**PARTNERS IN FRONT RUNNING**
DANIELI INNOVACTION MEETING
13 OCTOBER 2010
DANIELI HEADQUARTERS – ITALY
LONG PRODUCTS

# MI.DA.®, the new generation of Danieli Minimills. The most competitive way to produce long products in terms of Capex and Opex. Facts and experiences.

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## The Beginning

Danieli: pioneering experiences with Electric Steelmaking at the dawn of the Minimill Concept

## The evolution: one example among the 74 minimills realized

Danieli nowadays: Greenfield integrated minimill complex at ESI/GHC (UAE)

## The Future: Danieli MI.DA® Micromill

Danieli 2010: Micromill… makes a minimill smaller and more profitable.

Productivity ranges from 200,000 to 800,000 tpy of straight bars, wire rod and spooled coils

## MI.DA.® Micromill Danieli

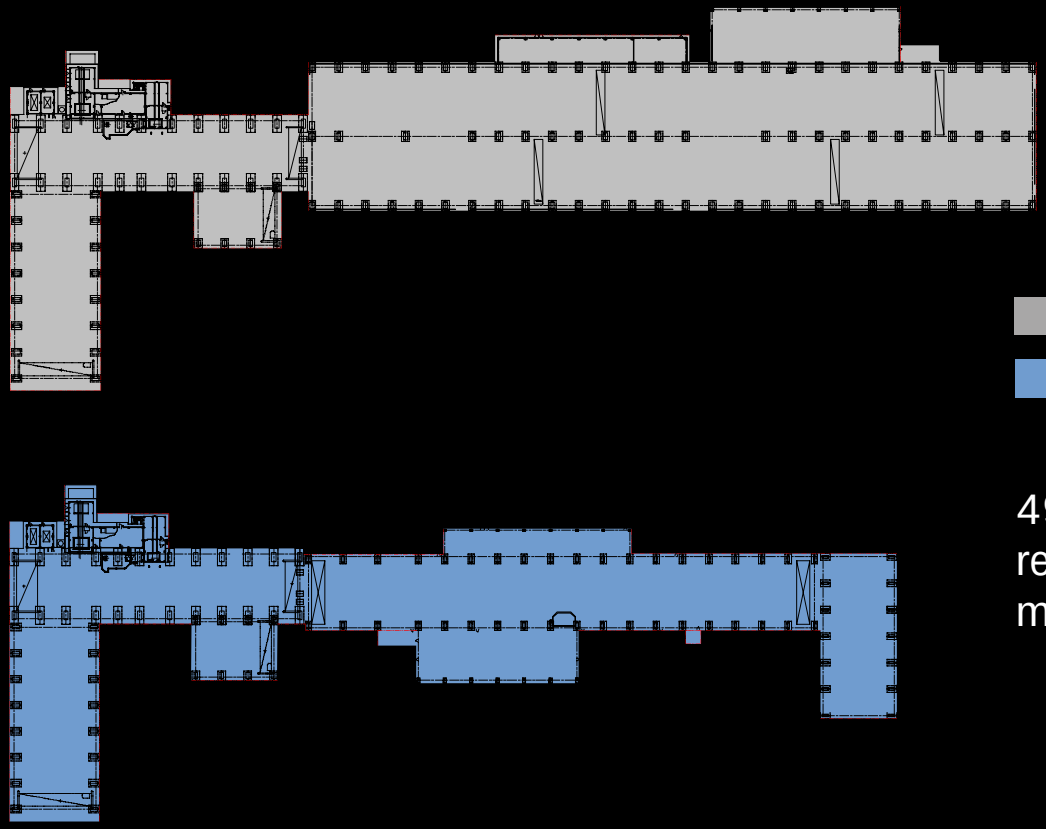
### The K^factors

… a winning strategy for the best integration of the most advanced technologies to allow our Customers to be the most competitive in long products production...

