

Andreas Gebhardt

Understanding Additive Manufacturing



Rapid Prototyping - Rapid Tooling -
Rapid Manufacturing

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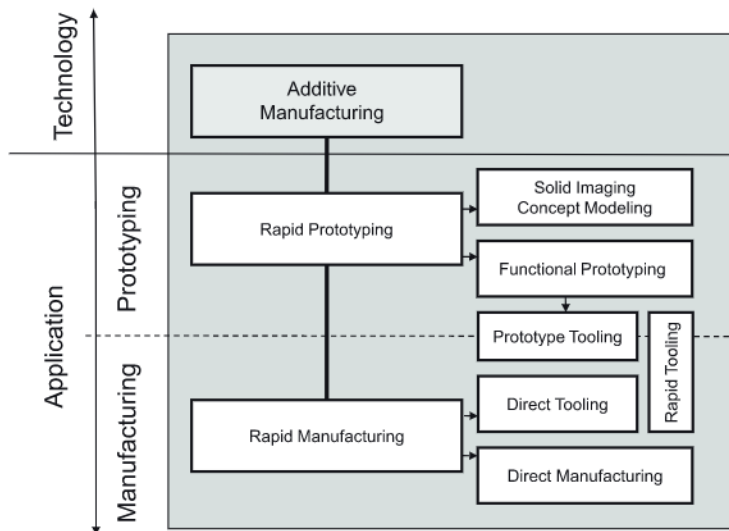
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1

Basics, Definitions, and Application Levels

Chapter 1 will provide a brief overview of what is called Additive Manufacturing (AM) and the principle of layer-based technology including the main definitions. Throughout this book we will approach the topic from the viewpoint of the applicator and will focus on the industrial applications of AM. Process details will be discussed in Chapter 2.

All definitions are linked to a step-by-step elaboration of the “AM Application Sheet” which summarizes the definitions and interdependencies of the various applications, all of which will be illustrated by typical examples. The final version of the “AM Application Sheet” (identical with Fig. 1.19) is shown below.



Additive Manufacturing (AM) Application Sheet: Technology - and Application Level Definitions

■ 1.1 Basics and Definitions

1.1.1 Additive Manufacturing – Layer Manufacturing

“Additive Manufacturing” (AM) is a layer-based automated fabrication process for making scaled 3-dimensional physical objects directly from 3D-CAD data without using part-depending tools. It was originally called “3D Printing” and is still frequently called that.

Together with the well established “Subtractive Manufacturing”, such as milling or turning, and the “Formative Manufacturing”, such as casting or forging, Additive Manufacturing provides the third supporting pillar of the entire manufacturing technology /Bur93/.

When the first approaches to “Additive Manufacturing” entered the market in 1987, it was called “Rapid Prototyping” or “Generative Manufacturing”. Both terms are still in use and in the past years many different names have been presented and frequently more are added. Although each of the names is perfect from the special viewpoint of its creator, many of them cause confusion. Often, this is one reason why newcomers to the industry in particular sometimes feel lost in the field of AM.

To obtain a brief overview, a small selection of the mostly used terms are structured according to a few families of key words. Often used terms include:

- “additive” Additive Manufacturing (AM)
Additive Layer Manufacturing (ALM)
Additive Digital Manufacturing (DM)
- “layer” Layer Based Manufacturing
Layer Oriented Manufacturing
Layer Manufacturing
- “rapid” Rapid Technology
Rapid Prototyping, Rapid Tooling, Rapid Manufacturing
- “digital” Digital Fabrication
Digital Mock-Up
- “direct” Direct Manufacturing, Direct Tooling
- “3D” 3D Printing, 3D Modeling

Any and all imaginable (and even not imaginable) combinations of these keywords are existing too.

Attention: Some of these terms are under copyright protection!

There are additional terms in use that are created according to new and innovative manufacturing technologies, they include: