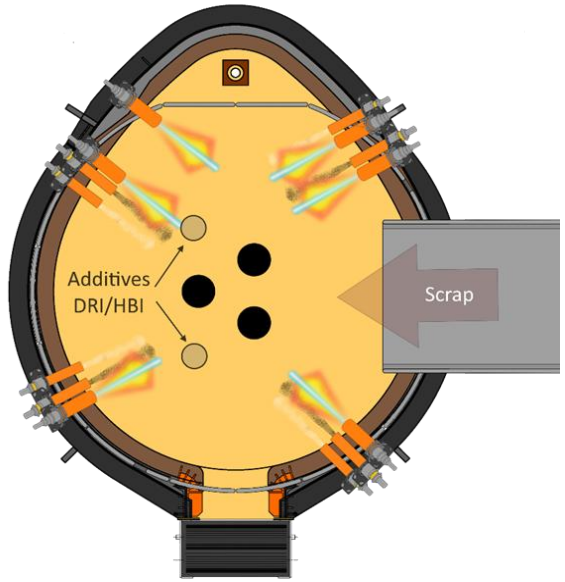
PROCESS CONTROL

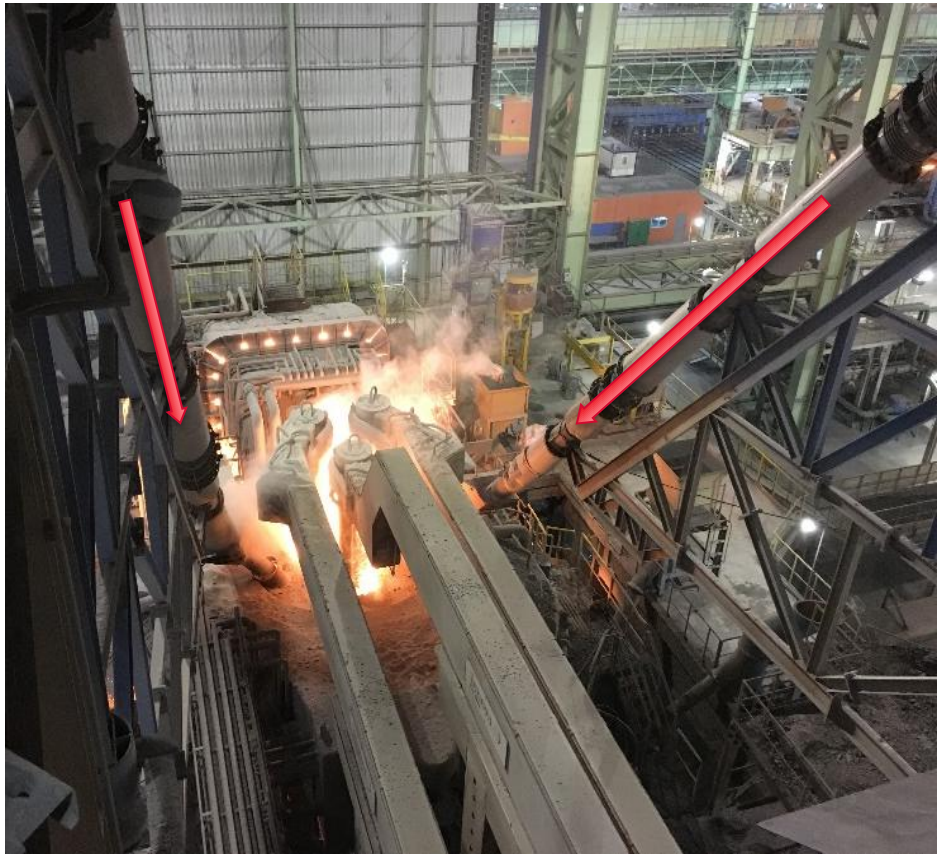
THE MELTING PROCESS

FLEXIBILITY MATTERS





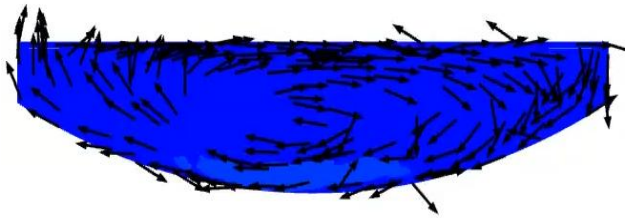


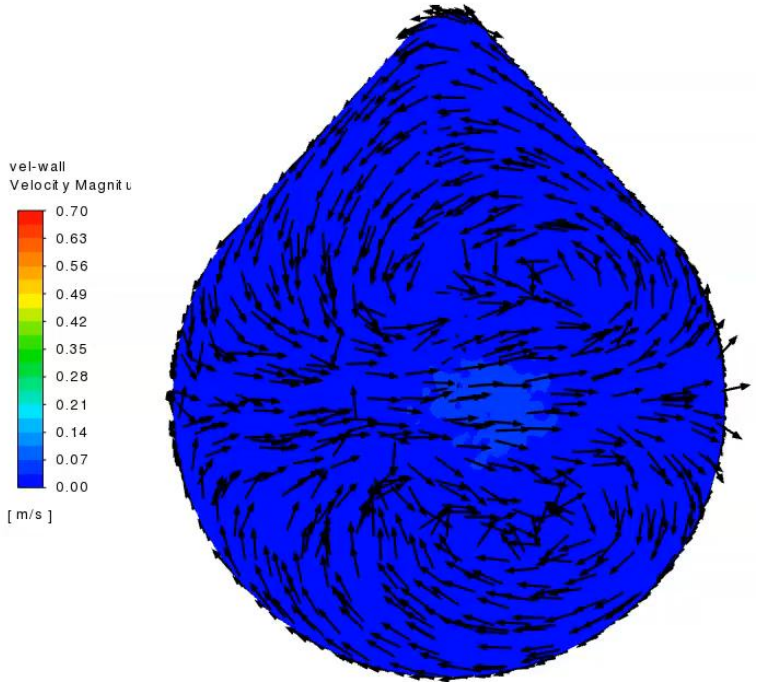


PRODUCTIVITY: 2,750,000 tls/yr, 385tls/h, **ALL CHARGE MIXES**

