FABBRICA FUTURO – Brescia 2024

Borgo Santa Giulia Corte Franca (Bs)

RED HOT PASSION FOR STEEL

venerdì, 5 Luglio 2024 - 9:00/17:00

Maurizio Zanforlin
R&S Manager
ORI Martin Group

ORI Martin Group

"Non può esserci una rivoluzione sostenibile nella ***filiera dell'acciaio*** *senza l'apporto delle tecnologie digitali "*

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History of ORI Martin Group

1934-40

O.R.I. MARTIN foundation (Brescia) by Mr. OGER MARTIN

1961

New E.A.F. (35-ton capacity)

1973

ORI MARTIN SUD Foundation (Ceprano) for rebar production (production ceased in Feb. 2018)

1995

Specialization in quality & engineering steels

TRAFILATI MARTIN foundation (y1996, Cologne) for cold finished bright bars

2010

New curved CC machine (Danieli)

2024

Acquisition of OMVP (Officine Meccaniche Villar Perosa)

1950

First E.A.F.

1965

Curved CC machine & wire rod-bars rolling mill

SIDERURGICA LATINA MARTIN foundation (Ceprano) for pre-stressed concrete strand production

1986-88

New Danieli wire rod rolling mill

First annealing furnaces

First drawing coil to bar

2008

Revamping of wire rod rolling mill

2016

Acquisition of **NOVACCIAI** (NO) specialized in cold finishing of bars

2019

Acquisition of **SAPES** (TN) specialized in cold and hot forging

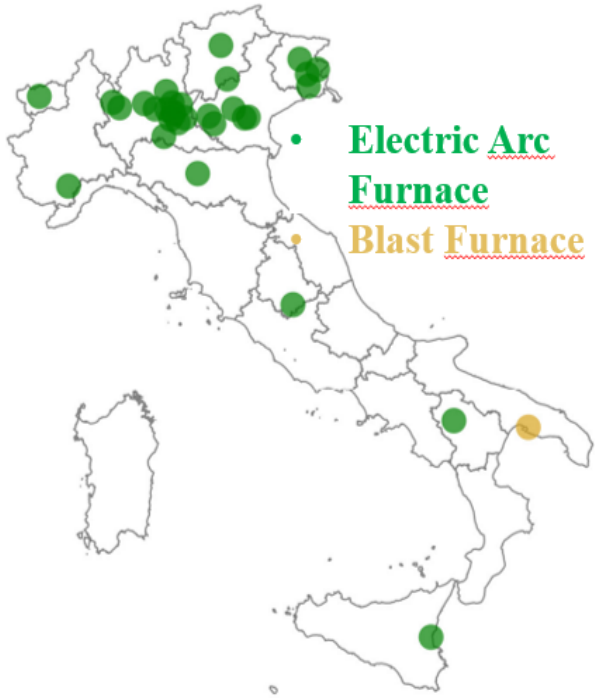
2021

Ferrosider becomes O.R.I. MARTIN Spa

THE ITALIAN STEEL INDUSTRY

A few highlights:

- **Production of 21,6 M.t. of raw steel**
- **2nd country in EU** (after Germany) for **steel production and consumption** and employment in steel industry; 11th globally for steel production
- **1st country in the EU** for:
  - Steel production from **Electric Arc Furnace** → about **85%** of domest production
  - **Energy efficiency** of the steel industry → **-38%** of specific consumptic compared to the EU average
  - **Import volumes from non-EU countries** → roughly **25% of EU total**
- **Strong propensity for export** → around **35% of its revenue**
- More than 35% of the industry's investment focuses on **improving environmental performance** and **occupational health and safety.**



THE ITALIAN STEEL INDUSTRY

STEEL'S NUMBERS IN ITALY

About 24,000,000 t/y produced of which 20-21,000,000 t from electric cycle (50% of production is in Lombardy);

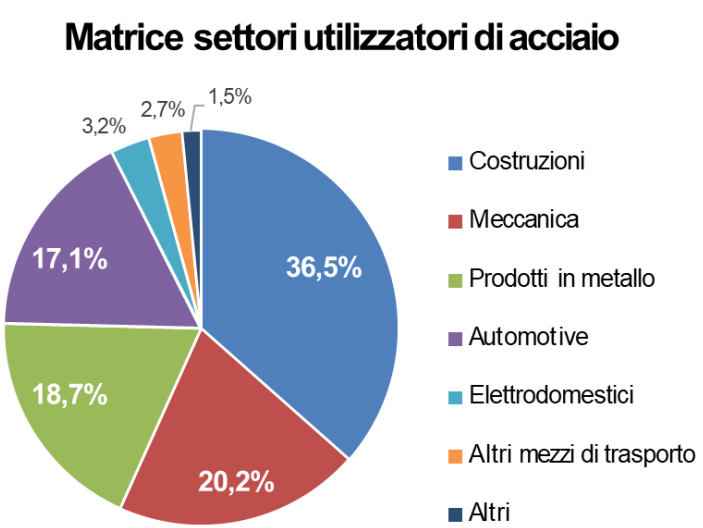
10th largest producer in the world;

2nd producer in Europe;

1st producer from electric cycle;

85% of steel produced from electric cycle: circular economy by definition.

