PROTIQ

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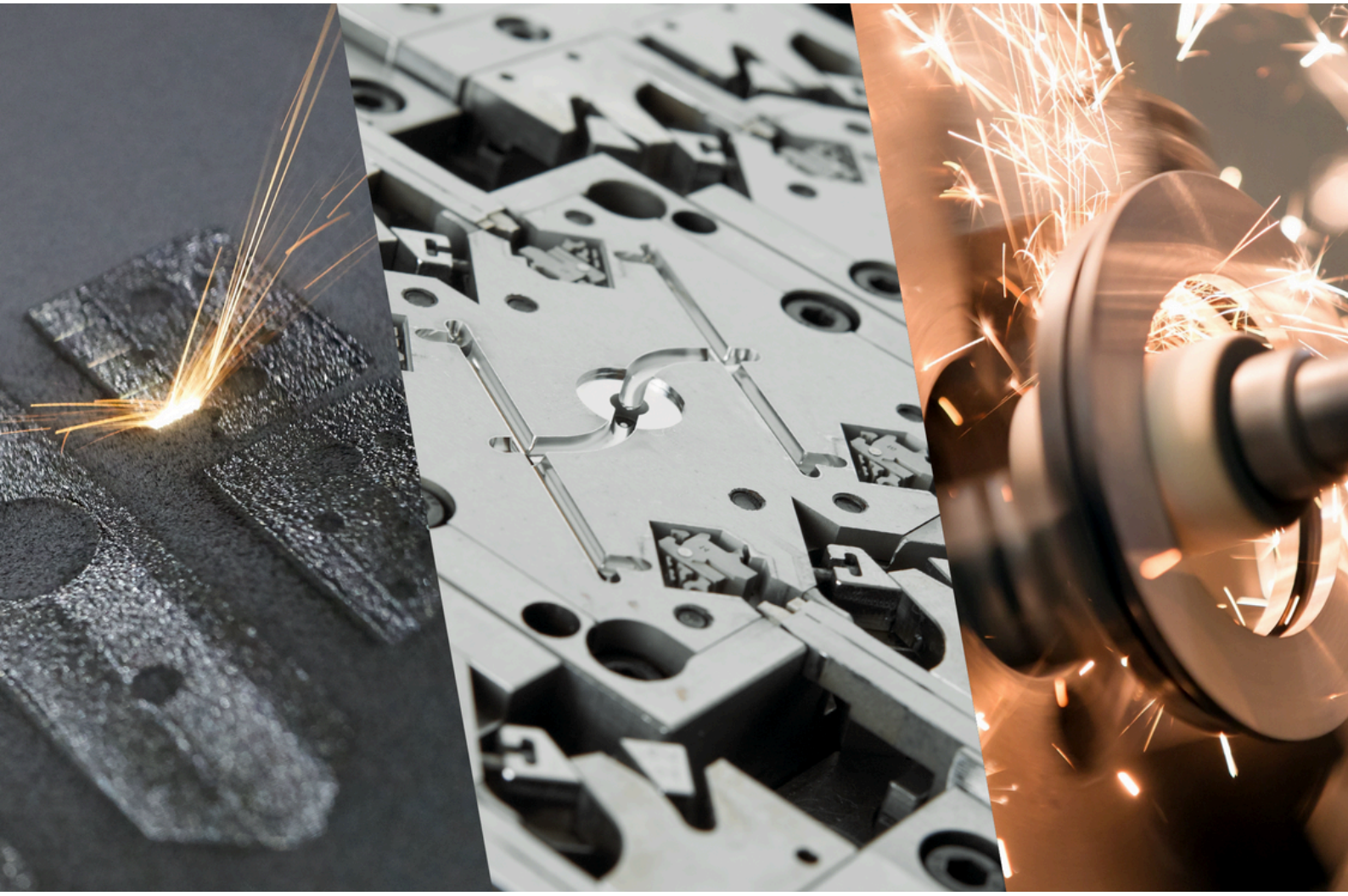
ADDITIVE MANUFACTURING

CHOOSING THE RIGHT PROCESS FOR THE RIGHT APPLICATION



**3D printing or conventional manufacturing?
How to find the right process for your next project
and how online platforms can help**