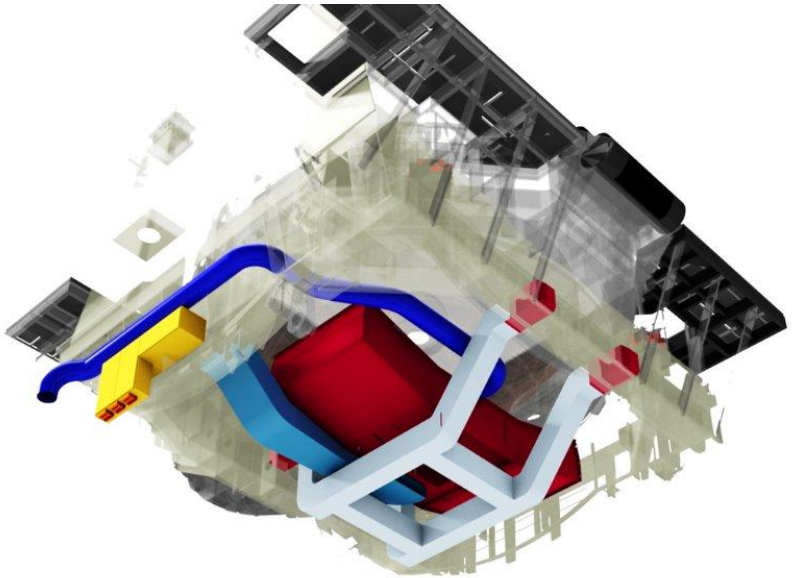
CONSTEERER®

JOINT PATENT BY TENOVA AND ABB



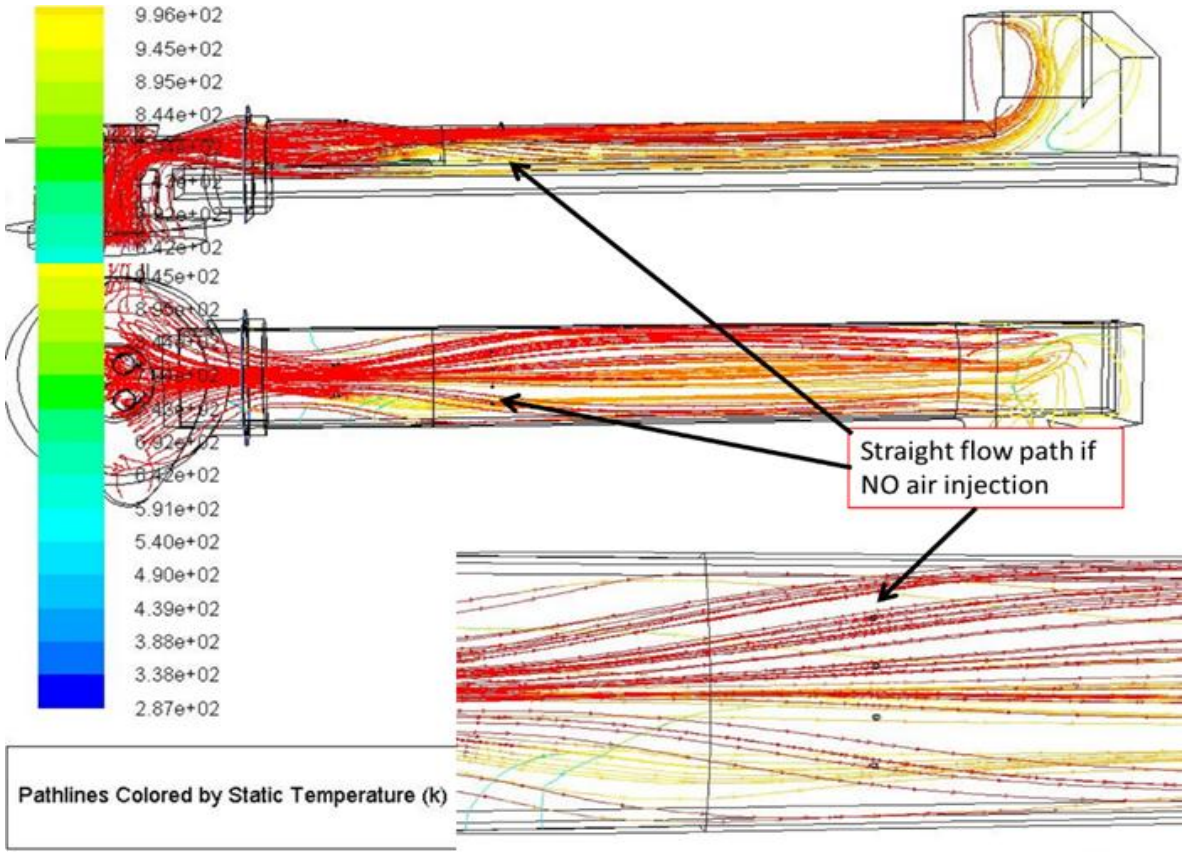


- **%FeO** in slag **-10%**
- metallic charge **yield +0,5÷0,75%**
- **3÷4%** electric energy saving
- **AO** in liquid **-10%**
- Increased steel-slag interaction, increased P removal