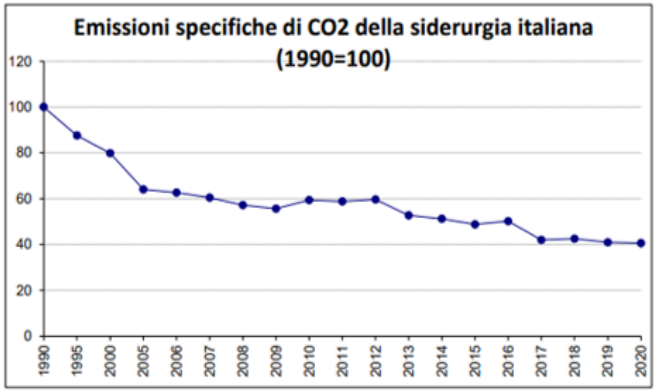
Electric cycle about 400kg CO2/t;Full cycle about 2000kg CO2/t;



The steel-intensive sectors are construction, mechanical engineering, metal products and automotive, and together account for more than 90 % of national steel product demand.

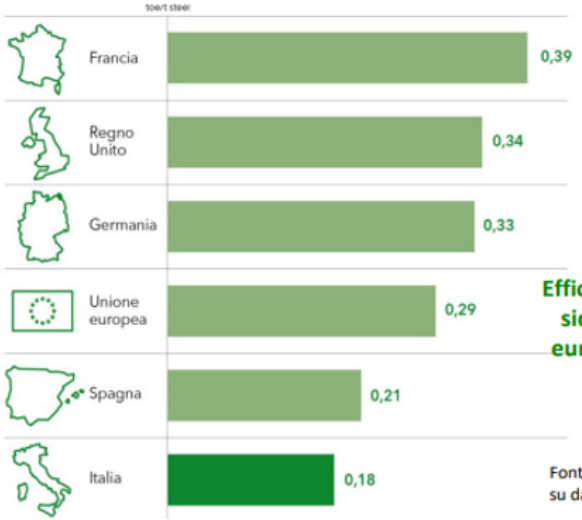
CO2 Emissions & Energy Efficiency

CO2 specific emissions for the italian steel industry



Fonte: Elaborazione su dati UNFCCCC

Energy efficiency in the steel industry: A European comparison.



Efficienza energetica della siderurgia - Confronto europeo [toe/t steel -2018]

Fonte. elaborazione Federacciai su dati Odyssee Database

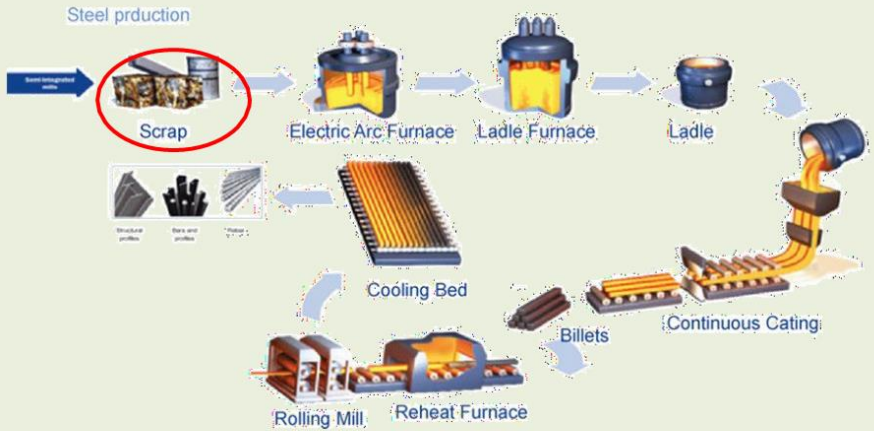
- Italian steel industry = **-60% CO2 from 1990 to 2020**
- direct and indirect **emissions** from the Italian steel industry now account for about **4.5 % of total Italian emissions**
- **Reduction** of more than **33% in energy consumption** per ton of steel since 2000
- Italian steel industry **first in EU for energy efficiency** with specific consumption **values 38% lower than European average**

