Extension of the Current Three Level Research Inverter to a Five Level Research Inverter

Research Internship by Florian Bauer,
Matriculation Number: ********,
supervised by Dipl.-Ing. Peter Stolze
DC link

one phase

+100 %

+75 %

+50 %

+25 %

-25 %

-50 %

-75 %

-100 %

1 Five Level Flying Capacitor Inverter and Five Level Nested Neutral Point Clamped Inverter
Five Level Flying Capacitor Inverter and Five Level Nested Neutral Point Clamped Inverter
Pentium PC with real time Linux current & speed controller

ISA-BUS switching states

FPGA safety functions, IGBT dead times

optical gate signals

inverter phases

2 System Overview
Current Three Level Inverter
3 Current Three Level Inverter
3 Current Three Level Inverter
3 Current Three Level Inverter
3 Current Three Level Inverter
3 Current Three Level Inverter
1. RJ45/RS485 based communication
1. RJ45/RS485 based communication
2. Power supply simplifications
1. RJ45/RS485 based communication
2. Power supply simplifications
3. Low inductance DC link connection
3. Low inductance DC link connection

4 General Design Changes
IGBT module (bottom side)

inverter board

5 New Five Level Inverter Design
5 New Five Level Inverter Design
5 New Five Level Inverter Design
connector board

inverter board

5 New Five Level Inverter Design
5 New Five Level Inverter Design
5  New Five Level Inverter Design
5 New Five Level Inverter Design
6 Five Level Flying Capacitor PCB Layouts
6  Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
5 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
6 Five Level Flying Capacitor PCB Layouts
<table>
<thead>
<tr>
<th>PCB</th>
<th>Quantity</th>
<th>Total Price in €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Board</td>
<td>100</td>
<td>167.00</td>
</tr>
<tr>
<td>Flying Capacitor Inverter Board</td>
<td>10</td>
<td>143.30</td>
</tr>
<tr>
<td>Flying Capacitor Connector Board</td>
<td>10</td>
<td>145.30</td>
</tr>
<tr>
<td>Nested Neutral Point Clamped Inverter Board</td>
<td>10</td>
<td>136.90</td>
</tr>
<tr>
<td>Nested Neutral Point Clamped Connector Board</td>
<td>10</td>
<td>154.10</td>
</tr>
<tr>
<td>∑ 746.60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>