## K^Factor 1: MI.DA.® Businessland

Economically-sized to cover regional market demand

## $K^{Factor}$ 2: MI.DA.® Super compact production unit



Traditional MiniMill: 21,210 $m^2$

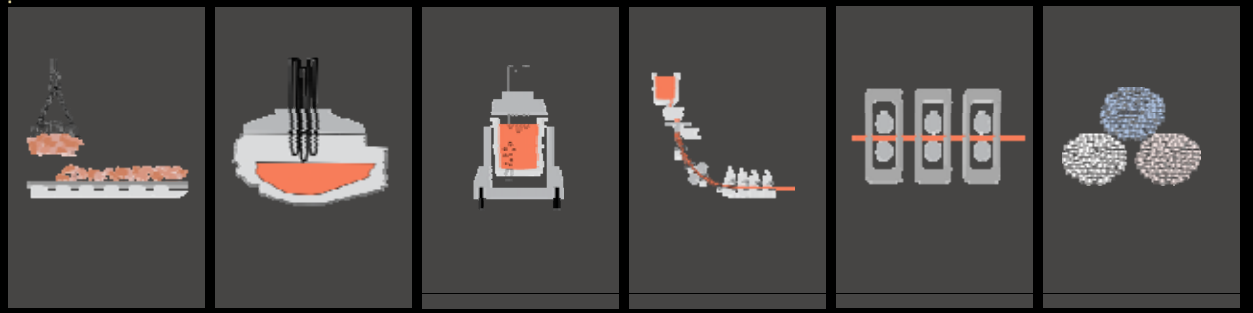
MI.DA.® MiniMill: 14,265 $m^2$

49% more building space required by a conventional mill vs. MIDA mill

## K[Factor] 3: MI.DA.® from scrap to finished product…

Steel is always present in all stages of process, thanks to the matching of the various process steps (SCRAP > LIQUID > CASTING > ROLLING)

**… in 2 hours…!!!**



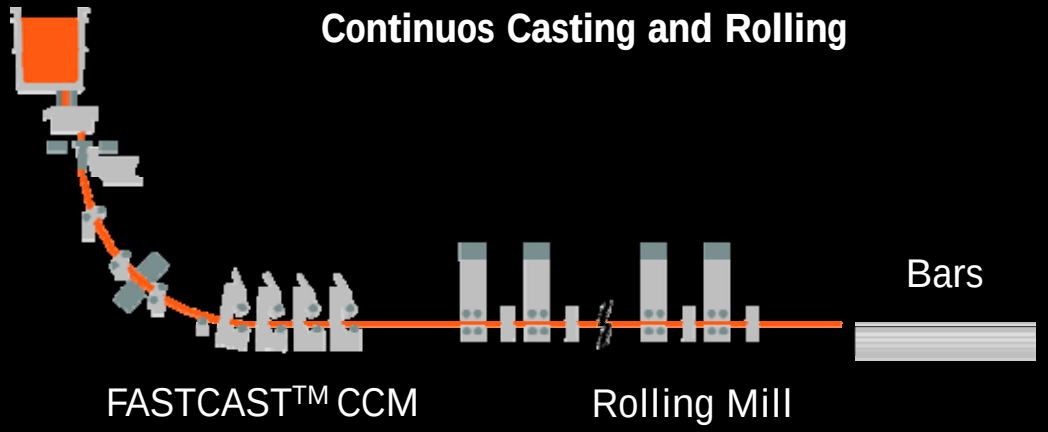
## $K^{Factor}$ 4: MI.DA.® Micromill production…

MI.DA.® 23-hours/day uninterrupted production…means:

- Up to 32 continuous heats/day casting sequences
- 1 hour overall product change (rolls, rings, guides) and preventive maintenance
- Plant automation allows to switch from continuous casting and rolling to semi-continuous operation to accommodate for unexpected delays

## $K^{Factor}$ 5: MI.DA.® an uninterrupted Casting-Rolling Process

- Longest billet ever rolled over **8,220 m** in a single uninterrupted casting/rolling sequence
- No Reheating furnace …. significant savings in conversion cost **(minus 75% natural gas)**



## $K^{Factor}$ 6: MI.DA.® highest bar bundles quality

Thanks to the patented DRB “Direct Rolling & Bundling” system for 1 to 6 tons Bundles:

- Straight bars cut to final sales length (any customized length) and bundled, directly at finishing mill delivery side
- Traditional cooling bed, cold cut-to-length and bar counting no longer necessary
- Extremely tight Cut-to-Length tolerances

## $K^{Factor}$ 7: MI.DA.® Micromill construction paths

...in 13 months...

