

Additive Manufacturing Design Guides

Nicholas Leathe, SNL/2616
nleathe@sanida.gov



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Current Design Guides

■ Few design guides exist

- AWE
- Print Shops
- Academia



Design Guide for Additive Manufacturing

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Design guidelines for laser additive manufacturing of lightweight structures in TiAl6V4

J. Kranz and D. Herzog
Institut für Laser- und Anlagentechnik, Technische Universität Hamburg - Hamburg,
Denzigerstraße 17 (L), 21073 Hamburg, Germany

C. Erhardt
Institut für Laser- und Anlagentechnik, Technische Universität Hamburg - Hamburg,
Denzigerstraße 17 (L), 21073 Hamburg, Germany and Laser Zentrum Nord GmbH, Am Schleusengraben 14,
21029 Hamburg, Germany

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Today, laser additive manufacturing (LAM) is used in more and more industrial applications. Due to a new freedom in design it often e.g., in the aerospace industry. For conventional manufacturing methods experience in designing products design guidelines is therefore limited. In LAM, the underlying process is not yet well understood. Therefore, design guidelines for accuracy and surface quality are yet to be identified and built in LAM. built in different orientations to be comprehensive design guidelines for DIN 2222 and as presented in detail shown, the underlying process test © 2014 Laser Institute of America.

Key words: laser additive manufacturing (DPM)

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Revision A

proto labs
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Designing for the DMLS Process

David Bentley

Production Manager, DMLS - Proto Labs

May 20th, 2014

■ Why?

- Proprietary information
- Difficult to characterize manufacturability details
- Printability varies between printers and models

I. INTRODUCTION

Laser additive manufacturing (LAM) is a wise manufacturing process which uses a laser to solidify material in a powder-bed according to a three-dimensional computer (3D-CAD) model. Stepwise production can complete 3D geometries into simpler two-dimensional parts.¹⁻³

Lightweight design studies, e.g., in the already successfully demonstrated LAM's 1 field of application due to its geometrical freedom, have been conducted. Solidified manufactured counterparts were feasible. These studies were generally created by experience the process inherent restrictions are not yet known. Even though LAM's geometrical freedom is significantly higher compared to conventional approaches, it has process specific restrictions which are not well understood when designing parts.

Creating design guidelines are thus of importance in order to allow a wide industrial use. Available studies on design guidelines for LAM currently only give recommendations regarding the basic process inherent restrictions, influences, part design as well as general

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CNC machining service

CF3

Test specimens used for guideline generation were consistently manufactured on unmodified industrial production

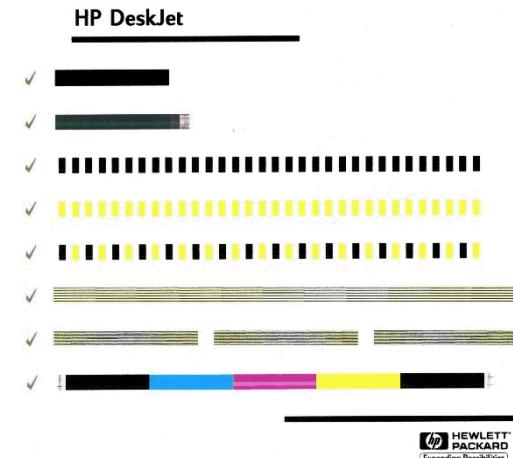
protomold
Injection molding service

Why important?

- Improve manufacturability
 - Stop the guess and check
 - Reduce design cycle time and waste
 - Enables wider adoption of AM technologies
- Other industries have guides:
 - Design for conventional manufacturability
 - Machining, Stamping, Molding, etc.
 - Microelectronics design guides

Considerations

- Development of standard coupons
 - Similar to paper printer calibration page
 - Evaluate machine to machine capabilities
- Enable use for non-technical users
 - Diagrams, examples, and common language
- Cover multiple materials and machines
 - Enable different design options to new designers
- Reduce “tribal knowledge” from additive manufacturing



Questions

Nicholas Leathe

Sandia National Laboratories

nleathe@sandia.gov

(505) 844-4584