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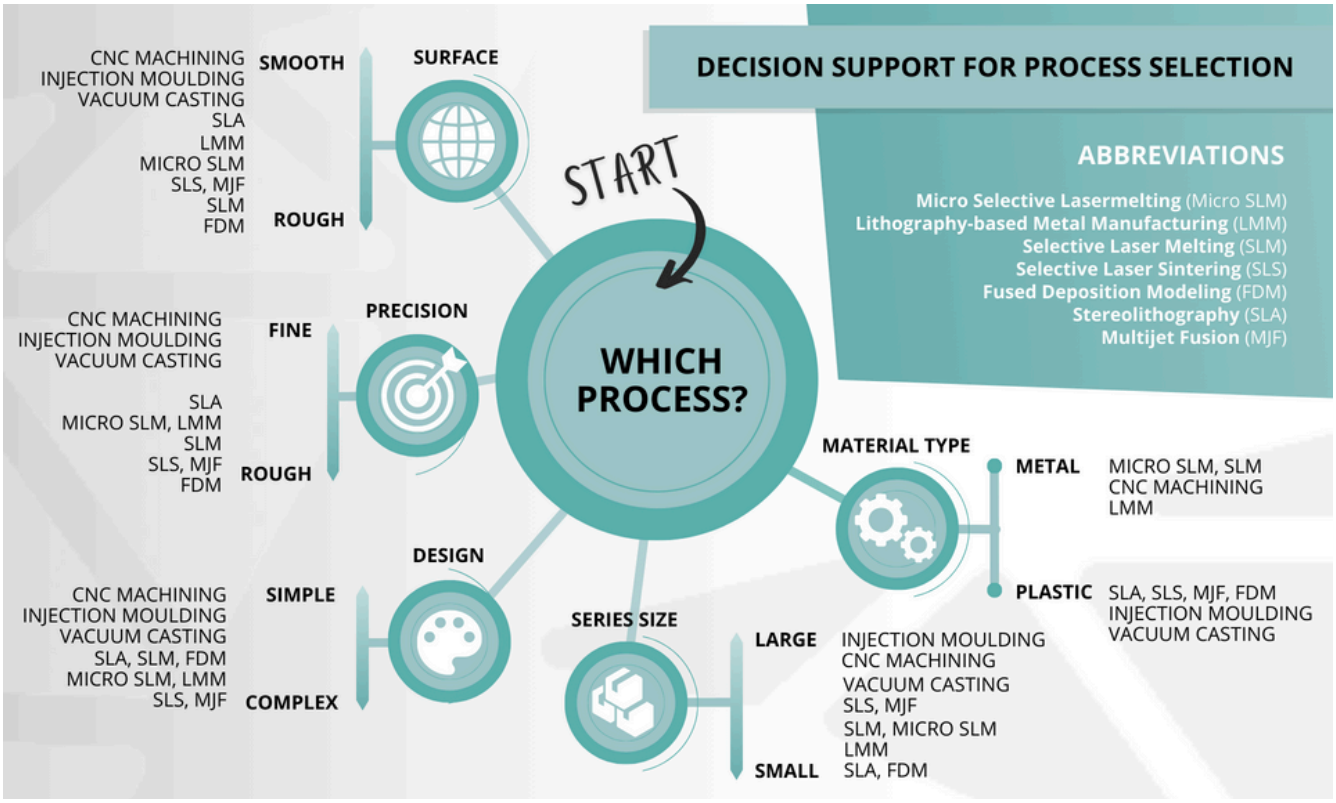


The technology of additive manufacturing processes, commonly referred to as 3D printing, has become established in more and more industries in recent years. Unlike in its early days, the technology no longer only involves the rapid production of initial prototypes made of plastic. A wide bandwidth of processes and materials enable, among other things, the production of highly durable metal components, series articles made of plastic or even components made of high-purity ceramics or quartz glass.

What all additive manufacturing processes have in common is that the components are built up layer by layer by adding material and without the need for a mold. This makes the technology fundamentally different from traditional industrial manufacturing processes such as CNC turning and milling, forming or casting and offers a very high degree of flexibility. The components are produced directly from the 3D CAD data so that production can begin immediately. The layered structure enables a particularly high degree of design freedom and the production of very complex components.

For the user, additive manufacturing joins the existing process portfolio alongside traditional processes and complements it with its unique properties and advantages. The many 3D printing processes differ significantly from one another in terms of their properties and processable materials. The processes are differentiated from one another by the type of layer structure and the starting material used.

The FDM process (Fused Deposition Modeling), which is particularly popular in the private sector, is based on the melting of a plastic filament, which is deposited locally through a fine nozzle. The process is cost-effective, but has low component strength and detail reproduction.

Due to its limited productivity, it is more suitable for small quantities and components without high quality requirements. Resin and powder-based processes are primarily used for additive manufacturing with industrial requirements.

The resin-based additive process, e.g. stereolithography (SLA), enables the production of the best detail and surface qualities. The components are produced from liquid, photoreactive synthetic resin, which is cured layer by layer using a precise UV light source. The components are very precise, but previously always had low strength and formability, meaning that they could only be used for prototypes. Thanks to newly developed resins, however, it is now possible to produce highly resilient series components.

In the field of powder-bed-based additive manufacturing processes for the production of plastic components, the two processes of selective laser sintering (SLS) and multi-jet fusion (MJF) dominate the market. In both processes, the components are produced from fine plastic powder that is melted locally using a powerful light source (laser or steel). During the printing process, the components are surrounded by non-melted powder, meaning that support structures are not required. As a result, the process is highly productive and significantly finer details, higher strengths and greater complexity can be achieved. The parts are particularly suitable for mechanically stressed components and can also be used for series applications.

