Metal Additive Manufacturing

THE INDEPENDENT MARKET & TECHNOLOGY SOURCE

Analytics of the international market size segmented by technology, industry, region and material
Covering all leading user industries • Supplier and user perspective • Representing more than 95% of the installed system base • Global database of system, service and material suppliers with more than 800 entries • Comprehensive cost calculation tool • Catalogue with more than 80 industrial applications
Preface: A challenging year

The year of 2020 was marked by the beginning of the COVID-19 pandemic. The impact on the world was severe as lockdown measures, travel bans and social distancing turned everyday life upside down. The aftermath of the pandemic and the subsequent significant slump in the global economy of course also affected the field of Additive Manufacturing. Strong drivers of the technology, such as the aviation and automotive sectors, were affected and development activities were put in the backseat to focus on core processes.

During the beginning of the crisis 3D printing gained media attention, as there were high hopes of absorbing the collapse of supply chains through the flexibility of additive technologies. There are success stories, such as the additive production of nasal swabs, that allowed quick production of the necessary testing equipment without access to specialized machinery. However, even if Additive Manufacturing is a feasible alternative, it became apparent that switching a production technology takes time: processes have to be set up, quality demands have to be met, and of course AM production capacity has to be available. The future will show how companies will cope with the dependency and resulting risk from international supply chains, and whether AM can become a viable solution to cover short-term demand for certain products or even replace traditional manufacturing methods.

2020 was also a year, where large investments and funding into start-ups of new additive technologies continued as well as company acquisitions in the triple-digit millions and onset of further stock market listings. These activities will have a lasting impact on the market and landscape of Additive Manufacturing.

The extend of the COVID-19 pandemic on the metal Additive Manufacturing market is shown in the AMPOWER Report 2021: METAL, now published in its 3rd edition. The AMPOWER Report 2021: POLYMER is released for the first time. The aim of this new market report is to provide a comprehensive and reliable market overview for the additive use of plastics. In addition to the updated market figures for 2020 and the outlook for 2025, the AMPOWER Report includes for the first time input from esteemed AM experts and thought leaders, that provide an overview on regional developments in Additive Manufacturing technology.

The market and technology report, the databases as well as the application catalogue of real-world industrial use cases are available online through the interactive website at

https://additive-manufacturing-report.com

This PDF is compiled from the data available online. Additional resources such as databases and technology deep-dives are only available online.

March 2021

Dr. Maximilian Munsch, Matthias Schmidt-Lehr and Dr. Eric Wycisk
Managing partners of AMPOWER GmbH & Co. KG
Table of contents