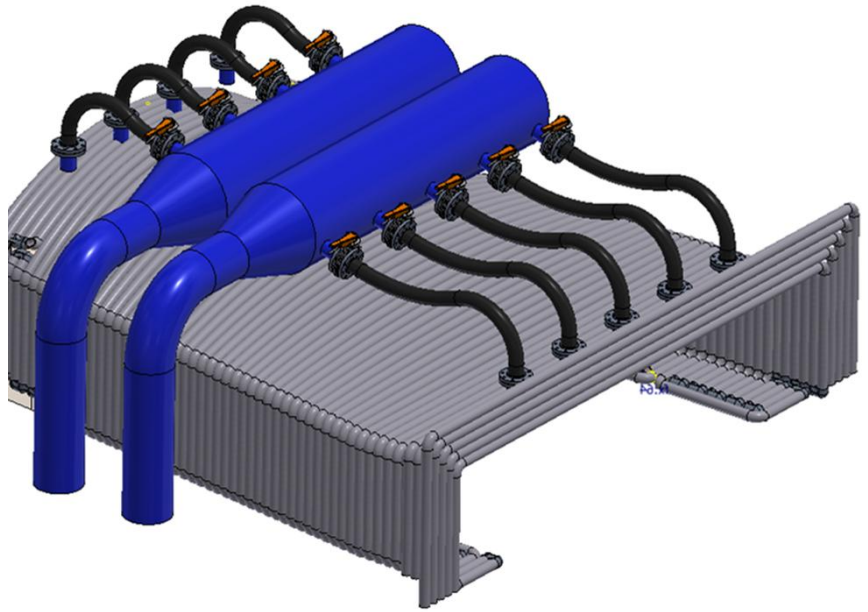
AIR JET TURBULATORS

POST-COMBUSTION OPTIMIZATION SYSTEM



Low-maintenance off-gas turbulators

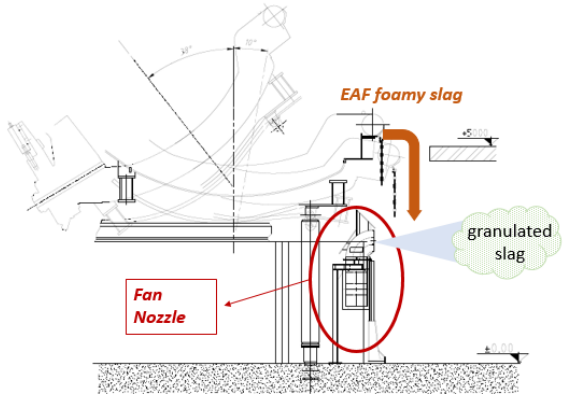
- Improved combustion of CO
- Improved heat exchange
- No impact on system reliability



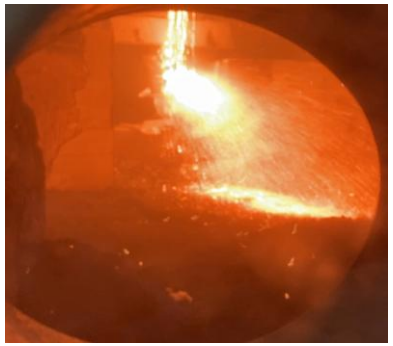
SLAG VALORIZATION: DRY GRANULATION

LF AND EAF SLAG UPCYCLING

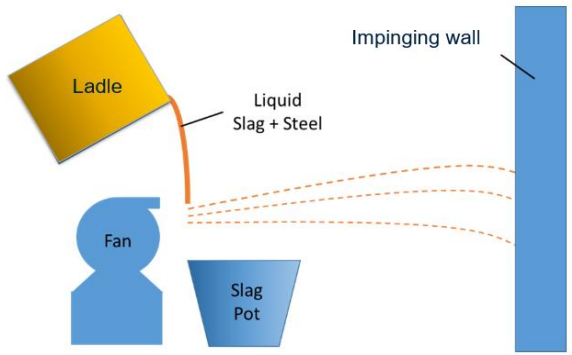
IN-LINE: EAF slag directly in the pit



Type	Pilot
Application	On Line
Slag	EAF Slag +steel*
Slag Flow Rate	Variable



OFF-LINE: EAF slag in slag pot and **LF** slag in ladle



Type	Pilot/Industrial
Application	Off Line
Slag	EAF/LF Slag + steel*
Slag Flow rate	Controlled

LF GRANULATION REFERENCE

Recent industrialization of the granulation plant applied on LF slag.

Gruppo Pittini
30.349 follower
2s • Modificato •

Presso lo stabilimento di Ferriere Nord sono ufficialmente iniziati i test operativi del nuovo impianto di granulazione a secco della scoria bianca, il primo al mondo di questo tipo.
Questa nuova soluzione trasforma i residui siderurgici in risorsa per l'industria del cemento, favorendo sostenibilità ed economia circolare. Un nuovo traguardo concreto nell'ambito della politica #ZeroWaste del Gruppo Pittini.
Leggi l'articolo completo:
https://bit.ly/3SRmPGR

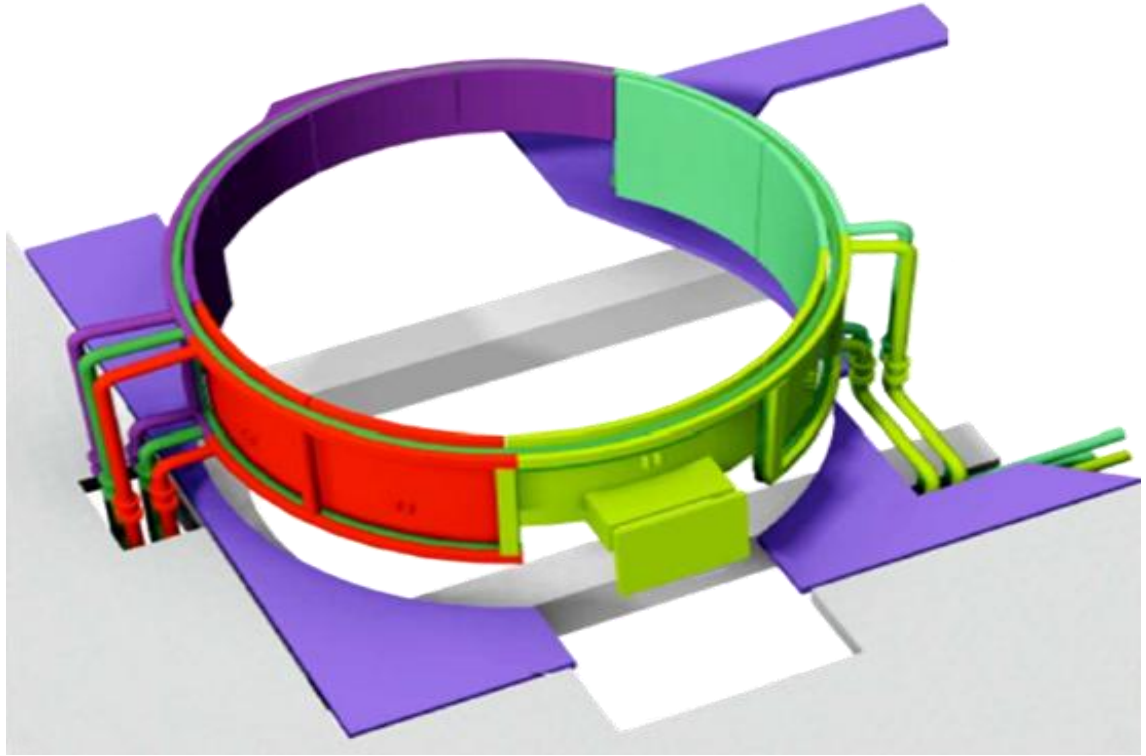
At the Ferriere Nord plant, operational tests have officially begun on the new dry slag granulation plant for white slag - the first of its kind in the world.
This new solution turns steelmaking residues into a resource for the cement industry, supporting sustainability and the circular economy. A new concrete result of the #PittiniGroup #ZeroWaste policy.
Read the full article:
https://bit.ly/43qyXUj
#steelahead

