DemandDriven MRP implementation

ArcelorMittal Brazil Distribution Network
The Largest Steel Producer In The World

Leading the global steel Market
Crude steel production, 2019

A benchmark in the development of innovative, safer and more sustainable production processes.

190,000 employees

Present in + 60 COUNTRIES

+ 1,300 R&D collaborators

Industrial presence in 19 countries:

38% Americas
47% Europe
15% Other countries
<table>
<thead>
<tr>
<th>Products for Construction</th>
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<tbody>
<tr>
<td>Strands for prestressed concrete</td>
</tr>
<tr>
<td>Annealed wire</td>
</tr>
<tr>
<td>Cut &amp; bend structures</td>
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<tr>
<td>Rebars</td>
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<tr>
<td>Nails</td>
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<tr>
<td>Truss</td>
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<td>Wire mesh</td>
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<td>Gabions</td>
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PRODUCTS FOR INDUSTRY

Wire rod

Merchant bars

Drawn bars

Round, Square and Hexagonal Rolled Bars

Flat bars
DRAWN PRODUCTS

- Galvanized wire
- Wire for agribusiness
- Welding wire
- Dramix ®

Meshes
FLAT PRODUCTS

Heavy plates, Cold & hot rolled sheets, coated & uncoated

Tubes and profiles
STRUCTURAL PRODUCTS

- Sheet piles
- Foundation pipes
- Heavy sections
ArcelorMittal Brazil

THE LARGEST STEEL COMPANY IN BRAZIL AND LATIN AMERICA

17,000 Employees
149 Sites & service centers
7Mt/year Iron ore
12Mt/year Crude steel

95% Apparent Consumption Geographical Coverage
Scope of implementation

- Buffers in 75 sites
- About 3,200 SKUs
- About 236,000 combinations SKU-sites
Background and challenges

**OLD MODEL**

- Solution and methodology in line with available solutions at the time
- SAP SNP until 2015
- Time-consuming process
- Each site/channel replenishment was constrained to its forecast (no pooling)
- Monthly forecast with low accuracy at SKU-Site level
- Lost or delayed sales
- Excess stock as well as stock outs

Low forecast accuracy resulting in stock outs, excess stock and constrained replenishment
Background and challenges

MIN-MAX BROUGHT SOME IMPROVEMENTS...

- Standard SAP MRP until 2019 for the distribution network
- Min-max parameters calculated in spreadsheets, updated every 1 to 3 months
- Low visibility and responsiveness
- Time-consuming process, subject to spreadsheet errors and limitations
- Lack of basic planning and execution tools

Significantly better, but still a lot of room for improvements...
Background and challenges

...DDMRP SIGNIFICANTLY IMPROVED OUR PERFORMANCE

- Noticed about DDMRP methodology as an evolution of MRP, TOC, Six Sigma & Lean
- Little information available about implementations in heavy industries
- Pilot project in one site, with many lessons learned
- Software selection (no companies were present in Brazil at the time)
- WA Solutions software as the DDMRP engine integrated with SAP, where the transactional processes remain

Great results very quick, with further room for improvement!
Timeline

**Feb**
- DDMRP Planner training: 1 person

**May**
- Kick-off pilot Project (1 site)

**Fev**
- Kick-off Integration Project
  - 11 views, transactional and master data

**Feb**
- Go-live one product line

**Apr**
- InHouse training: 14 people

**Nov**
- Training 4 people

**Mar**
- Go-live Hubs
- Prioritized share in the upstream

**Nov**
- Results and conclusions
- Software selection process

**Dec**
- WA Solutions as the solution provider
- DDMRP Planner training: 7 people

**Jul**
- Go-live all product lines

**Murphy’s influence**
- M&A process
- Truck drivers strike
- New freight legislation

**Next steps...**
- Further customizations
- Analyzing DDS&OP
- Upstream implications
Results

Market conditions favoured sales increase, coincident with DDMRP Go-Live...

...which allowed a decrease of stock coverage in days...

...and a reduction in lost sales simultaneously!

Lost sales due to low stock relative to sales

- 13% sales increase
- 19% reduction of stock coverage
- 17% reduction of lost sales

Forced maintenance
Supplier problems
Production capacity deprioritized
Results

Favourable evolution of On-Hand status, as combinations of SKUxSite

- 50% reduction on excess (blues)
- 25% increase on on-hand Ok’s (yellows+greens)
- 30% reduction on dangerously low (blacks+reds)
- And still a lot of room to improve!
Some interesting customized features

- Buffer equations split for regular and sporadic SKUs consumption pattern, with automatic detection

- Prioritized share beyond the scope of DDMRP implementation: release of orders considering GATP and block planning availability (SAP)

- Master buffers: several identical SKUs under different codes affecting the same buffer, with alternative BOM’s for replenishment

- Automatic flagging of causes of deviations (shortages and excess)
Next steps

• Deepen the methodology into the routine of planners, focusing on causes of deviations instead of transactional tasks (continuous improvement)

• Analyse the implications of DDS&OP in the upstream, in an environment of constrained capacity, low speed of reaction and high CAPEX involved

• Expand the scope to flat products finishing lines (steel service centres) and flat distribution network

• Analyse the utilization of machine learning algorithms to automate warnings and buffer parameters (demand, variability, lead times, alternative BOM, etc.)