Blast Furnace VS Electric Arc Furnace

Blast Furnece/ Basic Oxigen Furnece

- **Iron ore** and **Coal** are the main materials (**75%**) and just 25% steel scrap are used in the BOF
- The amount of **CO2 emission** of per ton crude steel from the BF-BOF steelmaking is about **2000 kg**

Electric Arc Furnece



- **95% metal scrap recycling** is used in the EAF. Perfect example of a **circular economy** process.
- The amount of **CO2 emission** of per ton crude steel from the EAF steelmaking is **about 400 kg.** Compared to BOF**,** the use of **EAF** permits:
  - **90% natural resource saving**
  - **80% of co2 reduction**

ORI Martin Sustainability Framework

ORI Martin is a **modern steel plant** with an **electric furnace**, considered one of the most advanced companies in technological and innovative terms.

It produces **special steels** to be mainly used for **mechanical, energy and construction industries**. Most of the produced steel supplies the **automotive and railway sector.** Suspension springs, components, bolts and bars generally supply the mechanical, energy and construction industries

The plant covers a total area of about 246,000 m2 (87,000 m2 indoors). It is equipped with a **steel plant run by an electric arc furnace, rolling mill for wire rod and bar products** and a heat **treatment department** (annealing, quenching and tempering).

The main raw material used to produce steel **is scrap**. Accordingly, ORI Martin is part of the **circular economy model.**

The Group's current composition is **the result of a diversification strategy** that began in the **1960s and led to internalisation** and **consolidation** of **various companies** operating at different levels of the steel industry.

Industrial harmony with the sorroundings

Decarbonisation

Renewable energy

The steelmaking process

ORI MARTIN'S mission is to **contribute to the steel industry by leveraging the circularity embedded in the business model, innovating products and processes** with **lower environmental impact**. In pursuing its goals, the Group focuses on its people, ensuring and spreading full compliance with ethical principles throughout the supply chain.

The 6 Strategic Pillar of Sustainability Framework

Decarbonization

Reduce environmental impacts during the production process by monitoring its **Carbon Footprint** and developing initiatives that encourage the **reduction of energy consumption and emissions**.

Waste to Production

Promote the integration of the **circular economy** into production processes by reducing impacts related to **waste management**, **water consumption**, **raw material,** and promoting recovery activities and the use of **recycled and recyclable materials**.

Care for People

Safeguard the well-being of employees by enhancing **safety standards**, ensuring **equal opportunities**, and promoting **talent development** and enhancement through structured **training** paths involving all employees.

Act for community

Enhance the relationship with the local community in which ORI Martin operates, ensuring an **ongoing dialogue** based on **respect for the environment and people**, while implementing **proactive initiatives** aimed at **improving the local context**.

Integrated Governance

Ensure the generation of shared value over time for all **stakeholders** through an appropriate **integrated control system** of risks and sustainability issues. **Spread ethical principles and values** of sustainable growth throughout the **supply chain**.

InnovAction

Continuously improve the quality and **environmental performance of products** through **research and development** of innovative methodologies aimed at supporting the sustainable development of the steel industry by pursuing the **satisfaction of its customers**.

Sustainability in ORI Martin

1

- **4th Sustainability Report** compliant with the recognized GRI Standards and assured by EY

2

Decarbonization strategy launched in **2023**

3

Scope 1, 2 and 3 emissions

Measured CO2 emissions and continuous monitoring

ENVIRONMENTAL PRODUCT DECLARATION achieved in 2022 for 8 products

Certification ISO 14064 achieved for Brescia and Ospitaletto plant

CODE OF BUSINESS CONDUCT

4

ORI MARTIN Code of Business Conduct: The compass that guides the behavior and actions of ORI MARTIN

5

ORI MARTIN learning activities:. In 2023 ORI Martin provided for:

- **8 hours** course on **CSR**
- **4 hours** on **Circular Economy**
- **12 hours** course on **Training for Circularity**

CONSTEEL TECNOLOGY

ORI MARTIN USES **CONSTEEL** TECHNOLOGY, WHICH ALLOWS THE CONTINUOUS LOADING OF THE SCRAP INTO THE ELECTRIC FURNACE THROUGH A SPECIAL MECHANICAL CONVEYOR THAT ALLOWS THE PREHEATING OF THE SCRAP WITH **GREATER ENERGY EFFICIENCY**.