## $K^{Factor}$ 8: MI.DA.® Total cost lower than ever (cash + depreciation)

From 200,000 tpy to 800,000 tpy with a total (cash + depreciation) cost lower than any other minimill up to or over 1 Million tpy

The estimated competitive edge against the average performance of a traditional Minimill is between 10%-30%”

Cost Advantages vs. Traditional MiniMills

- Lower labor cost: **4-8 USD/t** (less than 1 man-hour/ton)
- Lower natural gas cost: **4 USD/t** (6-8 Nm3/h vs 26-28 Nm3/h)
- Higher yield > 99,1%: **6 USD/t** (minimized material losses)
- Lower consumables cost: **3.5 USD/t**
- Lower production cost: **8 USD/t** (thanks to QTB & no Alloys required in Steel Meltshop process)
- Lower inventory cost: **2 USD/t** (no billets storage, minimized bundles storage)
- Higher revenue due to Best Bundles Quality: **2 USD/t**
- Lower freight cost: **10-20 USD/t** (according to plant location and logistics)

Total estimated **savings** of approx **40 to 54 USD/t**

## The ultimate step forward in production of commercial steel long products

- **K Factor 1** MI.DA.® Businessland
- **K Factor 2** Saving thanks to Super-compact design (50% less building space)
- **K Factor 3** 2 hours from scrap to finished product
- **K Factor 4** 23 hours uninterrupted production
- **K Factor 5** 8,220 m longest 1,070 tons heaviest billet ever rolled.
- **K Factor 6** 1 to 6 ton Bundles of highest quality ever seen
- **K Factor 7** 13 months construction path.
- **K Factor 8** 40 to 54 USD/ton transformation cost saving

## Key Technological innovations at the base of MI.DA.® The ECR ® System

- Endless Casting & Rolling process
- Direct connection of the single strand FastCast CCM to the 1st Rolling Mill stand for uninterrupted production
- No Reheating Furnace…no consequent gas/fuel consumption
- Longest and heaviest billet ever rolled…over 1,000-ton uninterrupted casting and rolling sequence during the daily operative shifts
- Fastest casting speed ever achieved of 7.2 m/min (>55 TPH per strand !!)

## Key Technological innovations at the base of MI.DA.® The DRB ® System

- DRB “Direct Rolling & Bundling” system (patented)
- Deformed bars cut to final sales length (any customized length) and bundled, directly at finishing mill delivery side
- Traditional cooling bed for multiple-length bars, cold cut-to-length and bar counting facilities no longer necessary
- Bar bundles of the highest quality ever seen in the market
- Excellent Cut-to-Length tolerances

