ABB in Motors and Generators
Overview – Technology Platform
ABB Motors and Generators
Facts and Figures

- World’s leading manufacturer of LV, MV and HV motors and generators, and mechanical power transmission products serving all industries and applications, on all markets
- +4 BU SD revenue
- 15 000 people, 45 factories in 13 countries
- Complete product offering from sub-fractional HP up to 70 MW
  - LV, MV and HV induction motors and generators
  - Synchronous and permanent magnet motors and generators
  - DC motors, servomotors, gear motors
  - Mechanical power transmission products
- About 300 000 motors in 6 central stocks globally

Source: ABB Motors and Generators
### Product Offering Worldwide

Complete Technology Platforms

<table>
<thead>
<tr>
<th>Total offering</th>
<th>ABB</th>
<th>Baldor</th>
<th>ABB + Baldor</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEMA LV</td>
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<tr>
<td>IEC LV</td>
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<tr>
<td>Large &lt; 11000 kW, 15000 hp</td>
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<tr>
<td>Large &gt; 11000 kW, 15000 hp</td>
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<td>Gear</td>
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<tr>
<td>Small generators</td>
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<tr>
<td>Large generators</td>
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<tr>
<td>Mechanical power transmission</td>
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<tr>
<td>Service</td>
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</tbody>
</table>

- Asynchronous motors
- Synchronous motor (PM and reluctance)
- Field-wound synchronous machines
- Synchronous and induction generators
- Servo motors (including linear motors)

Source: ABB Motors and Generators
MW Range Wind Power Generators
Full Ranges of Concepts

<table>
<thead>
<tr>
<th>Output power</th>
<th>Induction</th>
<th>Synchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kW – 2 MW</td>
<td>Fixed speed</td>
<td>Low speed permanent magnet</td>
</tr>
<tr>
<td>500 kW – 6 MW</td>
<td>Doubly-fed, semi-variable speed</td>
<td>Medium speed permanent magnet</td>
</tr>
<tr>
<td>20 kW – 7 MW</td>
<td>Full variable speed</td>
<td>High speed permanent magnet</td>
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<tr>
<td>100 kW – 7 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 7 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 kW – 7 MW</td>
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<tr>
<td>0 – 7 MW</td>
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</tbody>
</table>

Source: ABB Motors and Generators
Large Synchronous Machines in Mining
18.6 MW Gearless Mill Drives (GMD)

Esperanza copper-gold mine, located in Antofagasta in the northern part of Chile, at 2300 meters above sea level (Antofagasta Minerals S.A.)

Source: ABB Mining
Very High Voltage and High Power Motors
Motorformer (both DOL and VSD)

Y1998-2000: Basic development of Motorformer™ technology

Y2001: First DOL Motorformer™ delivered to Air Separation Plant, Sweden

Y2005: First VSD Motorformer™ for O&G-business

Y2011: ABB wins new order: VSD Motorformer™ & HVDC -Light

Y2000-2001: Refinement and Prototyping of DOL Motorformer™ concept

Y2002-2004: Development of VSD and HVDC Light Motorformer™ concept

Y2008: Further deliveries of Motorformer™ for O&G applications

Source: ABB Motors and Generators
MV and High Power Drive Train Technology in Marine Azipod Propulsion System

Source: ABB Marine
Summary
Perspectives on HMW Electrical Machines for VSDs

- Application driven
  - Requirements
- Power density
  - Compactness or overall footprint
- Integrated approach (motor and drive integration)
  - Ultra high power density
  - Package solution (high compatibility)
- “Performance” optimization (?) vs Overall Cost
  - Overall efficiency
- Reliability and
- End-customer benefits
- …
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