FURTHERMORE, THIS TECHNOLOGY BRINGS CONSIDERABLE ADVANTAGES RELATED TO THE ENVIRONMENTAL IMPACT: **REDUCTION OF NOISE** AND **BETTER CONTROL** OF THE **RADIOACTIVITY** OF **THE INCOMING SCRAPE**

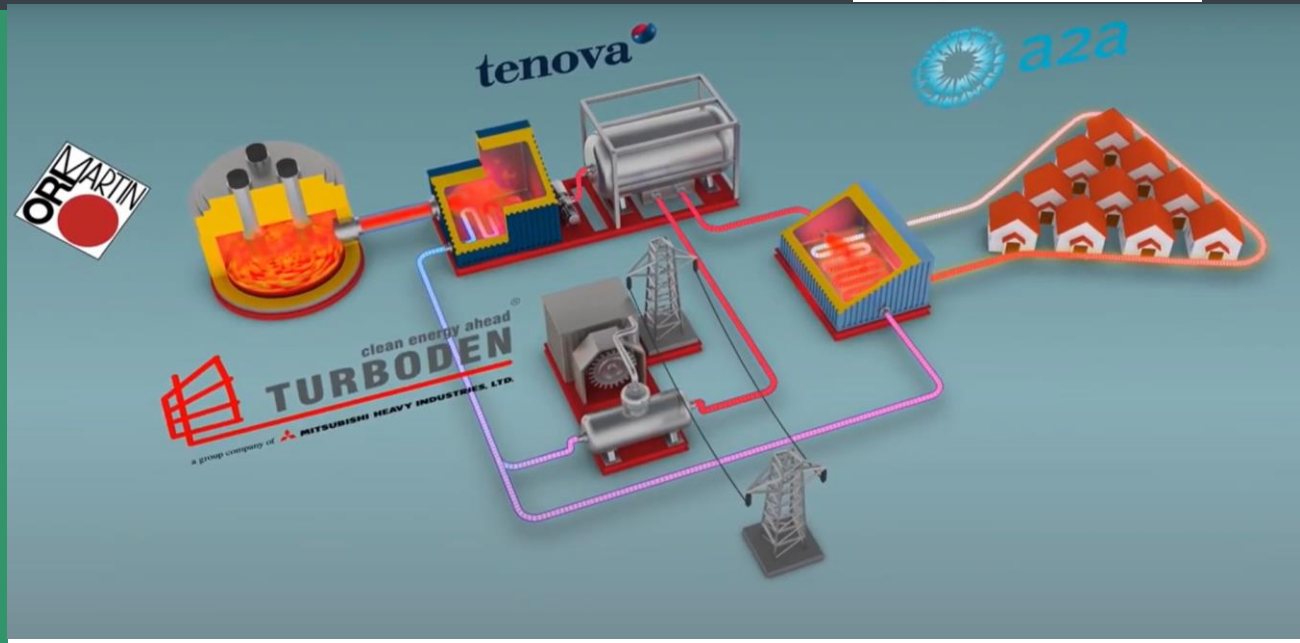
- REDUCTION OF EAF DUST DISPERSION
- SCRAP PRE-HEATING
- ACOUSTIC IMPACT REDUCTION

IRECOVERY

IRECOVERY

- Electricity during summertime (April-October) : ~ 1,8 MW,el (nominal)
- District Heating during wintertime (October-April) : ~ 12MW,th (nominal)

- Average **steam production**: 11 ton/h
- Average **accumulator pressure**: 24 bar(g)
- Average **thermal power to a2a DH**: 6 MWth
- Average **thermal power to ORC cycle**: 5,5 MWth
- Average **net electric power from ORC cycle**: 1 MWel



clean energy ahead TURBODEN

a2a PRESENTE NEL FUTURO

ORI MARTIN

tenova

IRECOVERY

ANNUAL REDUCTION OF 10’000 T CO2

52 GWH ANNUAL HEAT RECOVERY CAPACITY

25 MWH DAILY ELECTRIC ENERGY PRODUCTION IN SUMMER (EQUAL TO 700 FAMILIES’ ELECTRICAL CONSUMPTION THROUGHOUT THE YEAR)

26 GWH ANNUAL THERMAL PRODUCTION IN WINTER (EQUAL TO 2000 FAMILY CONSUMPTION)

12 MLN€ TOTAL INVESTMENT

LARGE HEAT PUMP

RECOVERY OF
HEAT FROM COOLING WATER
USED FOR THE CONSTEEL® EAF

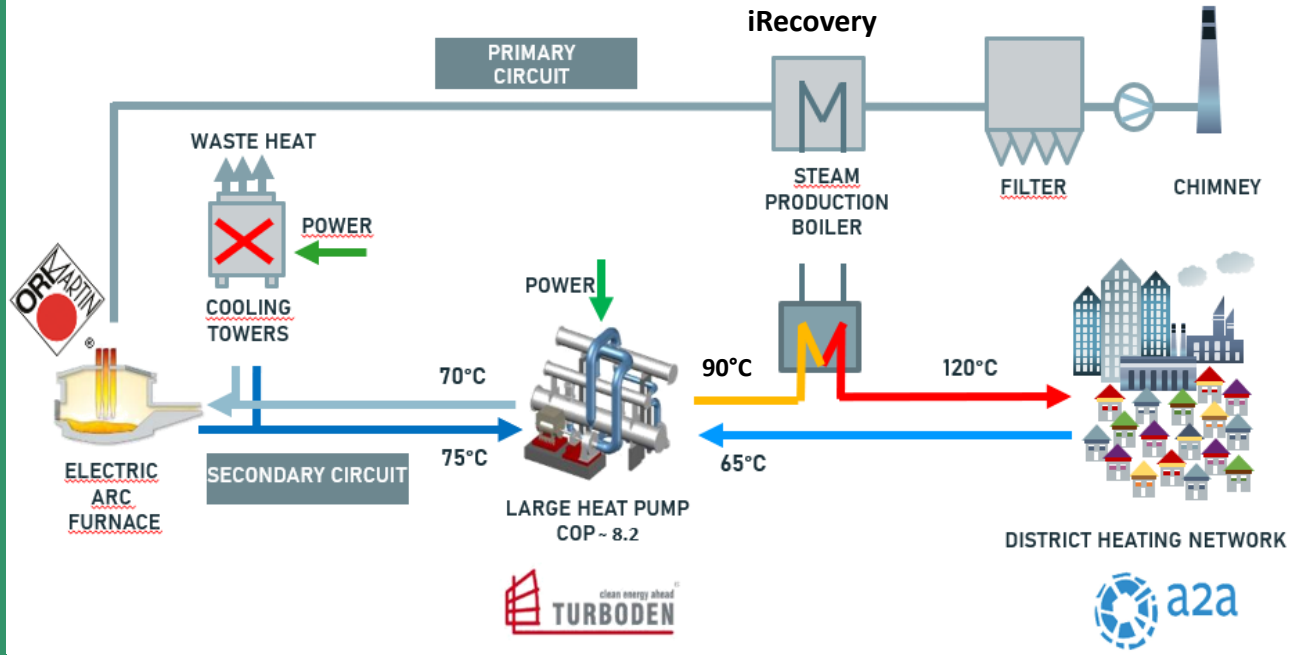
- 6.5 MLN/€ OF TOTAL COST
- HEAT PUMP OF ~6 MW
- IMPROVING ENERGY EFFICIENCY
- ANNUAL SAVING OF 5.000 TON CO2

HEAT LEAP

LARGE HEAT PUMP IN ORI MARTIN MELTSHOP

LHP TECHNICAL FEATURES

- **6 MWth** design heat delivered
- Full **integration** with DH network. Control system designed to be highly flexible depending on:
  - DH network operating temperature
  - Steam production boiler heat production
- **High flexibility** with 2 compression stages and variable frequency driver (due to a very variable process)
- **Working fluid**: Low GWP HFO, R1233ZD



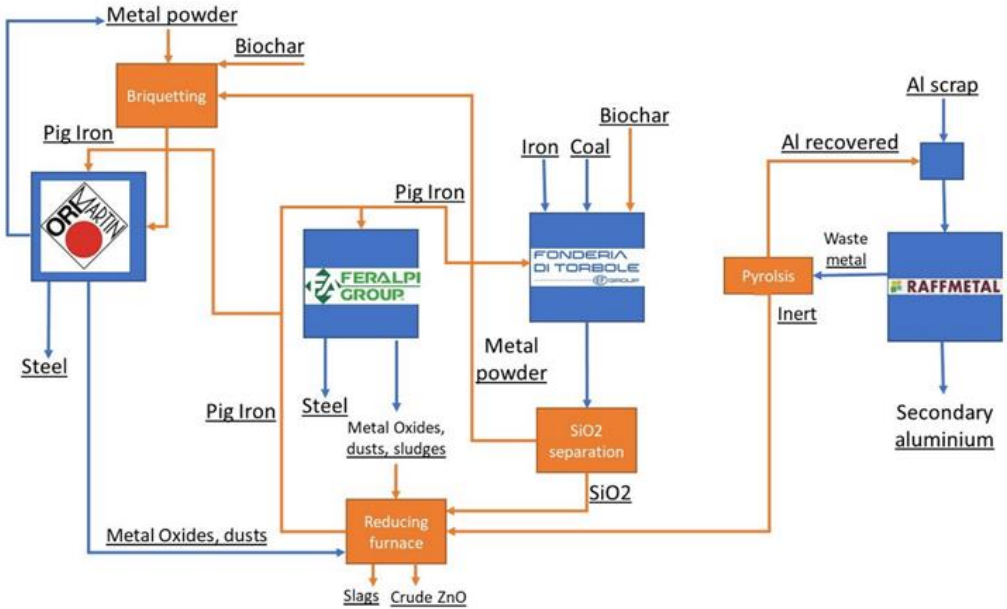
CORALIS

Coralis project aims at the valorization and **reuse of iron oxide-rich metal waste** produced by production cycles and with that, an overall **reduction of material sent to landfills**.