## Key technological innovations in Automation System

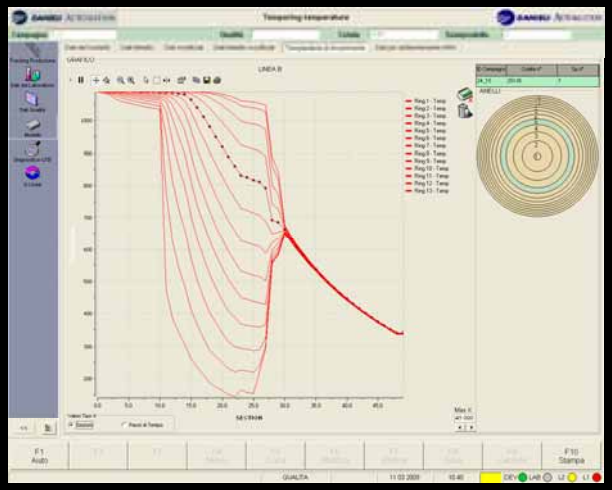
### CCM / RM link

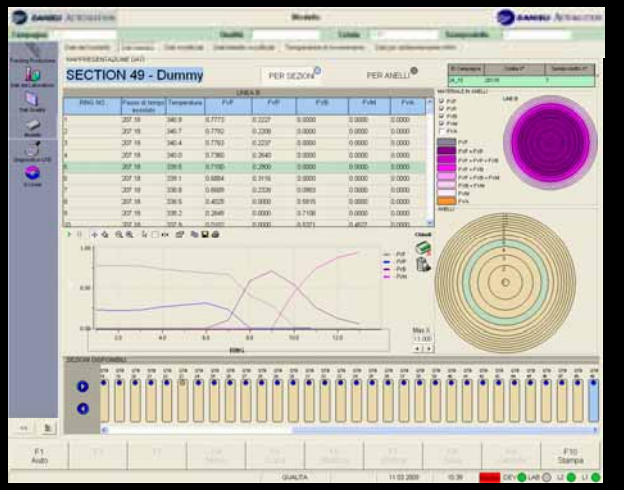
- Speed control from mould to cooling bed
- Cascade control from mill impacts also on casting speed
- Speed changes do not affect product quality or cut accuracy
- Single pulpit for endless process control

## Key technological innovations in Automation System

### QTB Plus

- Prediction and control of Mechanical Properties of Hot Rolled Bars in Real- time
- Final quality under control
- On line analysis of Strength and Hardness of final Product
- Control of shrinkage for optimum cut length

