SMMT Open Forum – The Supplier’s View
Perspectives from Tata Steel Europe
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Product Market Manager
Tata Steel
Introduction to Tata Steel Europe

- Tata Steel is Europe’s 2\textsuperscript{nd} largest steelmaker & only UK-based steelmaker
- Tata Steel Automotive Facilities
  - Flat products: IJmuiden (NL) & Llanwern / Port Talbot (UK)
  - Long products: Rotherham, (UK)
  - Auto Steel Service Centres: Gelsenkirchen (Ger), Wednesfield (UK), Paris (F), Maastricht (NL)
  - Automotive Tubes: Zwijndrecht (NL)
- Tata Steel Automotive Products
  - Hot Dipped Coated for BIW
  - Cold Rolled for BIW, Seating & Interior
  - Hot Rolled for Chassis & Suspension, Seating & Interior
  - Engineering Steels for Powertrain
- Tata Steel Automotive Customers
  - OEM, Tier1, Supply Chain – Pressworkers, Fabricators, Forgers, Distribution Centres
  - Currently supply Europe & North America
Automotive Market Trends

• Vehicle production worldwide is growing fast – but not in Europe
  • Growth in steel consumption is limited in Europe

• Key trends and drivers
  • “Costs” drives Consolidation
    – Economy of Scale critical to OEM success: FIAT take over Chrysler, collaborations for purchasing (RN-Daimler) & development (engines: BMW-PSA)
    – Tata Steel need to adapt to consolidation, support reduction of ‘Total Cost of Ownership’
  • “Green” drives Legislation
    – Increased demand for advanced steels, Aluminium replacing steel in outer panels & CFRP applications becoming affordable?
    – Tata Steel need advanced products for improved mechanical performance, new lightweight solutions e.g. Tata Steel support of WorldAutoSteel ‘Future Steel Vehicle’ for Low Carbon Vehicles (LCV)
  • “Growth” drives Globalisation
    – Increased demand for global availability of advanced steels & influence of new (Chinese) automotive OEM & steelmaker entrants
    – Tata Steel needs to provide global availability of advanced products (EU, Americas, India, China)
Supply Chain – Current Position

• Recent SMMT ‘Meet the Buyer’ feedback
  • Generally positive about UK Automotive industry, Tata Steel presence
    – Tata Steel is in a unique position to help UK supply chain take advantage of UK ‘in-sourcing’ initiatives by SMMT & UK OEMs
  • Steelmaker & OEM ‘duty of care’ for UK supply chain criticised
Supply chain imbalanced with significant pressure from all aspects of the supplier base

Steelmakers squeezed by raw material, energy & shipping costs - pass on increased steel prices to supply chain

OEMs under market & regulatory pressure to improve performance – impose price / cost squeeze on supply chain
Supply Chain – Vision for Future

Material Supplier | Sub-Tiers | Major Tiers | OEMs
---|---|---|---
Tier X | Tier X | Tier X | Tier X
Tier X | Tier X | Tier X | Tier X
Tier X | Tier X | Tier X | Tier X
Tier X | Tier X | Tier X | Tier X
Tier X | Tier X | Tier X | Tier X
Tier X | Tier X | Tier X | Tier X

Steel & OEM collaboration to achieve equilibrium in Supply Chain

- Agree ‘standard’ steel grades for cost-effective performance improvement - with ‘up front’ homologation for ‘supply chain readiness’
- Implement steel ‘resale programmes’ – OEM pays supplier for processing steel
- Provide support to supply chain to reduce ‘Total Cost of Ownership’
Supply Chain – Vision for Future

Material Supplier

Sub-Tiers

Tier X Tier X Tier X
Tier X Tier X Tier X
Tier X Tier X Tier X
Tier X Tier X Tier X
Tier X Tier X Tier X

Major Tiers

Major Sub-Tiers

OEMs

Full transparency of each major supply chain

TATA STEEL
Achieving this vision
Reducing Supply Chain ‘Total Cost of Ownership’

• Role of OEM
  • Supplier pre-nomination to avoid time & cost of competitive bidding
  • Early Vendor Involvement to incorporate supplier capability / limitations
  • Product Specification beyond ‘make to print’ design – access to OEM simulation models / tools, ‘open book’ cost estimation, ‘up front’ VA/VE for cost / weight **with shared benefits**
  • Supply Chain Management & Support – during product development, launch & volume ramp-up, volume production, end of life – accurate OEM production forecast / schedule to smooth demand - minimise product & inventory, quality & rework, logistics & delivery costs

• Role of Supply Chain
  • Willingness to collaborate with OEM & steelmaker for TCO
  • Acknowledge need for / acceptance of support from OEM & steelmaker - ‘help is not a threat’
  • Openness & Transparency – support ‘open book’ costing, ‘up front’ VA/VE, production availability / capacity
Achieving this vision
Reducing Supply Chain ‘Total Cost of Ownership’