Preface: A challenging year ......................................................................................................................... 3
Table of contents .................................................................................................................................................. 4
Table of figures .................................................................................................................................................. 6
Methodology ........................................................................................................................................................ 8
Data acquisition ................................................................................................................................................ 8
Analysis ............................................................................................................................................................ 9
Period of interest ............................................................................................................................................. 9
Region of interest ........................................................................................................................................... 9
Respondents .................................................................................................................................................... 10
Market player categorization ........................................................................................................................ 11
Segmentations ................................................................................................................................................. 12
Overall Additive Manufacturing market size .................................................................................................. 15
Metal and polymer AM market size 2020 and 2025 ......................................................................................... 16
Regional distribution of system sales revenue in 2020 and 2025 ................................................................. 17
System sales revenue by industry 2020 .......................................................................................................... 18
System sales revenue by technology 2020 and 2025 ................................................................................... 19
Metal AM market size ..................................................................................................................................... 21
Metal market size and growth 2020 and 2025 .............................................................................................. 22
Metal market growth 2020 and 2025 – supplier vs. buyer ........................................................................... 23
Metal AM installed base 2020 and 2025 – supplier vs. buyer ...................................................................... 24
Market comparison with CNC ...................................................................................................................... 26
Metal AM market by region ............................................................................................................................ 27
Regional metal market of buyers 2020 and 2025 .......................................................................................... 27
Regional metal market of system sales 2020 and 2025 ................................................................................ 29
Regional metal market of system suppliers by countries 2020 and 2025 .................................................... 31
Origin of metal system suppliers by technology 2020 and 2025 ................................................................. 32
Origin of metal system suppliers of installed Powder Bed Fusion machines 2020 and 2025 ....................... 33
Focus region EMEA – metal system sales 2020 and 2025 ......................................................................... 34
Metal part manufacturing service in AMER and EMEA by industry 2020 and 2025 .............................. 35
Metal AM market by technology ................................................................................................................... 37
Metal system sales by technology 2020 ......................................................................................................... 38
Installed metal base by technology 2020 ...................................................................................................... 40
Metal technology market share 2020 and 2025 ......................................................................................... 41
Metal machine sales by technology 2020 and forecast 2025 – supplier vs. buyer ...................................... 42
Installed base by metal technology 2020 and 2025 – supplier vs. buyer forecast ....................................... 44
Number of lasers in Powder Bed Fusion machines 2020 and forecast 2025 – supplier vs. buyer ............. 46
Supplier origin of sold metal machines 2020 ............................................................................................. 47
Metal AM market by industry .......................................................................................................................... 48
Metal system sales by industry 2020 ........................................................................................................... 48
Metal system sales by industry 2020 and 2025 ........................................................................................... 49
Sold metal systems by industry 2020 .......................................................................................................... 51
Installed metal base by industry 2020 and 2025 .......................................................................................... 52
Metal AM market by material ....................................................................................................................... 53
Metal feedstock use 2020 and 2025 ............................................................................................................. 54
Metal material use by industry 2020 and 2025 ........................................................................................... 55
Metal AM degree of industrialization ........................................................................................................... 57
Metal system utilization ................................................................................................................................ 58
Metal part quantity per year ......................................................................................................................... 59
Purpose of metal parts ..................................................................................................................................... 60
Metal AM technology report ......................................................................................................................... 62
Technology deep dives ................................................................................................................................. 63
Metal Additive Manufacturing history ....................................................................................................... 64
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology developments and maturity</td>
<td>66</td>
</tr>
<tr>
<td>Metal AM Maturity Index</td>
<td>66</td>
</tr>
<tr>
<td>Current machine and technology developments</td>
<td>67</td>
</tr>
<tr>
<td>Developments and innovations in AM software</td>
<td>70</td>
</tr>
<tr>
<td>Databases</td>
<td>72</td>
</tr>
<tr>
<td>Supplier databases for systems, material and part manufacturing</td>
<td>72</td>
</tr>
<tr>
<td>Part application catalogue</td>
<td>73</td>
</tr>
<tr>
<td>The investor's view</td>
<td>75</td>
</tr>
<tr>
<td>Development of publicly traded companies</td>
<td>75</td>
</tr>
<tr>
<td>Investment news of 2020</td>
<td>82</td>
</tr>
<tr>
<td>Regional reports</td>
<td>87</td>
</tr>
<tr>
<td>AMER – North America</td>
<td>87</td>
</tr>
<tr>
<td>AMER – South America</td>
<td>88</td>
</tr>
<tr>
<td>APAC – China</td>
<td>89</td>
</tr>
<tr>
<td>APAC – India</td>
<td>90</td>
</tr>
<tr>
<td>APAC – Oceania</td>
<td>93</td>
</tr>
<tr>
<td>EMEA – France</td>
<td>94</td>
</tr>
<tr>
<td>EMEA – Germany</td>
<td>96</td>
</tr>
<tr>
<td>EMEA – Israel</td>
<td>97</td>
</tr>
<tr>
<td>EMEA – United Arab Emirates</td>
<td>98</td>
</tr>
<tr>
<td>EMEA – United Kingdom</td>
<td>99</td>
</tr>
<tr>
<td>R&amp;D reports</td>
<td>101</td>
</tr>
<tr>
<td>China</td>
<td>101</td>
</tr>
<tr>
<td>Europe</td>
<td>104</td>
</tr>
<tr>
<td>North America</td>
<td>105</td>
</tr>
<tr>
<td>The AMPOWER Report team</td>
<td>109</td>
</tr>
<tr>
<td>About the authors</td>
<td>109</td>
</tr>
<tr>
<td>International contributors and partners</td>
<td>110</td>
</tr>
<tr>
<td>About AMPOWER</td>
<td>114</td>
</tr>
<tr>
<td>Legal disclaimer</td>
<td>114</td>
</tr>
</tbody>
</table>
# Table of figures