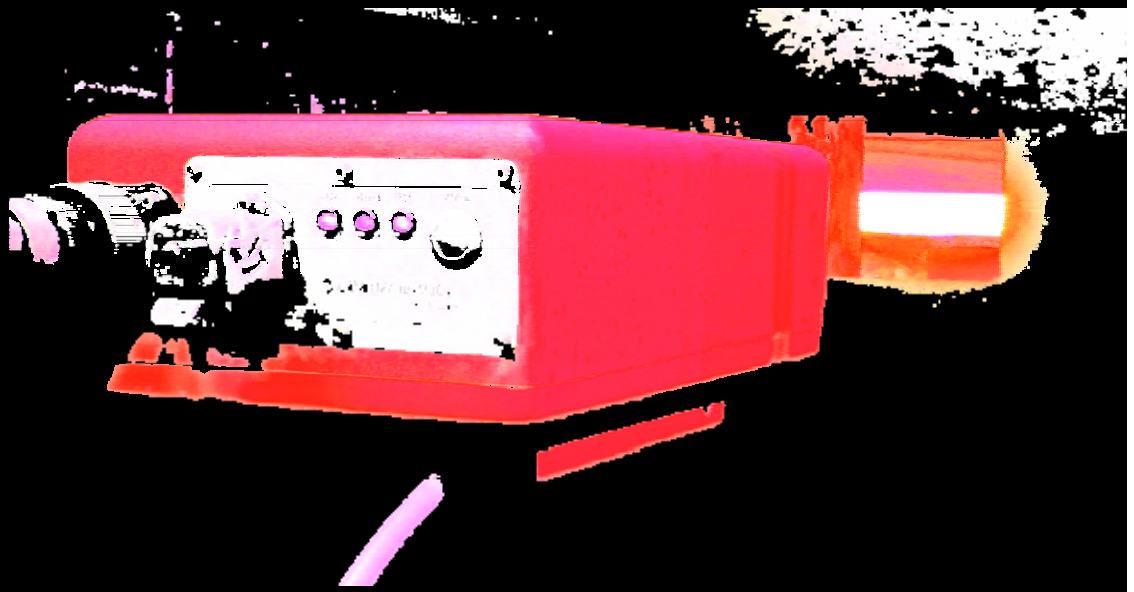




## Key technological innovations in Automation System

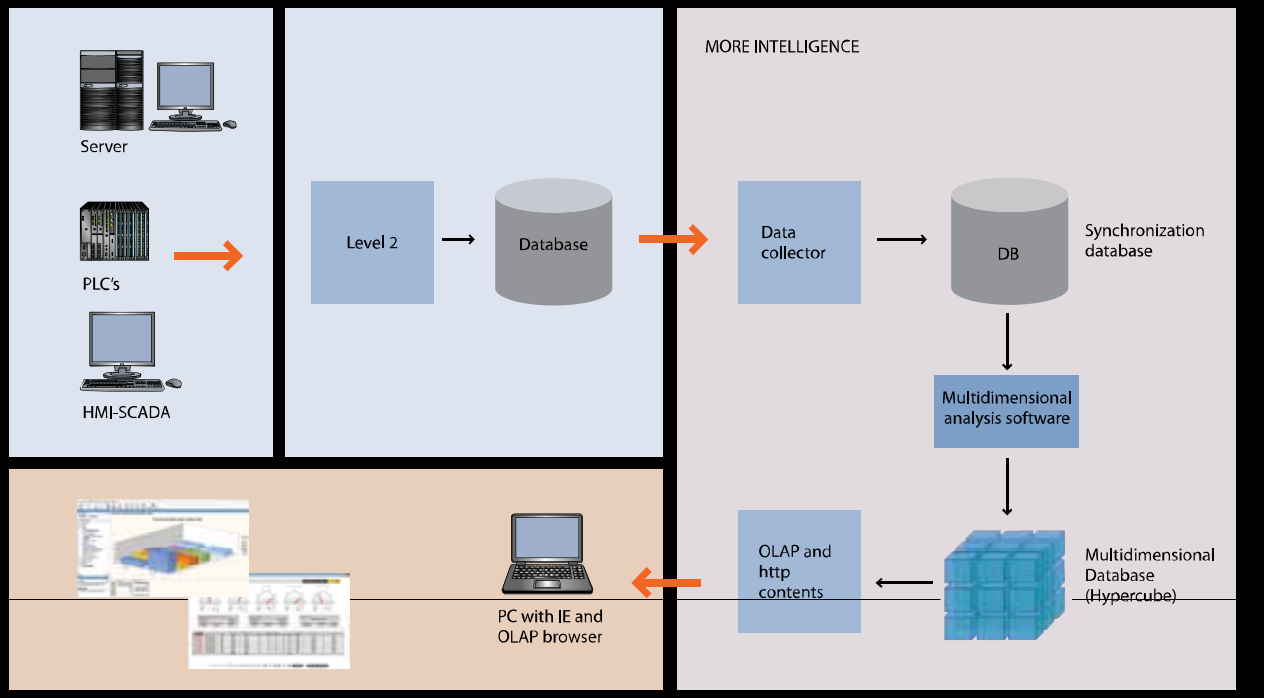
### QTB Plus

- HiSPEED sensor to measure actual rolling speed
- Dedicated automation package for shears control
- High accuracy of cut (even in endless operation)



## MOREIntelligence

- Multidimensional data analysis system adding intelligence and information to the reports
- Better process and plant operation knowledge
- Easier decision making for plant managers