• Role of Steelmaker
  • Cost-effective material selection for: performance requirements, manufacturing & assembly processes, enhanced sustainability
  • Steel Product Specification beyond ‘data sheet’ – access to materials simulation data / tools, ‘up front’ materials VA/VE to optimise steel specs with shared benefits
  • Supply Chain Management & Support – material traceability, service centre steel stockholding & downstream processing for assured quality, improved logistics & delivery performance
  • Manufacturing & assembly process support in press-shop and assembly line
Our mission & ambition

Connected performance
Tata Steel Initiatives

• New Operating Model & Organisation
  • Sector-based organisation – a single face to our automotive customers, driving R&D for product innovation and manufacturing for cost leadership

• Advanced Products
  • Improved AHSS – high strength with formability - HDG for BIW, CR for Seating, HR for Chassis
  • Innovative Coatings – Magizinc Auto for improved corrosion protection
  • Improved Processing – Boron ZnX coated press hardened steel

• Connected Performance
  • Material data – e.g. Aurora on-line materials database
  • Materials simulation & test – e.g. formability, energy absorption, fatigue, fracture
  • In-service performance – e.g. crash, durability, corrosion
  • Manufacturing – e.g. pressing, spot & Laser welding
Tata Steel - Automotive Sales & Marketing
- Providing a single face to our automotive customers

OEM – Tier Customers

- Bodystructure
- Seats & Interior
- Powertrain
- Chassis & Suspension

Automotive Sector

- Strip UK Hub (e.g. PT/Llanwern)
- Strip MLE Hub (e.g. IJmuiden/Segal)
- Long Products Hub (e.g. Engineering Steels)
- Distribution (e.g. Wednesfield)
Tata Steel - Automotive Sales & Marketing
- ‘Connected Performance’

- Selection of Advanced Automotive Steels:
  offering

  Best steel based solutions

- Quality & consistency in Advanced Automotive Steels:
  offering

  Reducing Total Cost of Ownership

- Cost leadership in Advanced Automotive Steels:
  offering

  Most value in use
Our Offering

Connected performance
Tata Steel - Automotive Sales & Marketing
- What is Total Cost of Ownership?

**TCO is a process to quantify the benefit of advanced steel application**

**Baseline Performance**
- Understand baseline performance characteristics:
  - Mass
  - Cost
  - Performance requirements

**Material Selection**
- Deploy suitable advanced steel products:
  - Maintain performance
  - At lowest mass
  - Basic manufacturing feasibility assessed

**Manufacturing Analysis**
- Understand manufacturing robustness of advanced products:
  - Formability
  - Joining
  - Assembly

**Detailed Cost Study**
- Perform detailed cost analysis from steel to final assembly:
  - Material cost
  - Tooling cost
  - Production cost
  - Assembly cost

TCO
- Performance
- Weight Save
- Cost
- Robustness
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Example TCO: DP800HyPerform in BIW

**Aim:** DP800HyPerform+Z is a galvanised AHSS suitable for crash structures requiring high strength and formability

**Methodology:** Working in close collaboration with OEM and Tier1 chassis supplier to replace current DP600 sill with DP800HyPerform at estimated 10% lower gauge to save weight, maintain performance without added cost

<table>
<thead>
<tr>
<th>Product</th>
<th>Test direction</th>
<th>Rp (MPa)</th>
<th>Rm (MPa)</th>
<th>n (10-Ag)</th>
<th>A80 (%)</th>
<th>r-value</th>
<th>BH2</th>
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<tbody>
<tr>
<td>DP800HpF-GI</td>
<td>long.</td>
<td>450-550</td>
<td>780-900</td>
<td>0,14</td>
<td>17</td>
<td>0,5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>trans.</td>
<td>450-550</td>
<td>780-900</td>
<td>0,14</td>
<td>17</td>
<td>0,5</td>
<td>35</td>
</tr>
<tr>
<td>DP800-GI</td>
<td>trans.</td>
<td>450-560</td>
<td>780min</td>
<td>-</td>
<td>14</td>
<td>-</td>
<td>30</td>
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<tr>
<td>TRIP800-EZ</td>
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<td>470-600</td>
<td>780min</td>
<td>0,16</td>
<td>21</td>
<td>-</td>
<td>40</td>
</tr>
<tr>
<td>DP600-Gi</td>
<td>trans.</td>
<td>340-420</td>
<td>600min</td>
<td>0,14</td>
<td>20</td>
<td>-</td>
<td>30</td>
</tr>
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</table>

**Mass Reduction 10%**

**Mass Saving 0.7kg (per vehicle)**

**Cost Premium 0 EUR/kg**

**Performance:** Match performance of sill structure with optimised lower gauge combinations for the DP grades

**Manufacturing:** Improved press-shop efficiency compared to standard DP800 applications with poor press performance
**Aim:** Apply Magizinc coating for improved corrosion performance  