- **Reduction** in total **amount of waste in landfills**
- **Reduced raw material** for **industrial processes**
- **Valorization of waste/by-products** that become **alternative resources**
- Development and **implementation** of **key technologies** for **metal waste recovery**
- **Synergy** and **interaction** between **companies** and related **production processes**
- **Reduction of CO2** emissions and promotion of **circular economy**

CORALIS
Industrial Symbiosis in Energy Intensive Industries

Scheme of industrial symbiosis - Italian District



Metal Scrap Classification

Using Convolutional Neural Networks

Automatic Classification of Scrap Category from Images

Using Convolutional Neural Networks

Over 50000 images in 9+2 categories

Image Resolution 640 x 360 pixel

Training on an NVIDIA GeForce 1080Ti

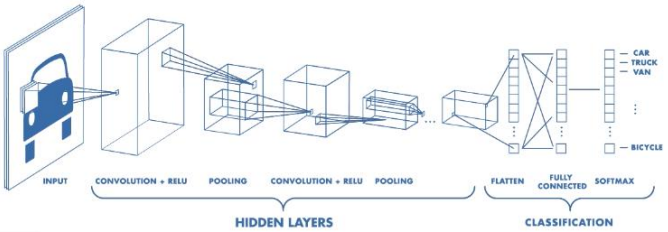
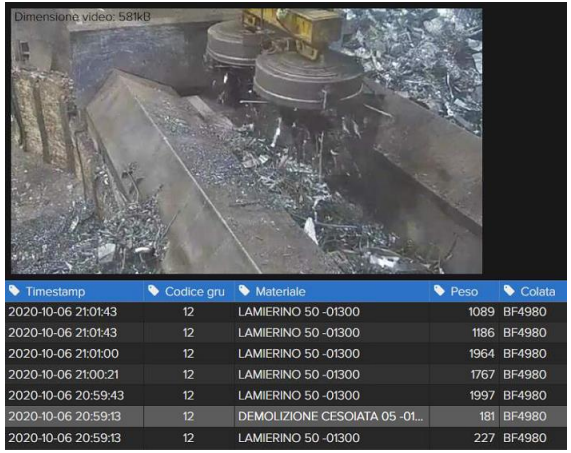


Image from Sumit Saha
Towards Data Science

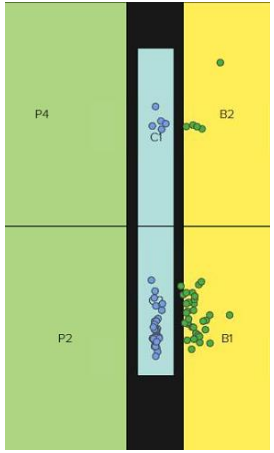
Digital tools

ORI Martin focuses on digital technologies and considers digital information to be an added value. Activities that involves cutting-edge technologies about data analysis and image recognition are WIP.

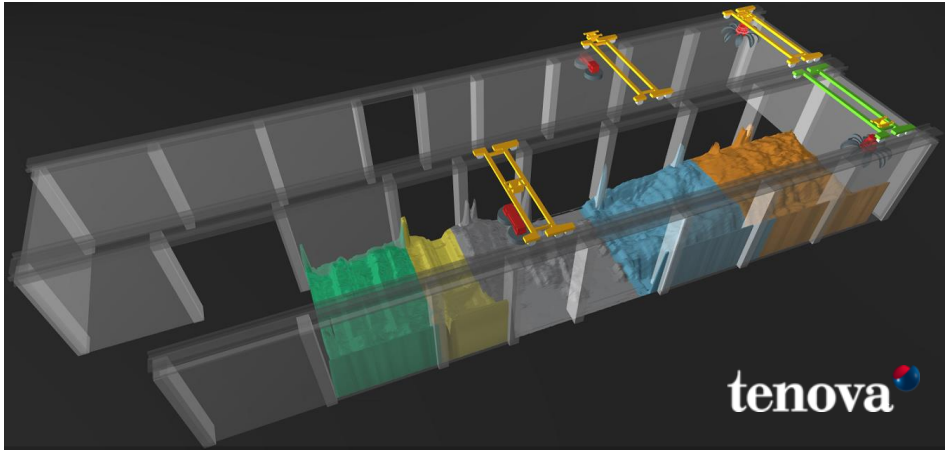
Just an example: **Automatic Scarps Classification and Monitoring of Scrap in EAF Charge** is an activity developed in the framework of lighthouse plant project.