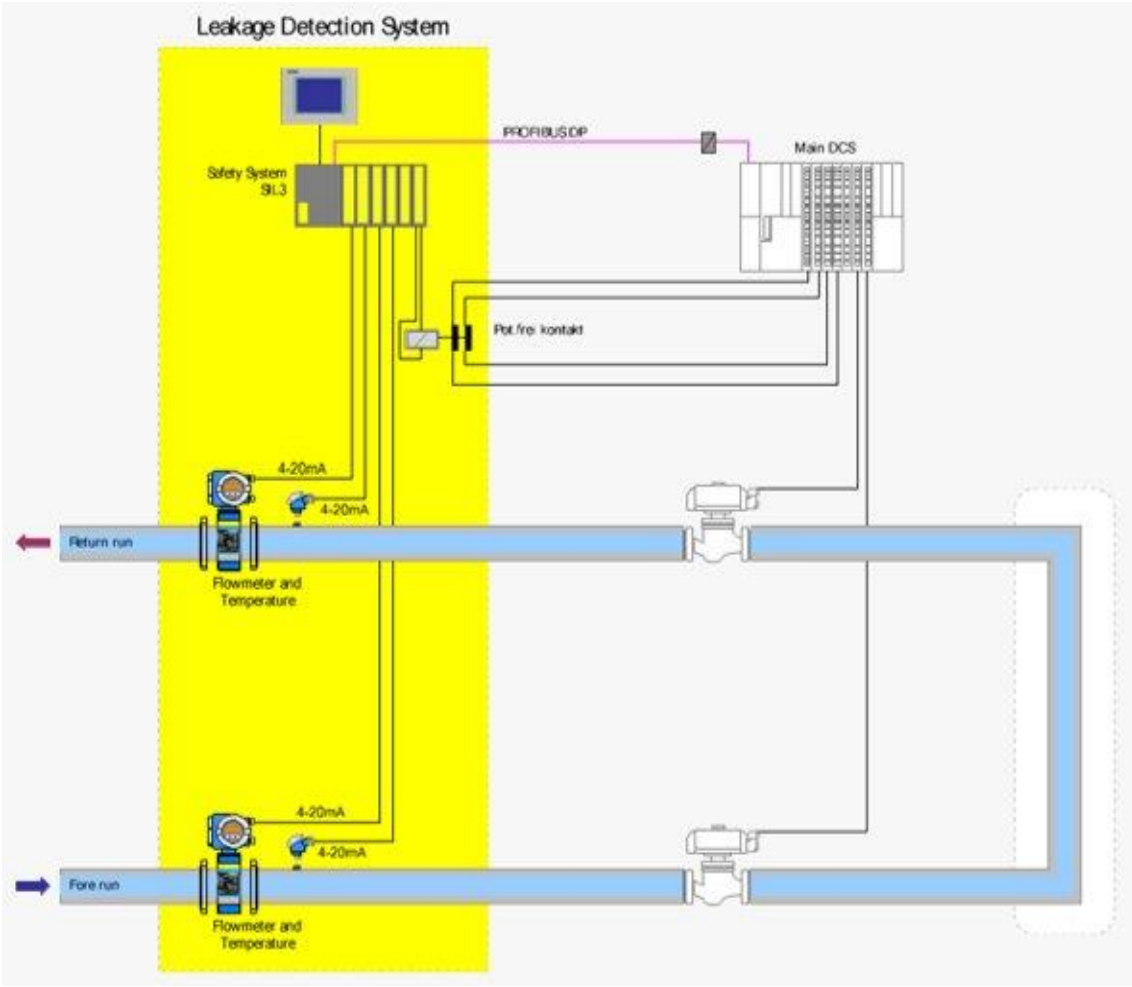
Source: LinkedIn

ENHANCED SAFETY

SAFE+ WATER LEAKAGE DETECTION AND RISK MITIGATION