**Methodology:** Press trials using Magizinc for forming performance, salt bath and vehicle test for corrosion performance  

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**Improved corrosion performance**  

**Mass Saving up to 1.1kg (per vehicle)**  

**Cost reduction 2-30 EUR/vehicle (depending on application)**  

**Performance:** Maintain active corrosion performance at lighter coating weight; improved formability resulting from reduced galling  

**Manufacturing:** Reduction in galling helping to reduce issues in tool cleanliness and tool maintenance
**Aim:** Apply CR DP products to replace uncoated HSS material for cost-effective light-weighting

**Methodology:** Leverage strength increase boost from work-hardening Dual-Phase material within stamped component

<table>
<thead>
<tr>
<th>Part Name</th>
<th>HSS Baseline Material</th>
<th>CR DP Modified Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH Seat Upr Frame</td>
<td>zste340 1.20 mm</td>
<td>HCT780X 1.00 mm</td>
</tr>
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<td>LH Seat Upr Frame</td>
<td>zste340 1.20 mm</td>
<td>HCT780X 1.00 mm</td>
</tr>
<tr>
<td>LH Seat Lever Long</td>
<td>qste500 2.00 mm</td>
<td>HCT600X 1.75 mm</td>
</tr>
<tr>
<td>RH Seat Lever Long</td>
<td>qste500 2.00 mm</td>
<td>HCT600X 1.75 mm</td>
</tr>
</tbody>
</table>

**Performance:** Match performance of the seat structure but at optimised lower gauge combinations for the DP grades

**Manufacturing:** Ensure manufacturing & assembly robustness of replacement grades and calculate through process costs

Mass Reduction 15%
Mass Saving 0.7kg (per vehicle)
Cost Premium 0.7 EUR/kg
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Example TCO: Dual-Phase in Suspension

**Aim:** Evaluate lower control arm to replace HSS with AHSS to understand the weight-save opportunity

**Methodology:** Using the latest F2S (forming to strength) technique to take advantage of the work-hardening of DP material - replacing XF350 / 400 with HR DP600

- Mass Reduction 17%
- Mass Saving 1.9kg (per vehicle)
- Cost Saving 1.3 EUR/vehicle

**Performance:** Equivalent fatigue and formability to HSS

**Manufacturing:** Ensure manufacturing & assembly robustness of replacement grades and calculate through process costs
Aim: Achieve weight saving through replacement of current material with advanced high strength fracture split grade

Methodology: Using FEA to quantify lightweighting potential through section reductions using high strength material

Performance: Equivalent fatigue factor of safety (FoS)

Manufacturing: calculate through process costs with benefits from
- improved machinability
- air-cooling to reduce energy & improve sustainability
- fracture split for assembly

Mass Reduction 15%

Mass Saving 0.16kg (per engine)

Cost Saving TBD
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Example LCV Innovation: EV Driveline solutions

**Aim:** Apply high performance gear, bearing and shaft steels to enhance performance and manufacturability of EV driveline components

**Methodology:** VA/VE to review material specification of current design, rationale for material selections and promote wide range of advanced grades to optimise performance / weight / size

Manufacturing process review to identify cost optimised volume production routes

**Performance:** Target is to optimise performance, manufacturability & cost whilst extending the range of applications from e.g. D class car to Commercial Vehicles

**Manufacturing:** Evaluate best in world low to medium volume manufacturing processes e.g. forging vs. hot extrusion vs. cast & machining / heat treatment and identify material implications to maximise manufacturing volumes and reduce overall costs (minimise scrap)

**Increased application range**

No. of vehicles 2000 – 10000+

Cost saving > 50%
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Example LCV Innovation: Manufacturing EV Motors

**Aim:** Identify implications of different manufacturing processes on the electromagnetic performance of electrical steels

**Methodology:** Complete detailed testing and analysis of material properties after each stage of traction motor production route. Identify process stages that degrade properties and potential mitigation through process development or alternative electrical steel grades

**Performance:** Ensure that published properties represent in-service performance for EV motor designers to optimise designs for size, weight & cost

**Manufacturing:** Evaluate standard processing routes, identify potential process development and propose optimised manufacturing/materials combinations
Summary & Conclusion

• Tata Steel is Europe’s 2nd largest steelmaker & only UK-based steelmaker

• Tata Steel understand current UK automotive supply chain pressures and have ‘Vision for Future’

• Tata Steel have automotive sector-based strategy, organisation & operations

• Tata Steel would like to collaborate with UK OEMs to achieve equilibrium in UK supply chain

• Total Cost of Ownership applies to all in UK supply chain, Innovation is key to our future

• Tata Steel is prepared for Low Carbon Vehicle – steels for lightweight vehicle structures, EV driveline & motors

• Tata Steel is in a unique position to help UK supply chain take advantage of UK ‘in-sourcing’ initiatives by SMMT & UK OEMs