CONVERTEAM AT A GLANCE

- Converteam – an engineering company with more than 100 years experience providing customized solutions

- These solutions are made of systems built around 3 core components:
  - Rotating Machines
  - Variable Speed Drives
  - Process automation & control

- We address 4 major markets:
  - Marine
  - Oil & Gas
  - Energy
  - Industry

- Our scope covers consulting, design, manufacturing, system integration, installation, commissioning and a broad range of services
In Oil & Gas, scope of supply corresponds to electrical systems which drive compressors or pumps … … and correspond to power supply of O&G process …
Gas compression: Electrical Solutions

Efficiency

1. TX
2. Variable speed drive
3. Electrical motor
4. Compressor

Efficiency

1. TX
2. Variable speed drive
3. Sinusoidal Filter
4. High Speed
5. Compressor

Efficiency

1. TX
2. Variable speed drive
3. dV/dt Filter
4. Very High Speed
5. Compressor
# Converteam MV 7000 Systems

<table>
<thead>
<tr>
<th>VARIABLE SPEED DRIVE SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>MV7000</td>
</tr>
<tr>
<td>SD7000</td>
</tr>
</tbody>
</table>
# MV Drives Topology Comparison

<table>
<thead>
<tr>
<th>Topology</th>
<th>2-Level inverter</th>
<th>3-level NPC</th>
<th>3-Level NPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performances</td>
<td></td>
<td></td>
<td>Advanced</td>
</tr>
<tr>
<td>Output voltage &amp; current</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td></td>
<td>Switching frequency x 2</td>
<td>50% reduction of current ripple</td>
<td></td>
</tr>
<tr>
<td>Applicable to</td>
<td>LV drives</td>
<td>MV drives</td>
<td>MV drives</td>
</tr>
<tr>
<td>Drive series</td>
<td>MV3000 – MD2000 – LV7000</td>
<td>MV 7000</td>
<td>MV drives next generation</td>
</tr>
<tr>
<td>Power</td>
<td>Up to 3 MW</td>
<td>up to 32 MW</td>
<td>up to 46 MW</td>
</tr>
<tr>
<td>Voltage</td>
<td>690 V</td>
<td>3.3 - 6.6 kV</td>
<td>3.3 - 6.6 kV</td>
</tr>
<tr>
<td>Current in motor</td>
<td>3140 A rms</td>
<td>2800 A rms</td>
<td>4025 A rms</td>
</tr>
</tbody>
</table>
**MV7000 VFD Range**

<table>
<thead>
<tr>
<th>MV7000 Range</th>
<th>Voltage</th>
<th>Power (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV7306</td>
<td>3300</td>
<td>6</td>
</tr>
<tr>
<td>MV7308</td>
<td>3300</td>
<td>8</td>
</tr>
<tr>
<td>MV7312</td>
<td>3300</td>
<td>12</td>
</tr>
<tr>
<td>MV7316</td>
<td>3300</td>
<td>16</td>
</tr>
<tr>
<td>MV7403FP (air-cooled)</td>
<td>4160</td>
<td>3</td>
</tr>
<tr>
<td>MV7406FP (air-cooled)</td>
<td>4160</td>
<td>6</td>
</tr>
<tr>
<td>MV7612</td>
<td>6600</td>
<td>12</td>
</tr>
<tr>
<td>MV7616</td>
<td>6600</td>
<td>16</td>
</tr>
<tr>
<td>MV7624</td>
<td>6600</td>
<td>24</td>
</tr>
<tr>
<td>MV7632</td>
<td>6600</td>
<td>32</td>
</tr>
</tbody>
</table>

**Main features of the drive system:**

Uses a PWM inverter for the motor and one of the following front ends:

- 12 pulses diode front end (option- Active front end)
- 24 pulses diode front end (option- Active front end)

**A family of drives up to 32 MW**
MV7306

Controller PEC

Diode stack

IGBT phase power stack

DC grounding switch

DC capacitors

Terminals to motor

Terminals Bottom

Cooling unit with standby pump

MV7000 Today’s Technology
Inverter - phase leg: the heart of the converter

- 4 gate drivers (2 fiber optics per gate driver)
- 4 isolating DC/DC converter boards for gate driver supply
- 2 press pack diodes
- 4 press pack IGBTs (with integrated freewheeling diode)
MV7000  Up to date technology

• Soft start-up without grid disturbance

• MV7000 provides low inrush current when energising the drive

• Pre-magnetising of the input transformer is achieved by means of auxiliary transformer.

• Closing of main circuit breaker is completed without incoming bus disturbances
Active Front End

Fault Det.

Inv

CNV

MCB can only be closed by drive controls

Pre-charge

M 4kV

MCB

3

4.16kV

CUSTOMIZED TECHNOLOGY FOR CUSTOMER SUCCESS
Figure 5. Converteam HTLC Starter

4160V INPUT
LINE

4160V OUTPUT
TO MOTOR SWITCHGEAR

MV 3000

SYNCHRONIZING
SYSTEM

CUSTOMER START
COMMAND

CONTROL
SYSTEM

PT

PT

MOTOR SWITCHGEAR
COMMAND
Figure 6. Typical Switchgear for HTLC Starter

- 4160V LINE
- STANDARD 4160V FIXED OR DRAWOUT STARTERS
- ETC.
- INTERLOCK CONTROLS
- HTLC
- M1
- M2
Figure 4. HTLC Compressor Starting

![Graph showing Torque and Line Amps versus Percent Speed.]

- **Torque**
- **Line Amps**
Induction motor technology

Power rate (MW)

- BC 3: NGV
- BC 2: MGV
- BC 5: DONGES
- BC 4: UNIPAK

Up to 18,000 RPM with Magnetic Bearing Technology
Thank you for your attention

www.converteam.com