Figure 1 AMPOWER Report 2021: METAL system supplier coverage ................................................................. 8
Figure 2 AMPOWER Report 2021: METAL - Distribution of respondents by company revenue ................................................................. 10
Figure 3 AMPOWER Report 2021: METAL - Distribution of respondent's region ................................................................. 11
Figure 4 Global metal and Polymer Additive Manufacturing market 2020 and supplier forecast 2025 [EUR billion] ............ 16
Figure 4 Global distribution of buyers by system sales revenue 2020 and forecast 2025 [EUR million] .................................................. 17
Figure 5 System sales revenue by industry 2020 [EUR billion] ............................................................................ 18
Figure 6 System sales revenue by technology 2020 and supplier forecast 2025 [EUR million] .................................................. 19
Figure 7 Metal Additive Manufacturing market 2020 and supplier forecast 2025 [EUR billion] .................................................. 22
Figure 8 Metal Additive Manufacturing market 2020 – supplier vs. buyer forecast 2025 [EUR billion] .................................................. 23
Figure 9 Metal AM installed base 2020 and supplier vs. buyer forecast 2025 [units] .................................................. 24
Figure 10 Annual metal AM system sales 2020 and forecast 2025 [units] .................................................. 25
Figure 11 Metal AM vs CNC system market 2020 and supplier forecast 2025 [EUR billion] .................................................. 26
Figure 12 Regional distribution of buyers by system, material and service sales revenue 2020 and supplier forecast 2025 [EUR billion] .................................................. 28
Figure 13 Regional distribution of buyers by system, material and service sales revenue share 2020 and supplier forecast 2025 ... 28
Figure 14 Regional distribution of buyers by metal system sales revenue 2020 and supplier forecast 2025 [EUR billion] .................. 30
Figure 15 Global distribution of buyers by system sales revenue 2020 and supplier forecast 2025 .................................................. 31
Figure 16 Origin of metal system suppliers by installed systems and technology 2020 and supplier forecast 2025 [units] .................................................. 32
Figure 17 Origin of metal system suppliers of installed PBF machines 2020 and supplier forecast 2025 [units] .................................................. 33
Figure 18 Regional focus EMEA – origin of metal system suppliers by sales revenue 2020 and supplier forecast 2025 [EUR billion] .................................................. 34
Figure 19 Metal part manufacturing service revenue in AMER and EMEA by industry 2020 and forecast 2025 [EUR billion] .................................................. 35
Figure 20 Metal Machine sales by technology 2020 [units] .................................................. 38
Figure 21 Number of metal system supplier companies by technology 2020 .................................................. 39
Figure 22 Installed Metal base by technology 2020 [units] .................................................. 40
Figure 23 Metal System sales revenue by technology 2020 and supplier forecast 2025 [EUR billion] .................................................. 41
Figure 24 Metal machine sales by technology 2020 and supplier vs. buyer forecast 2025 [units] .................................................. 42
Figure 25 Metal machine sales by technology 2020 and supplier vs. buyer forecast 2025 – share of units .................................................. 43
Figure 26 Trend of PBF machine sales 2020 to 2025 - supplier vs. buyer forecast [units] .................................................. 43
Figure 27 Installed base by metal technology 2020 and supplier vs. buyer forecast 2025 [units] .................................................. 44
Figure 28 Installed base by metal technology 2020 and supplier vs. buyer forecast 2025 – share of units .................................................. 45
Figure 29 Share of number of lasers per Powder Bed Fusion machine in 2020 and supplier and buyer forecast 2025 .................................................. 46
Figure 30 Origin of suppliers by share of sold metal machines 2020 [units] .................................................. 47
Figure 31 Metal system sales revenue by industry 2020 [EUR billion] .................................................. 48
Figure 32 Metal system sales revenue by industry 2020 and supplier forecast 2025 [EUR million] .................................................. 49
Figure 33 Metal system sales revenue by industry 2020 and supplier forecast 2025 - share of sales revenue .................................................. 50
Figure 34 Sold metal systems by industry in 2020 [units] .................................................. 51
Figure 35 Installed base of metal AM machines by industry 2020 and supplier forecast 2025 [units] .................................................. 52
Figure 36 Metal material consumption 2020 and forecast 2025 [ton] .................................................. 54
Figure 37 Metal material consumption by industry 2020 and forecast 2025 [ton] .................................................. 56
Figure 38 Average metal system utilization by industry 2020 .................................................. 58
Figure 39 Part quantity per year of metal Additive Manufacturing components 2020 .................................................. 59
Figure 40 Application category of printed parts 2020 and forecast 2025

Figure 41 Metal Additive Manufacturing technology map

Figure 42 Metal Additive Manufacturing history

Figure 43 Metal AM Maturity Index 2021

Figure 24 Share of AM applications by industry in India in 2020 - Courtesy of Indian 3D Printing Network

Figure 24 Share of healthcare specialties service by AM in India in 2020 - Courtesy of Indian 3D Printing Network

Figure 44 Landscape of AM R&D in China (2020). Courtesy of 3D SCIENCE VALLEY

Table 1 Regional distribution of Metal machines sales and average unit revenue in 2020

Table 2 Stock prices of 3D printing companies 2020 and 2021

Table 3 Revenue and EPS of publicly traded 3D printing companies

Table 4 EPS of publicly traded 3D printing companies at March 2021

Table 5 EBITDA of publicly traded 3D printing companies at March 2021