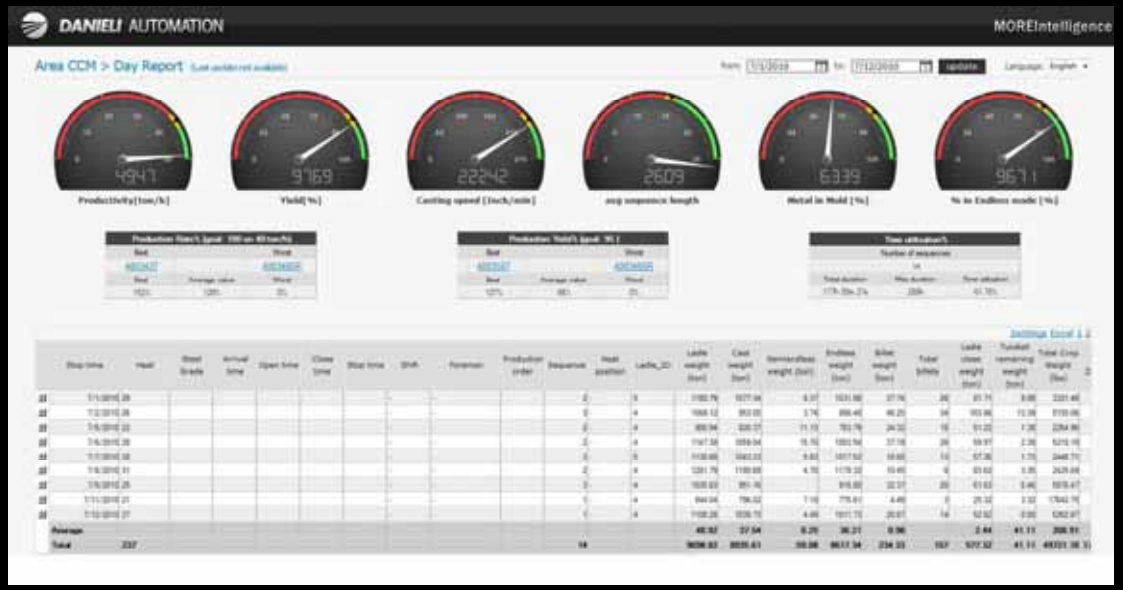



Integrated information from SCRAP to BAR BUNDLE

## MOREIntelligence dashboards

### Dashboard reports

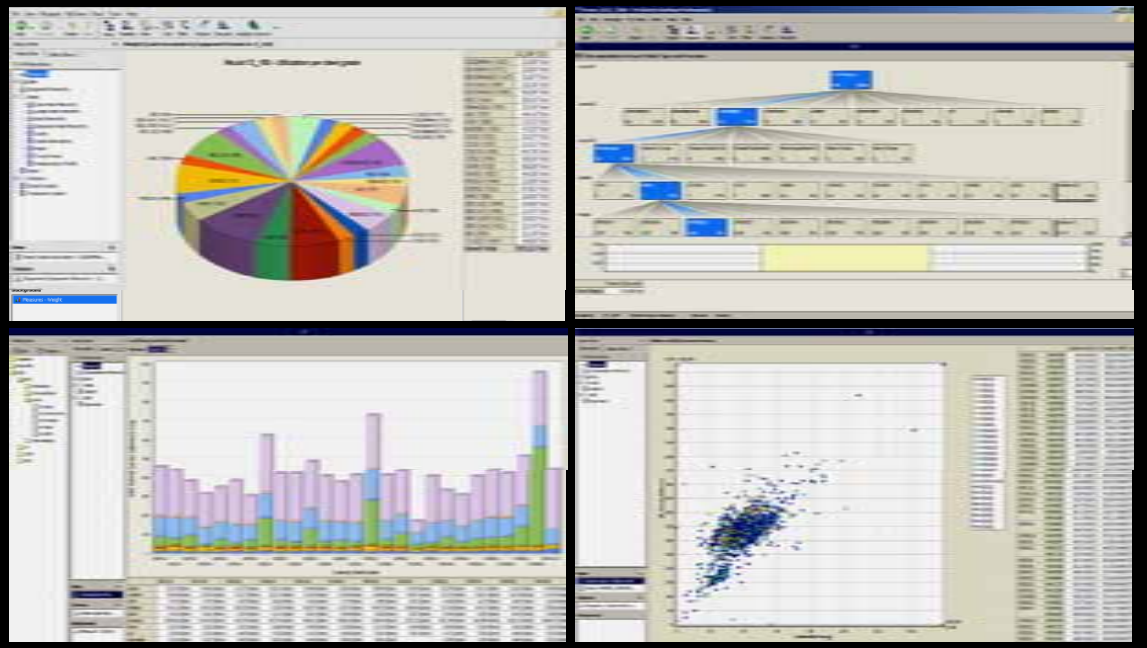
- Pre-configured and ready-to-use reports
- KPIs for assessment of Plant performance
- Visualization of main parameters for heats, campaign shifts or any time period



## MOREIntelligence dynamic reports

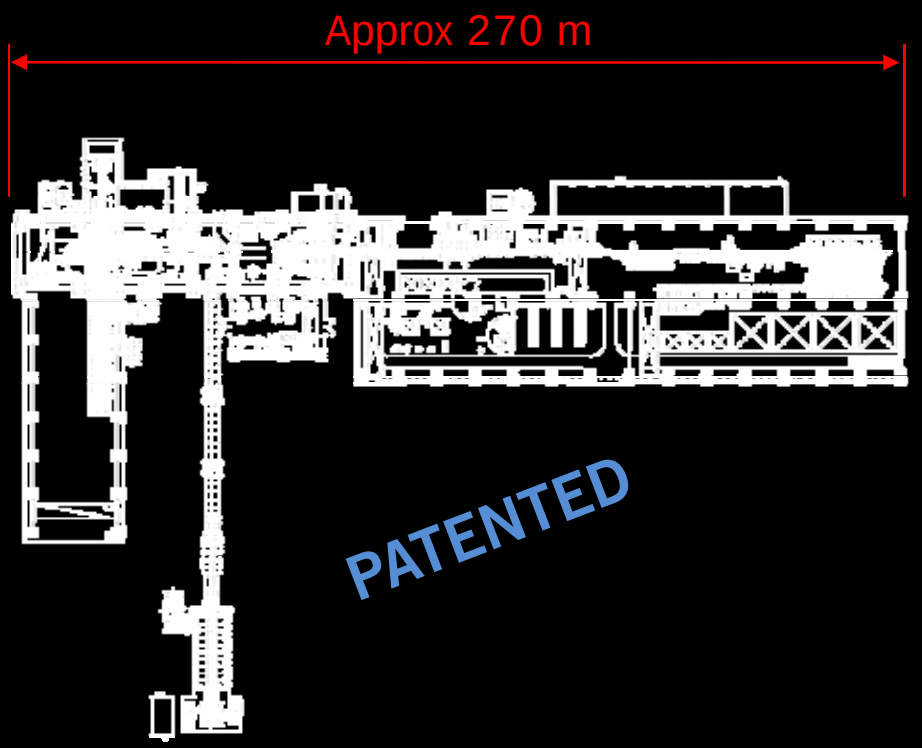
### Dynamic reports

- Flexible and advanced display tools
- Trends, correlations and cause-and-effect relationships

