„Spectrum of Modern Fuze Batteries“

60\textsuperscript{th} Annual Fuze Conference
May 11\textsuperscript{th}, 2017
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Diehl & Eagle Picher GmbH
Overview

- Primary Design Features of Fuze/ Reserve Batteries
- Assembly and Function
- Large Caliber Reserve Batteries for Artillery and Navy
- Medium Caliber miniaturized Reserve Batteries
- Overview and samples in production
- Conclusions
Reserve Battery Design

- **Primary Design Features of all Reserve Batteries**
  - Lithium Metal Battery
  - Lithium Thionylchloride electrolyte (LiSOCl₂)
  - glass ampoule
  - release mechanism/activation mechanism
  - metal to glass seal
  - hermetically sealed stainless steel case
  - 100 % helium leak test
Large Caliber Group Reserve Batteries
Cross-sectional View Large Caliber Battery
Battery for a Modular Construction System

Main components for a Reserve Battery
Variety for the Modular Construction System

Cells

Ampoules

Activation Mechanism
### Battery as a Modular Construction System

#### Cells

- **Battery Type**: DEP-14001
  - **Serial Cells**: 7
  - **Parallel Cells**: 0
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14012
  - **Serial Cells**: 8
  - **Parallel Cells**: 0
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14017
  - **Serial Cells**: 5
  - **Parallel Cells**: 2
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14015
  - **Serial Cells**: 9
  - **Parallel Cells**: 0
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14016
  - **Serial Cells**: 4
  - **Parallel Cells**: 2
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14018
  - **Serial Cells**: 3
  - **Parallel Cells**: 2
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14012
  - **Serial Cells**: 3
  - **Parallel Cells**: 0
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14020
  - **Serial Cells**: 2
  - **Parallel Cells**: 0
  - **AM**: 1,000g or 5,000g
- **Battery Type**: DEP-14021
  - **Serial Cells**: 1
  - **Parallel Cells**: 2
  - **AM**: 1,000g or 5,000g
Medium Caliber Group Reserve Battery
Variety for the Modular Construction System

Cells

Ampoules

Activation Mechanism
# Battery as a Modular Construction System

## Cells

### Activation Mechanism

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Serial Cells</th>
<th>Parallel Cells</th>
<th>AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP-14202.01</td>
<td>2</td>
<td>0</td>
<td>7,000g</td>
</tr>
<tr>
<td>DEP-14202.02</td>
<td>2</td>
<td>0</td>
<td>7,000g</td>
</tr>
<tr>
<td>DEP-14202.03</td>
<td>3</td>
<td>0</td>
<td>7,000g</td>
</tr>
<tr>
<td>DEP-14202.04</td>
<td>4</td>
<td>0</td>
<td>7,000g</td>
</tr>
</tbody>
</table>
Variety for the Modular Construction System

Cells

Ampoules

Activation Mechanism

Large 1,000 g
Medium 7,000 g
Small 2,500 / 5,000 g

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D&EP/NDIA 60 Fuze Conf 60th Annual Fuze Conference_Spectrum of Modern Fuze Batteries May 2017
# Battery as a Modular Construction System

![Cells](image1)

**Examples in production**

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Serial Cells</th>
<th>Parallel Cells</th>
<th>AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP-14103.01</td>
<td>1</td>
<td>0</td>
<td>7,000g</td>
</tr>
</tbody>
</table>

**Activation Mechanism**

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No/ Low Spin Version
Nothing is impossible


2. Ampoule

3. Cell

Cell Ø = 30 mm

Cell Ø = 17 mm

Cell Ø = 9 mm
Reserve Battery-Versions Overview

<table>
<thead>
<tr>
<th>“Large”</th>
<th>“Large”</th>
<th>“Midi”</th>
<th>“Mini”</th>
<th>“Ultra Mini”</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP14001</td>
<td>DEP14007/17/12</td>
<td>DEP14020/21</td>
<td>DEP14202</td>
<td>DEP14103</td>
</tr>
<tr>
<td>1 – 10 cells</td>
<td>1 – 10 cells</td>
<td>1 – 2 cells</td>
<td>1 – 2 cells</td>
<td>1 cell</td>
</tr>
<tr>
<td>7 cells</td>
<td>8 cells</td>
<td>2 cells</td>
<td>2 cells</td>
<td>1 cell</td>
</tr>
<tr>
<td>25.2 V</td>
<td>28.8 V</td>
<td>7.2 V</td>
<td>7.2 V</td>
<td>3.6 V</td>
</tr>
</tbody>
</table>
Future developments

- 1-cell battery for high spin application

- Development on super quick in barrel activation batteries for artillery and naval versions

- Development of limited capacity for batteries, to be used in applications where de-energizing is requested for failure mode
Conclusion

- Most batteries in the past were designed only for one application in mind and were used by as many customers.

- Due to a modular construction of the subsystems a battery could be designed for almost all applications and will cover your requirements.

- In lab-testing for the batteries is available in short time, see next session.
Thank you for your attention!

Questions?
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