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Unveiling additive manufacturing with metal powders industry trends with technology interventions and competitive landscape as frame of reference

SPECIAL FEATURE

Sunil Hebbalkar

In the past few years, additive manufacturing with metal powders industry has gained rapid traction in the metal manufacturing sector, prominently in those regions where conventional manufacturing encounters limitations related to manufacturing capability and design methodology.

Additive manufacturing, also known as 3D printing, has been gaining significant popularity across the globe on account of its excellent design flexibility and improved production capability. Considering the fact that the additive manufacturing process can be used to develop critically complex parts, it has been implemented in the medical sector to manufacture implants. For instance, recently, the U.S. Food and Drug Administration (FDA) approved spinal implants made of titanium alloys with 3D printing technology. The approval for 3D printed medical implants from regulatory bodies is thus likely to have a considerable impact on additive manufacturing with metal powders industry outlook. In addition, several giants in additive manufacturing with metal powders market are investing heavily in new product development and strategic collaborations to enhance the methodology portfolio in 3D printing processes.

In this current era driven by automation and digitalization, the development of advanced manufacturing processes has left a profound imprint on additive manufacturing with metal powders industry trends. In fact, many metal manufacturing and automation companies are constantly focusing on the enhancement of metal additive manufacturing technologies with regard to mass customization, on-demand production, and digitalization – right from idea generation to prototype manufacturing. The increasing adoption of innovative technologies across the metal manufacturing sector is also slated to have a profound influence on additive manufacturing with metal powders market share. In this regard, a detailed insight into the prominent additive manufacturing processes, their productive benefits, process advancements, and the role of industry contributors in impelling additive manufacturing with metal powders market size has been explained in the sections underneath (see Table 1).

Direct metal deposition (DED)|The robust implementation of high-profile projects |Unveiling the influence of DED technology on additive manufacturing with metal powders market share

It is prudent to mention that DED is essentially a layer-based additive manufacturing process, in which high power laser is used to melt metal powder for making three-dimensional objects. This technology enables metal manufacturers to develop realistic objects with a higher level of accuracy and excellent quality, speed, and economy. In consequence, the process is being used in myriad industrial applications including direct metal prototypes, die repair and renovation, surface modification and coatings, and parts repairing in aerospace industry, thus impelling the application landscape of the overall additive manufacturing with metal powders market. In addition, lately, laser technology is being widely deployed in direct metal deposition, further extending the growth prospects of additive manufacturing with metal powders industry.

In order to achieve higher cost-effectiveness and develop high-performance metal objects for the automotive and aerospace domains, many companies are looking forward to developing robot-assisted laser metal deposition process. One of the renowned manufacturers of industrial robots, KUKA Industries, in June 2017, collaborated with the German Federal Ministry for Education and Research (BMBF) to work on an automation project called ProLMD to develop larger metallic components with laser metal deposition process. Additionally, the additive manufacturing with metal powders industry giant has also been providing innovative manufacturing process solutions for several other tech giants including Daimler, Airbus, Laserline, MTU, BCT, and MBraun. Considering the shifting trends toward the surging adoption of the DED process for several industrial applications, additive manufacturing with metal powders market size from direct metal deposition

E-mail address: mayur.y@gminsights.com

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TABLE 1

Additive manufacturing process benefits and advancements.

Sr. No	Additive manufacturing process	Process benefits	Process advancement
1	Direct metal deposition (DED)	Speed: production time reduced by 40% Quality: objects can be manufactured with 0.001 accuracy Economy: result into low tooling cost	Implementation of sensor technology in closed loop control DED has been observed to improve process capability, stimulating DED-based additive manufacturing with metal powders industry trends.
2	Direct metal laser sintering (DMLS)	Time: reduces overall production cycle time Improvement in mechanical properties of product as compared to casting process Effective weight reduction	Companies in additive manufacturing with metal powders market have been continuously conducting R&D activities to overcome the limitation of surface smoothness
3	Electron beam melting (EBM)	Minimal additional finishing required Useful in processing of highly reactive materials Offers high degree of product customization Lower power consumption Required lower installation and maintenance costs	In order to reduce manufacturing defects such as porosity and minimize the vaporization of alloying elements, most biggies in additive manufacturing with metal powders industry are investing in research and development activities to further enhance EBM technology

technology is likely to register a stupendous CAGR of 26% over 2017–2024.

Direct metal laser sintering (DMLS) |Healthcare & aerospace sectors to fuel DMLS-based additive manufacturing with metal powders industry

Laser sintering is one of the latest technologies used in metal manufacturing for producing low cost, high quality, and multi-functional objects in order to fulfill the ever-changing consumer demands. Most of the companies partaking in additive manufacturing with metal powders market share are now primarily focusing on the minimization of product cycle times to enhance the development process. As of now, it has been observed that most of the aerospace companies have adopted the direct metal laser sintering process considering the benefits of time and cost savings. Myriad behemoths in metal manufacturing industry have also added DMLS technology to their production process portfolio, aiming to expand their reach in additive manufacturing with metal powders industry. For instance, recently, an Italian hydraulic systems manufacturer, Aidro Hydraulics incorporated the DMLS technology in its metal 3D printed hydraulic systems which now weigh 75% lesser than traditional hydraulics. In addition, the incorporation of the technology has led to improvement in mechanical properties such as elongation, tensile strength, hardness, and toughness of the newly manufactured hydraulic systems, which would prove beneficial for the DMLS-based additive manufacturing with metal powders market.

On the other hand, the emergence of additive manufacturing has solved many critical challenges in healthcare sector. Dental technology has been moving at tremendously fast pace in recent times with the help of direct metal laser sintering, thus impelling additive manufacturing with metal powders market share. The increasing prevalence of a sedentary lifestyle along with rapid growth in geriatric population has been primarily fueling the need for numerous medical devices. The escalating growth of the healthcare sector and the increasing adoption of digitalization across the medical devices manufacturing space will indeed fuel additive manufacturing with metal powders market size from medical applications, slated to generate USD 200 million by 2024.

Electron beam melting (EBM) | Extensive research to innovate advanced EBM techniques to fuel additive manufacturing with metal powders market trends

Electronic beam melting is one of the most unique additive manufacturing techniques, which can be used to reduce weight, cycle time, and production cost. At present, this technology is being heavily implemented in order to manufacture complex aerospace and automotive components such as turbine blades, pump impellers, and turbocharger wheels. In addition, it has been forecast that the EBM technology will gain massive traction across the healthcare and aerospace industries, pertaining to which renowned behemoths in additive manufacturing with metal powders market are further expanding their production capabilities by acquiring specialized EBM technology companies. For instance, a year before, GE acquired Arcam, a leading manufacturer of EBM incorporated medical implants like hip cups and aerospace products like turbine blades, to expand its reach in additive manufacturing with metal powders industry.

As of now, the growing deployment of energy efficient norms mainly across European countries has led to an ongoing requirement for low weight materials for aerospace and automotive applications. In consequence, aiming for weight reduction, many automakers and aircraft manufacturers are giving preference for aluminum alloys over titanium. Indeed, aluminum is often used to manufacture EBM-based aircraft components, expanding the scope of additive manufacturing with metal powders market. However, titanium is also prominently used in the development of customized medical implants with the help of EBM technology, driving EBM-based additive manufacturing with metal powders market size from medical applications. The massive upsurge in orthopedic implants surgeries across the

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