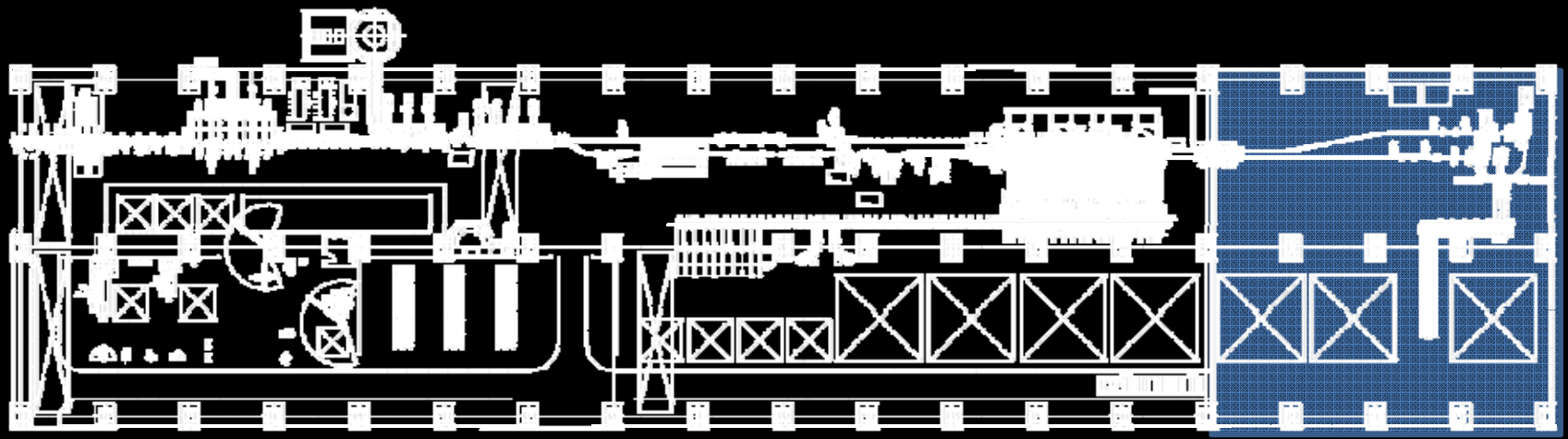


## Typical MI.DA.® Layout

| | |
|---|---|
| Nominal plant capacity | Up to 300,000 tpy (shipped) |
| Hourly productivity | 45 tph |
| Billet size | 130 mm |
| Product size range | from 8 to 40 mm dia |
| Finished products | 6 to 18 m long bundles |



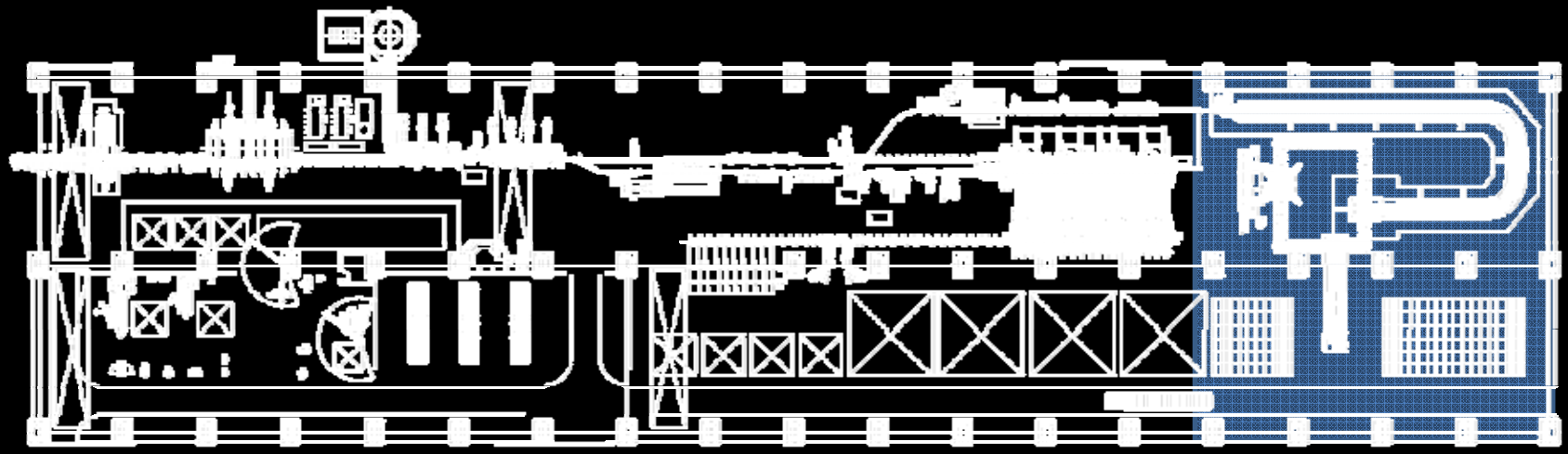
## MI.DA.® Layout flexibility



Spooler line

- Ultra-compact coils up to 3.5 tons, custom weight
- Twist-free winding
- End-users save up to $ 20/ton due to increased efficiencies

## MI.DA.® Layout flexibility



Wire Rod line

- Coils up to 3 tons
- 5.5 to 16 mm dia.
- Possibility to customize coil weight

## Our motto ... We make things happen !

DANIELI innovaction