Scrap tracking heat by heat



Charge scrap summary by heat



Continuous tracking of scrap yard by automatic (and human) scrap classification

Digitalization, machine vision and robotics in ori Martin

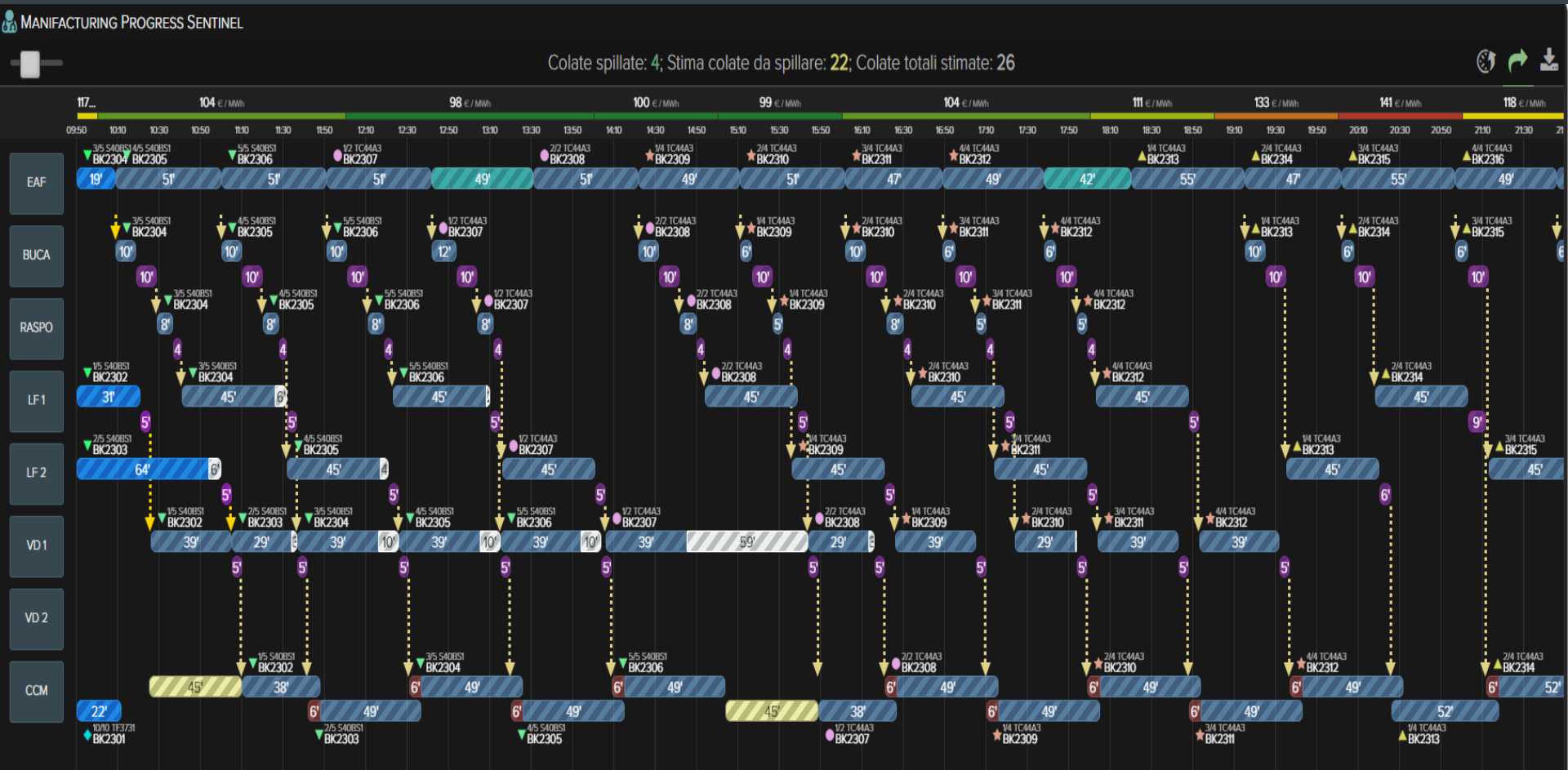
Digital technologies and robotics are powerful tools to implement integrated controls and performs very close reactions: very useful regarding the issue of process reliability and security.

- **EAF Refractory Wear Monitoring**

  has been achieved using a dedicated tool applied to the EAF steel sampling robot. The internal EAF images are observed in real time and historicized.

EAF INTERNAL INSPECTION

«Capoturno Digitale»



Digitalization, machine vision and robotics in ori Martin

BILLETT IDENTIFICATION (ANTIMIXING)

The risk of billet mixing at the input of reheating furnace ahead of rolling mill is the side effect of **Make To Order** production.