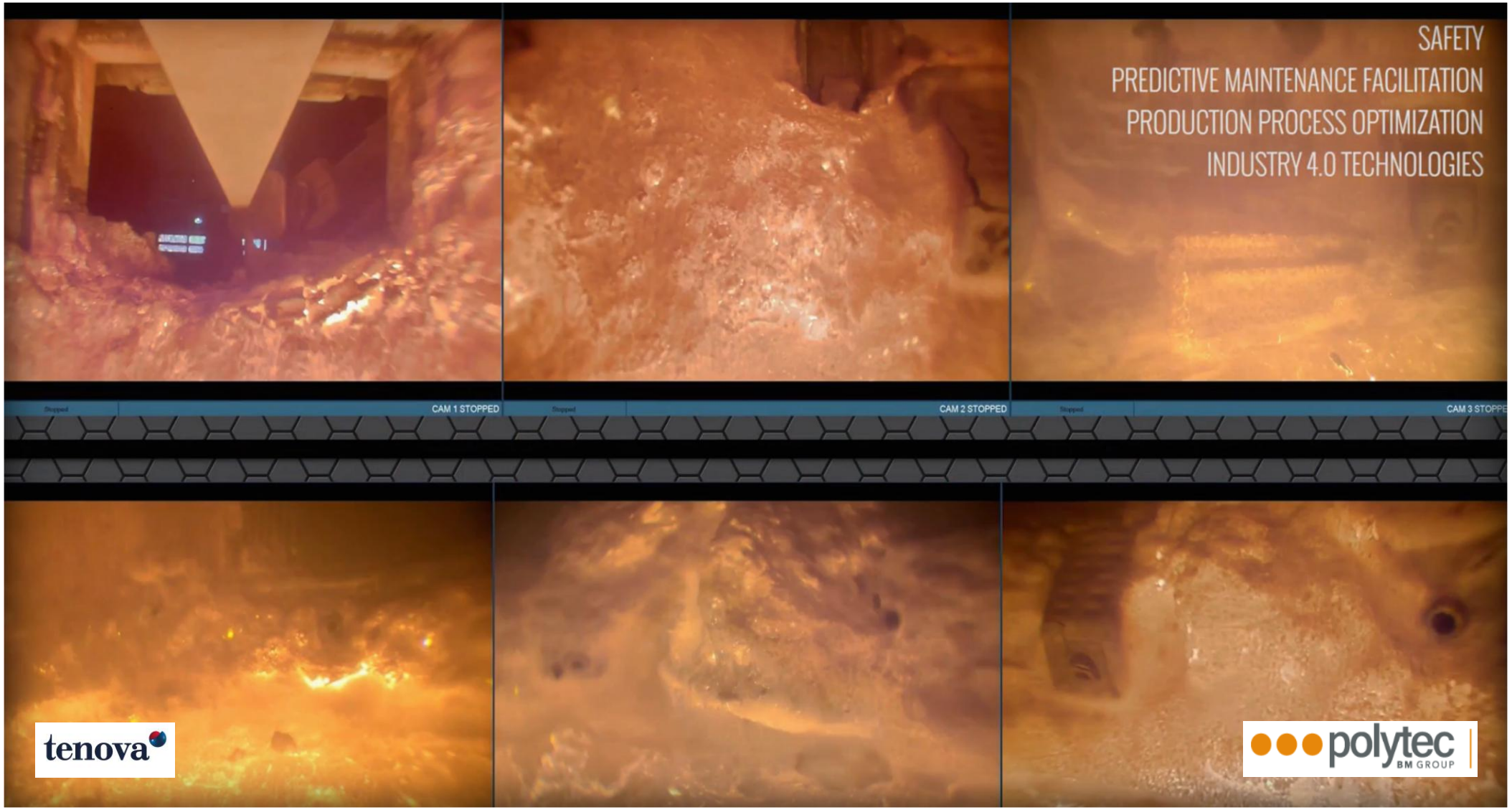
- **For every circuit:** Monitors, Detects and Actuates.
- **Detection accuracy:** 0.5-1.0% of nominal flow rate.





