Impact of Additive Manufacturing on Gas Turbines

Dr. Richard Grylls
Technical Director, SLM Solutions N.A. Inc.

richard.grylls@slm-solutions.us
Agenda

- Introduction
- Technical Feasibility
- Economics
SLM Solutions Worldwide
SLM Machines Overview

**Large System**

**SLM 500**

*Highest Performance for Large Volume Series Production*

- **Build envelope:** 500 x 280 x 365 mm
- **Laser:**
  - Twin (2x 400W or 2x 700W) fiber laser
  - Quad (4x 400W or 4x 700W) fiber laser
- **Build rate:** up to 171 cm³/h

**Mid Size**

**SLM 280 2.0**

*Standard for Scalable Production and Development*

- **Build envelope:** 280 x 280 x 365 mm
- **Laser:**
  - Single (1x 400W or 1x 700W) fiber laser
  - Twin (2x 400W or 2x 700W) fiber laser
- **Build rate:** up to 55 cm³/h

**Compact Size**

**SLM 125**

*Production and Laboratory*

- **Build envelope:** 125 x 125 x 125 mm
- **Laser:** Single (1x 400W) fiber laser
- **Build rate:** up to 25 cm³/h

(a) Depending on material and build part geometry.
SLM Solutions: Metal AM for Industrial Part Production
Technical Feasibility: Established

Images: Airbus, Relativity, GE Power
Challenges for Turbines

...that an equipment OEM needs to deal with...

- Size of Machines
- Build Rate of Machines
- Competitive Materials
Machine Size Challenge

SLM800
500 x 280 x 800 mm
~1kg/hr
Debut at formnext Nov 14th
Build Rate Challenge

1kg/hr range

100g/hr range

<table>
<thead>
<tr>
<th></th>
<th>Reale Aufbaurate (Aluminium)</th>
<th>Theoretische Aufbaurate (Aluminium)</th>
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<tbody>
<tr>
<td>Single 400W</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Single 700W</td>
<td>40</td>
<td>65</td>
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<tr>
<td>Twin 400W</td>
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<tr>
<td>Twin 700W</td>
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<td>131</td>
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<tr>
<td>Quad 400W</td>
<td>105</td>
<td>141</td>
</tr>
<tr>
<td>Quad 700W</td>
<td>169</td>
<td>261</td>
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- New superalloys with >IN718 performance
- Single-Crystal Ni-base superalloys
- New high fatigue-strength aluminum alloys
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