VAMA

Greener, lighter and safer cars with VAMA Steel Solutions
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1. **VAMA: Valin ArcelorMittal Automotive**

VAMA has the most integrated facility for automotive steel in China, allowing us to deliver comprehensive solutions.

- **Valin Steel (LYS)**
  - Hot rolled supply
  - 2 billion USD Upgrade

- **VAMA**
  - **PLTCM** (Pickling Tandem Cold rolling Mill)
    - 1.5 million tons (Phase 1)
  - **Mix-CAL** (Continuous Annealing Line)
    - 1 million tons
  - **CGL** (Continuous Galvanizing Line)
    - 500 kilotons

- **Greenfield Phase 1**
  - 8km

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VAMA’s state-of-the-art Production Facility at Loudi

VAMA has implemented the most advanced automotive steel production technology in order to produce products including the Advanced and Ultra High Strength Steel (AHSS and UHSS) grades with levels of up to 1200 MPa and USIBOR® 1500.

**PLTCM**
(Pickling & Tandem Cold Rolling Mill)
- Coupled Pickling Line /Tandem Cold Mill
- Width: up to 1890mm
- Capacity: 1.5M MT (Can be expanded up to 2.4M MT)

**Mix-CAL**
(Continuous Annealing Line)
- Exposed Capable, AHSS, USIBOR®
- Thickness: 0.5 – 2.5mm
- Width: 900 – 1850 mm
- Capacity: 1M MT

**CGL**
(Continuous Galvanizing Line)
- GI/GA, Exposed
- Thickness: 0.5 – 2.2 mm
- Width: 900 – 1850mm
- Capacity: 0.5M MT
Global Availability of ArcelorMittal Automotive offer

EUR: Europe
NAM: North America
SAM: South America

DP: Dual Phase (CP)
CP: Complex Phase
Mart: Martensitic grade
PH: Press Hardening grade
FB: Ferrite bainite
TRIP: Transformation Induced Plasticity
ArcelorMittal Technology Transfer

- **Assets capabilities**
  - Assets specification done by a team of ArcelorMittal experts
  - Assets have been defined for easy upgrading beyond current product offer
  - ArcelorMittal equipment experts during erection and commissioning

- **Process know-how**
  - Training for VAMA employees in ArcelorMittal plants
  - ArcelorMittal process experts support during ramp up

- **Product know-how**
  - Metallurgical Routings
  - Product Verification rules
  - Training for inspectors, product verification engineers, metallography
  - Experienced Inspectors for ramp up period
  - Automatic Surface Inspection Specialist

- **ArcelorMittal expert team full time assigned to VAMA**
  - Process Specialists
  - Product Development Specialists
  - Quality Control Specialist

Technology Transfer to ensure VAMA’s capability to produce ArcelorMittal Automotive Products at same quality level.
VAMA Product Development

• During its first year of operation VAMA has been realizing a very ambitious product development plan.

• Products developed and available for commercial supply or start approval processes contain mild steel, HSLA, BH, IF, DP-grades (450, 600 and 780) and Usibor®

Microstructure of HSLA420 GI

First trials of DP450 UA

BH220: relations between free C and BH-effect
2. Meeting automotive industry’s challenges

- Main challenges faced by the automotive industry:
  - Stiff fuel economy and reduced emissions requirements
  - Enhanced safety performances
  - Escalating gasoline prices
  - Sustainability, affordability
  - Geographical car production shifts...

ArcelorMittal is fully committed to support car makers worldwide in the challenges on passenger safety, weight savings and reduction of CO2 emissions
3. ArcelorMittal answers to the automotive industry challenges

S-in motion® automotive steel solutions catalog

A long tradition of steel solution development
S-in motion® Next Gen AHSS & PHS
BIW Mass and material distribution

• One of the solutions developed using next generation of AHSS and PHS, validated in crash and global stiffness, has the following BIW material distribution:

BIW mass: 240 kg
-20 % vs. Baseline BIW

Usibor® 2000: 65.3 kg
Ductibor® 1000: 7.9 kg
MartInsite® 2000: 6.9 kg
Fortiform® 1180: 12.1 kg
Fortiform® 1050: 9.9 kg
Fortiform® 980: 7.6 kg
4. Local Availability of PHS

Vehicle production 2014:
- > 20 M veh
- > 15 M veh & < 20 M veh
- > 10 M veh & < 15 M veh
- > 5 M veh & < 10 M veh
- > 2.5 M veh & < 5 M veh
- > 1 M veh & < 2.5 M veh
- < 1 M veh