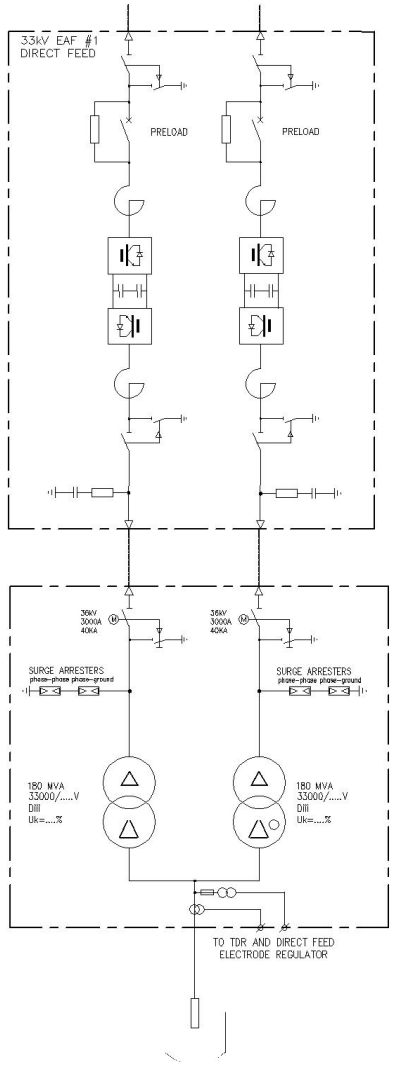
PROCESS CONTROL AND MONITORING

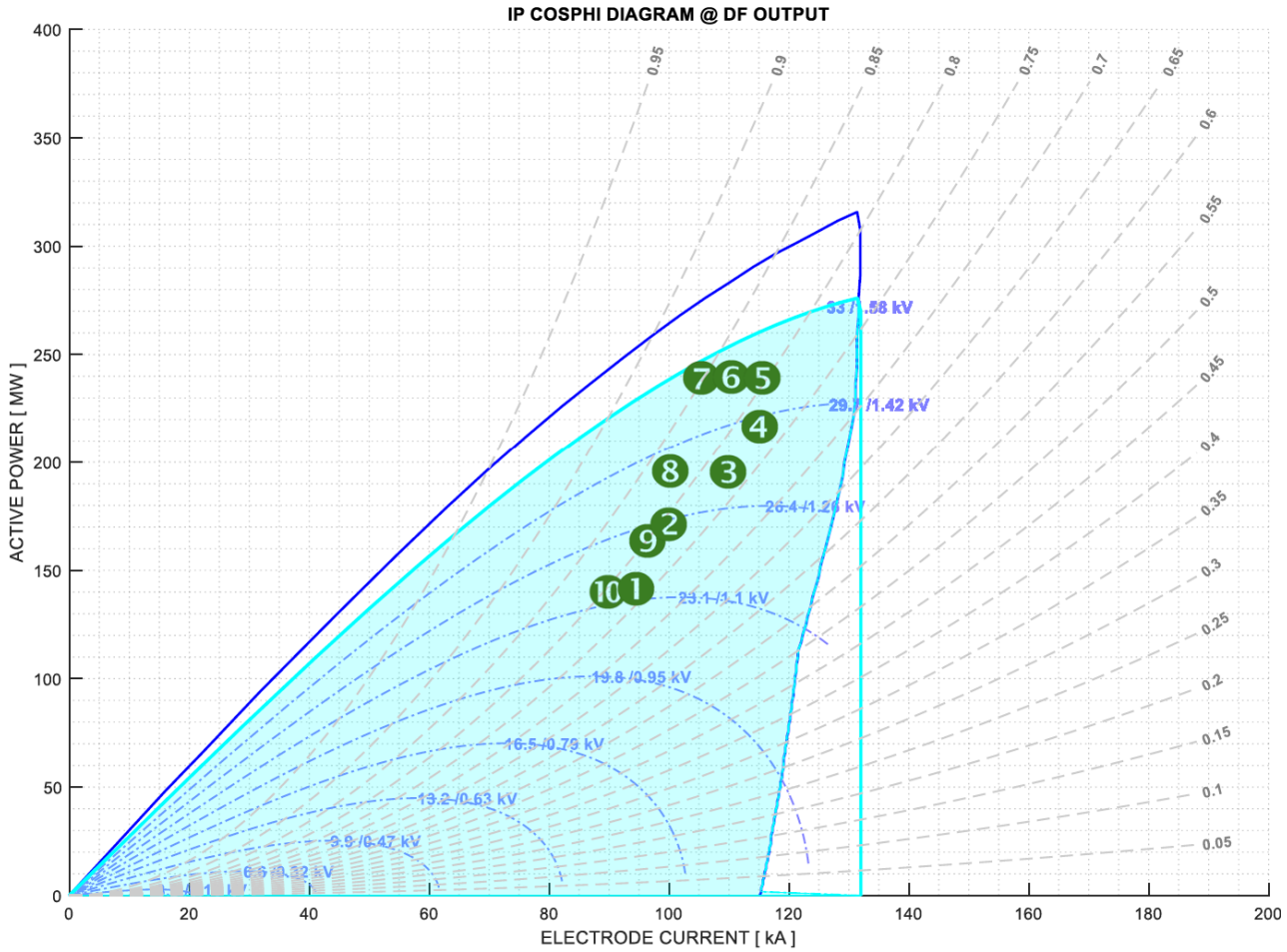
RISK MITIGATION: REMOTE INSPECTION AND ANALYSIS