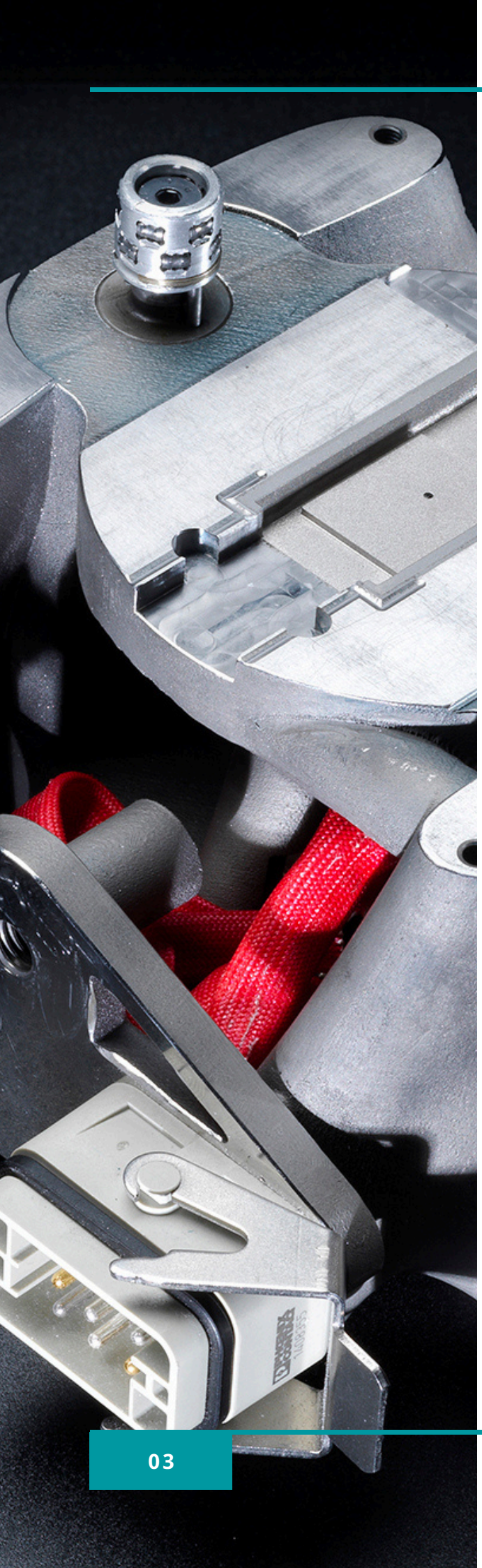
The very similar process of selective laser melting (SLM), also known as laser powder bed fusion (L-PBF), is used to produce metal components that can withstand even higher loads. As with the SLS process, fine powder, in this case metal powder, is also fused together using a very powerful laser.

The variety of materials available ranges from a bandwidth of high-strength steels and light metals such as aluminum and titanium to special materials such as zinc and copper. The possible fields of application, especially in the additive metal sector, are diverse, as the material properties of the components are comparable with conventional manufacturing processes. Typical fields of application for components made using this process include lightweight construction in the automotive or aviation industries, individual components in machine building and complex heating and forming tools.

At the same time, additive manufacturing is undergoing rapid, ongoing development, opening up new possibilities and potential year after year. Innovations in the field of available plastic materials now make it possible to manufacture components made of real silicone or with flame-retardant and ESD-dissipating properties.

New metal materials such as pure copper or the series material Zamak 5 (zinc) offer new opportunities for current-carrying applications or direct series production in combination with zinc die casting. Innovative additive manufacturing processes combine the advantages of resin 3D printing with the production of highly detailed components made of technical ceramics, pure quartz glass or high-strength metal components.

However, due to the very dynamic development, it is becoming increasingly difficult for users to maintain an overview and to evaluate and exploit new potential. Of course, additive manufacturing must always be considered and evaluated in relation to conventional manufacturing processes. Only if an individual use case proves to be more economical with additive manufacturing processes than with other manufacturing processes can it be sensibly implemented. This is usually the case for small and medium quantities or complex component geometries.



An additional decisive criterion for the use of additive manufacturing is the forecast of being able to ensure sufficient capacity utilization to cover the high system investment. Manufacturing service providers specializing in additive manufacturing and online platforms such as the PROTIQ Marketplace offer a flexible alternative to investing in your own machines.

The online marketplace offers its customers a wide bandwidth of additive manufacturing processes and materials that a company could not cover on its own. PROTIQ GmbH, which gave the online marketplace its name, specifically addresses the quality requirements and needs of industrial customers. Unlike other comparable online platforms, the focus here is on transparency and data security. The data uploaded to www.protiq.com is stored on the company's own servers in Germany and customers have full control over which service provider on the marketplace they place the order with.

The fully automated price calculation gives the customer the opportunity to compare the different processes, materials and manufacturing service providers immediately after uploading the 3D CAD data to be produced. This enables a direct, quantity-dependent comparison with other manufacturing processes. The decision for an available manufacturing partner is additionally supported by a review and star rating system.

Furthermore, PROTIQ offers competent, personal advice to clarify the individual requirements and boundary conditions for possible additive manufacturing of the respective components.

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