- **Reduce Mislabeling**

  has been the target of the ORI Martin and Polytec actions on billet labeling.

  Increasing the label reliability by robot at the end of CCM and interconnecting a label workstation at the end of CCM evacuation line the mislabelling at the input of reheating furnace moved from **6.7%** to **3.6%** as measured by the tracking rolling mill framework.

STAIN - Tracking billette

Windows

Esci | Aggiorna | Rinfresco automatico

Data	Ora Sbozzo	IS [min]	Linea	ϕ	Colata Lotto	Acciaio ORI	Stato Lavorazione Billetta	Sez.	Lungh. Billetta CCM	ID Billetta LAM	N° Billetta	N° Collo	Stato Qualità In Linea	Causale Stato Qualità in linea	Temp. Gabbia Finitrice	Colata	Codice Billetta CCM	Programma	Peso Billetta [kg]	Lung. Billetta al Carico	Acciaio Cliente
04/10/2020	17:56:45	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144333	23	23	CONFORME		839	BF4691	BF4691306	L12026E11	1.829	9.181	B02
04/10/2020	17:57:58	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144334	24	24	CONFORME		838	BF4691	BF4691506	L12026E11	1.829	9.181	B02
04/10/2020	17:59:12	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144335	25	25	CONFORME		836	BF4691	BF4691405	L12026E11	1.829	9.182	B02
04/10/2020	18:00:25	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144336	26	26	ISPEZIONE	LETTURA COLATA FAL...	835			L12026E11	1.829	9.181	B02
04/10/2020	18:01:38	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144337	1	1	CONFORME		838	BF4691	BF4691105	L12026E11	1.829	9.243	30CR...
04/10/2020	18:02:51	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144338	2	2	CONFORME		839	BF4691	BF4691305	L12026E11	1.829	9.182	30CR...
04/10/2020	18:04:04	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144339	3	3	CONFORME		836	BF4691	BF4691505	L12026E11	1.829	9.243	30CR...
04/10/2020	18:05:18	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144340	4	4	CONFORME		837	BF4691	BF4691404	L12026E11	1.829	9.243	30CR...
04/10/2020	18:06:32	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144341	5	5	CONFORME		837	BF4691	BF4691204	L12026E11	1.829	9.243	30CR...
04/10/2020	18:07:45	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144342	6	6	CONFORME		838	BF4691	BF4691104	L12026E11	1.829	9.243	30CR...
04/10/2020	18:08:59	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144343	7	7	CONFORME		837	BF4691	BF4691304	L12026E11	1.829	9.182	30CR...
04/10/2020	18:10:12	1,2	Stelmor	10	BF4691	S30B15M	EVACUATA	160	9.100	2020144344	8	8	CONFORME		837	BF4691	BF4691504	L12026E11	1.829	9.182	30CR...
04/10/2020	18:11:25	1,2	Stelmor	10	BF4691	S30B15M	SCARICO 2	160	9.100	2020144345	9	9	CONFORME		835	BF4691	BF4691403	L12026E11	1.829	9.243	30CR...
04/10/2020	18:12:38	1,2	Stelmor	10	BF4691	S30B15M	PESA ROTOLO	160	9.100	2020144346	10	10	CONFORME		837	BF4691	BF4691203	L12026E11	1.829	9.182	30CR...
04/10/2020	18:13:51	1,2	Stelmor	10	BF4691	S30B15M	PESA ROTOLO	160	9.100	2020144347	11	11	CONFORME		836	BF4691	BF4691103	L12026E11	1.829	9.243	30CR...
04/10/2020	18:15:04	1,2	Stelmor	10	BF4691	S30B15M	PESA ROTOLO	160	9.100	2020144348	12	12	CONFORME		839	BF4691	BF4691303	L12026E11	1.829	9.182	30CR...

Digitalization, machine vision and robotics in ori Martin

CoILS labeling Robot

The digitalization process involves the production processes as a whole. Large scale machine-to-machine communication (M2M) are integrated for increased automation, improve tracking of the products and monitoring of the process.

ORI Martin experience sees the convergence of M2M communication, robotics and machine vision in two main aspects of its steel production:

- **Product labeling**

  ORI Martin tracks all its products by labels: billets, coils and bundles of bars

- **Plant monitoring**

  ORI Martin monitors the EAF wearing by a daily internal inspection

A significant effort is spent to feed the M2M communication by **tracking** material and processes.

Are also WIP projects involving machine vision for **automatic qualification of defects** in products and **scrap identification**.


ORI MARTIN
ORI MARTIN
GREENSTEEL
‘Doing good is good for business’
Sir Richard Branson from The telegraph