DIRECTFEED POWER FEEDING SYSTEM

OVERCOMING POWER GRID LIMITATIONS





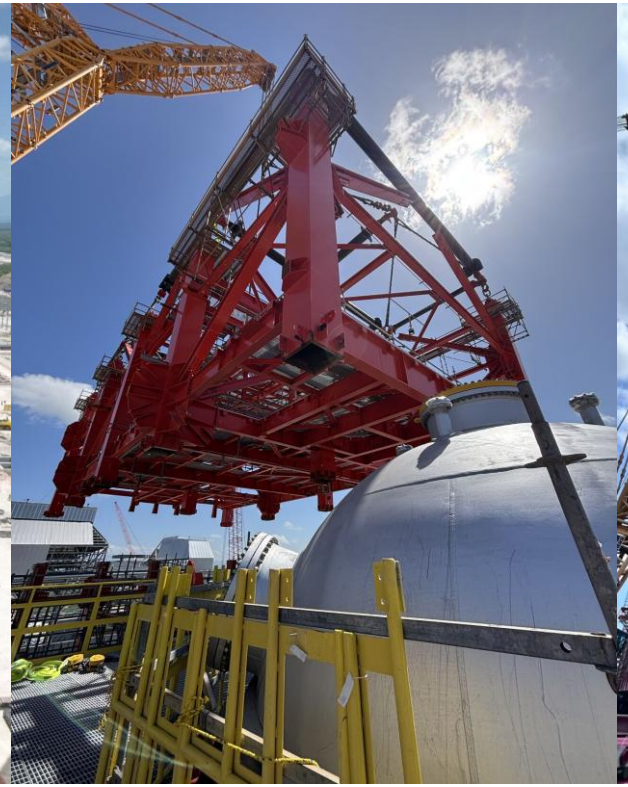
DirectFeed application

User: CONFIDENTIAL

- 2x180MVA transformers
- 260MW max. active power
- Flicker mitigation factor >**10** (no STATCOM/SVC)
- Power factor **>0,99**

TERNIUM NEW DRI PLANT

PLANT CONSTRUCTION EXECUTED BY TECHINT

TECHINT
Engineering & Construction

Construction strategy developed by Techint E&C – sister company of Tenova.
Structure Modularization for Reactor tower, **42mt high** and weighing **680t**.
Modules were assembled at ground level including equipment and piping and lifted to the reactor tower.

PROGRESS AND STATUS

VIEWS FROM THE SITE

PROGRESS AND STATUS

VIEWS FROM THE SITE

Tenova SpA

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