THE CAR INDUSTRY IS BEING DISRUPTED BY FOUR MEGATRENDS

**Electrification**
The non-negotiable future

The world will become significantly more **electrified**. Electrified powertrains will increase, **diesels will decrease** due to uncertainty about regulation and residual value.

**Connectivity & Digitalisation**
Key enablers for new business models

All cars become **connected** due to regulations and demand from customers. Digitalisation **enables a direct-to-consumer industry**. **Services** will be key differentiators.

**Autonomous Driving**
Focus on safety

Car manufacturers focus on autopilot feature for highways and traffic jams. Tech companies, with car manufacturers' support, launch autonomous robotaxis.

**Shared Mobility**
Addressing new customer segments

Shared mobility technology will **connect people** in need of a ride with drivers or shared cars.

New business models

- Care by Volvo
- Polestar (50%)
- **LINK & CO** (30%)
- ZENUIT (50%)
Challenges - Manufacturing flexibility

- Complexity increase – efficient production
- Volume shift over time
- Make or Buy new parts
- Equipment re-use

Different parts/products
Unique to ICE: ca 6-700
Unique to PHEV: ca 1-200
Unique to BEV: ca 6-700

Different battery packs
Layout of battery, modules and cells to meet competitive future

1-3 engines / car depending on car specification – planning complexity

Different carbodys
- Major changes in load distribution
- Charge lid vs fuel lid
- HEV and BEV are 2 different floor and side structures
Key focus areas
Marries information, technology and HUMAN INGENUITY

Performance

LEAN FOCUS
Catch up the leaders in Operational Excellence

PP20

Vision
Become Best in Class in Manufacturing

Connected Plant
Digital Twin
Operator 4.0
What is Smart Factory/ANALYTIC framework?

Create deeper insights through data interoperability and information transparency to enable democratize data driven decisions to reach world class Manufacturing & Supply Chain performance.

<table>
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<tr>
<th>Interoperability</th>
<th>Open <strong>standard</strong> for communication</th>
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<td>(Information) Transparency</td>
<td>Data <strong>virtualization</strong> of the physical world</td>
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<td>Technical Assistance</td>
<td>Remote engineering &amp; information based decisions</td>
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<td>Decentralized Decision</td>
<td><strong>Autonomous</strong> systems and teams</td>
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Operator 4.0

**What**

- Super-Strength Operator
- Augmented Operator
- Virtual Operator
- Healthy Operator
- Smarter Operator
- Collaborative Operator
- Social Operator
- Analytical Operator

**Why**

- Empower the shop, bring knowledge to the shop floor
- Use technology to augment humans to improve performance, autonomy and sustainability of the work
- Making the Smart Factory technology usable for the many
- Use human ingenuity and creativity in combination with technology