HDG capacity increase to produce Usibor®

<table>
<thead>
<tr>
<th>Product</th>
<th>Plant</th>
<th>Deadline of availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usibor® 1500 + AS (New added facilities since 2012)</td>
<td>CHINA (VAMA)</td>
<td>Available</td>
</tr>
<tr>
<td></td>
<td>BRAZIL (VEGA)</td>
<td>Q3/2015</td>
</tr>
<tr>
<td></td>
<td>EU (SAGUNTO)</td>
<td>Q1/2016</td>
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<tr>
<td></td>
<td>EU (DUDELANGE)</td>
<td>Available</td>
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<tr>
<td></td>
<td>EU (FLORANGE)</td>
<td>Available</td>
</tr>
<tr>
<td></td>
<td>NA (CALVERT)</td>
<td>Q1/2016</td>
</tr>
<tr>
<td>Ductibor® 500 + AS (laser welded blank in combination with Usibor® 1500 + AS only)</td>
<td>CHINA (VAMA ATS)</td>
<td>VAMA ATS (JV w/ Gonvarri) ROLL OUT IN 2016</td>
</tr>
<tr>
<td></td>
<td>BRAZIL (AMTB PROJECT)</td>
<td>AMTB PROJECT IS Q4/2016</td>
</tr>
<tr>
<td></td>
<td>NA (AMTB NA)</td>
<td>Available</td>
</tr>
</tbody>
</table>
5. GONVVAMA:
VAMA will offer a full range of steel processing services and through its extensive network of self-owned high end centers and strategic SSC partners all over China

VAMA GONVARRI AASS Advanced Automotive Steel Solutions

- 4 Advanced Technologies & Solutions (AASS) centers at locations – Shenyang, Shanghai West, Chongqing, and Loudi
- Best in class shape blanking and laser welding processing lines employing ArcelorMittal’s proprietary technologies and knowhow for automotive steel
- Focus on shape blanks for exposed panels and TWBs for hot stamping and AHSS/VHSS applications for structural safety parts

Classical processing at strategic SSC partners

- High performance slitting and cut-to-length (rectangular cutting) lines at strategic SSC partners
- ISO TS certificated, responding to demanding technical and services requests regular audits,
- IT connections with VAMA SAP
- Specific HR resources dedicated to the best quality of services

Advanced storage and logistics services

- Coil management
- JIT
- Quality control
- Full traceability
VAMA downstream network covering all clusters in JIT, classical processing until high end products
With such a network VAMA will be able to provide the best quality of product and services for all types of customers.

VAMA downstream organization covering all clusters

GONVAMA/Gonvarri partnership
VAMA Manufacturing Facility (Loudi)
VAMA Sales Offices
VAMA SSC partners

SOP Loudi Q2 2016
SOP Kunshan Q1 2017
SOP Chongqing Q1 2017
SOP Shenyang Q2 2017
Dongguan already operational in Blanking
LWB for Hot stamping:
Welding process and benefits

- Traditional LWB market has been focusing on cost reductions
- Next generation products focus on weight & energy management
  - Improved crash management
  - Reduced vehicle weight

Very high mass savings (>20%) were achieved thanks to the use of Laser Welded Blank hot-stamped solutions on key structural parts
We sell more than parts: solutions and services

technical support offer

- We are able to identify potential improvements according to customers priorities (cost, mass, performance)

Body-in-white reviews

- We offer a dedicated tool that takes into account the particular formability of the weld and its environment

Formability study of LWB parts

- Our specialists will develop optimal nesting of parts to maximize material savings

Nesting

- We ensure the full supply chain from coil supply (secured from ArcelorMittal) to JIT delivery to OEM and stampers

Integrated Supply Chain
6. Conclusions

• VAMA has successfully started the production of Ultra High Strength Steel grades such as **Usibor1500, DP600 and DP780** offering the Chinese car industry answers to the challenges they face to make their cars greener, lighter and safer.

• VAMA will develop **Ductibor®** steelgrades to offer even more advance steel solutions such as hot stamped laser welded blanks through its joint venture with Gonvarri.

• VAMA as a joint venture of ArcelorMittal has access to ArcelorMittal new product development such as **Fortiform®** and has the technology on its lines to produce these 3rd generation of steelgrades.