I Know What You Did Last Shift
What a Smart Battery Charger in a Class III Lift Truck Can Tell You

Presented by:
Conway Hui, P.Eng
Delta-Q Technologies
Conway Hui, P.Eng.
Sales Application Manager
Delta-Q Technologies Corp
WHAT YOU WILL LEARN

▪ What the data from a charger can tell you about an electric machine

▪ How to extract the charging data

▪ How to use the charger and battery data knowledge to your company’s benefit
CLOUD-CONNECTION AND TELEMATICS ISN’T THE FUTURE. IT IS TODAY:
CHARGER DATA TODAY

- Prevent Costly Repair/Service Calls
- Enforce Warranty / Claims
- Enhance User Interface / Experience
THREE CHARGER STORIES
ABOUT THE DATA

- **ON CHARGE:**
  - Continuous time, current, voltage, etc,

- **OFF CHARGE:**
  - Hourly voltage

*** NO REAL TIME CLOCK!
CHARGER 1: “MOE”
Good, Regular Use!
“MOE” is doing fine

Costly service call prevented!
CHARGER 2: “EDNA”
Needs Attention!
“EDNA” gets a flag

User could be notified to adjust use.
CHARGER 3: “PAT”
Bad Behaviour!
“PAT” needed a voice

Warranty Enforced!
WOW!

Now how do I get that charger data out?
<table>
<thead>
<tr>
<th>Serial Number</th>
<th>SW Version</th>
<th>Active Algorithm</th>
<th>Faults</th>
<th>Alarms</th>
<th>Lifetime Amp-Hr Returned</th>
<th>Lifetime Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>DQSB361305100138</td>
<td>0.6.0.8</td>
<td>42</td>
<td>No</td>
<td>Yes</td>
<td>408.5</td>
<td>131082</td>
</tr>
<tr>
<td>DQSB361306100163</td>
<td>1.1.0.8</td>
<td>28</td>
<td>No</td>
<td>Yes</td>
<td>967206</td>
<td>131346</td>
</tr>
<tr>
<td>DQTD361349101593</td>
<td>1.1.1.4.8</td>
<td>7</td>
<td>No</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DQTD361349101612</td>
<td>1.1.1.4.8</td>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DQTD361349101616</td>
<td>1.1.1.4.8</td>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DQTD361349101682</td>
<td>1.1.1.4.8</td>
<td>45</td>
<td>No</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DQUD241401101353</td>
<td>2.0.0.8</td>
<td>198</td>
<td>No</td>
<td>Yes</td>
<td>965.5</td>
<td>13</td>
</tr>
<tr>
<td>DQUD241409101007</td>
<td>1.1.0.8</td>
<td>26</td>
<td>No</td>
<td>Yes</td>
<td>901.1</td>
<td>7</td>
</tr>
<tr>
<td>DQUD241421100219</td>
<td>1.1.0.8</td>
<td>26</td>
<td>No</td>
<td>Yes</td>
<td>564.2</td>
<td>6</td>
</tr>
<tr>
<td>DQUD241616100996</td>
<td>4.3.8.8</td>
<td>413</td>
<td>No</td>
<td>Yes</td>
<td>344.2</td>
<td>2</td>
</tr>
<tr>
<td>DQUB241326100156</td>
<td>1.1.0.8</td>
<td>62</td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IC DATA ANALYSIS

IC Programmer and Data Analysis Tool: Version 1.3.0

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>SW Version</th>
<th>Algo ID</th>
<th>Algo Version</th>
<th>Faults in Cycle ID</th>
<th>Alarms in Cycle ID</th>
<th>Temp. Derate in Cycle</th>
<th>Cumulative Amp-Hr Returned</th>
<th>Cumulative Intermittent Charges</th>
<th>Cumulative Equalization Charges</th>
<th>Cumulative Total Number of Charges</th>
<th>Average Time Between Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>DQTD241505101120</td>
<td>4.5.1.8</td>
<td>.79</td>
<td>1.40</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>9823.4</td>
<td>11</td>
<td>0</td>
<td>459</td>
<td>372.97</td>
</tr>
<tr>
<td>DQTD241533100051</td>
<td>4.5.1.8</td>
<td>.47</td>
<td>1.16</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>14932.5</td>
<td>333</td>
<td>0</td>
<td>1144</td>
<td>57.47</td>
</tr>
<tr>
<td>DQTD241533100158</td>
<td>4.5.1.8</td>
<td>.47</td>
<td>1.16</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3640.1</td>
<td>168</td>
<td>0</td>
<td>487</td>
<td>5.76</td>
</tr>
</tbody>
</table>

Tally

- Amp-Hours
- Duration
- Battery Temp Max
- Use Case

Cycle View

MHI

FIND YOUR WOW
CAN - THE CONNECTED CHARGER
CANopen & J1939
Telematics Path

OEM HQ

The Internet

Machine / Vehicle Telematics

Delta-Q HQ

Delta-Q Charger
Summary

Chargers with Data Enable:

- Telematics / Fleet Management
- Service and Warranty Support
- Overall User Experience Improvement
Please Listen To Your Charger!
THANK YOU
For More Information

Email: info@delta-q.com
Website: www.delta-q.com.com

Visit ProMat Booth S5253