

Overview of ManSYS framework

ManSYS will be the European market place to bring demand and supply for AM metal products and adjacent services together, in a central managed online platform.

It contains three key elements:

1. **Decision support software:** The software, available on the ManSYS platform, will enable users to make key decisions on the production of the part early on in the development lifecycle. End users can decide whether AM is applicable and/or what is required for adoption of the technology. Also the decision support module will guide the user towards the Service Bureau that best fits its needs. This decision can be based on e.g. a geographical location, a specific end-market, a material preference and/or the specific support needed. Examples of the latter are production, optimization or a combination of the two. The decision support software gives fast and reliable feedback on business (e.g. cost per part) as well as technical aspects (e.g. holes in the design or incorrect wall thickness).
2. **Supply Chain Management (SCM) System:** This part of the ManSYS platform offers functionality for participating Service Bureaus and to end-users. It is the core of the match making process. It enables end-users to negotiate a deal with a Service Bureau, obtain a detailed overview of the status of the part design, production, material supply, post-processing, shipping and inventory. The system offers the same functionality to connected Service Bureaus. A tendering procedure is used to set up a specific supply chain between a Service Bureau and end-user. A tendering procedure is a modern and common approach to divide capacity and resources in a market.
3. **Facilitation of the Co-evolution of better or new products:** As part of the system, the ManSYS software tool will allow members of the platform to suggest areas where processes and designs can be optimised. This data can then be fed back into the decision making and supply chain management tool. This leads to the evolution of either better or new products. Furthermore, matchmaking of end-users and Service Bureaus can also occur for specifically geometry optimization. The platform provides best practices of design, manufacturing methods and the application of standards, which can be used by all members of the platform to enhance existing working methods. This supports the co-evolution of products and operating procedures.

In order to control the online platform, an administration office will manage the operational, tactical and strategic activities. This includes i.e. quality assurance, customer support, business development and long-term continuation of the platform. Another important task of the administration office is the registration and management of Service Bureaus and end-users.

Overall, important advantages of ManSYS are:

- Anywhere anytime a possibility to order AM metal parts or adjacent services
- Demand & Supply available for all the markets
- No matter the complexity, there is room for improvement – ManSYS facilitates this
- Faster and cheaper method of production
- Certified production processes and post production
- Secured network for uploaded files such as designs
- ManSYS Administration Office to ensure the right quality of all partners in the supply-chain
- Ongoing improvement and development of the platform
- A marketplace for product, design and material advice

Stakeholders

The environment in which ManSYS functions, including the stakeholders is visualized in Figure 1. Figure 1 also shows the project's work packages in which the functionality or service is developed. An important notice is that the material supplier and machine supplier are out of scope of ManSYS. The ManSYS administration office and the quality management of ManSYS only reaches from the Service Bureaus up to the end-users. As a result, Service Bureaus are therefore responsible for managing the quality of their own suppliers.

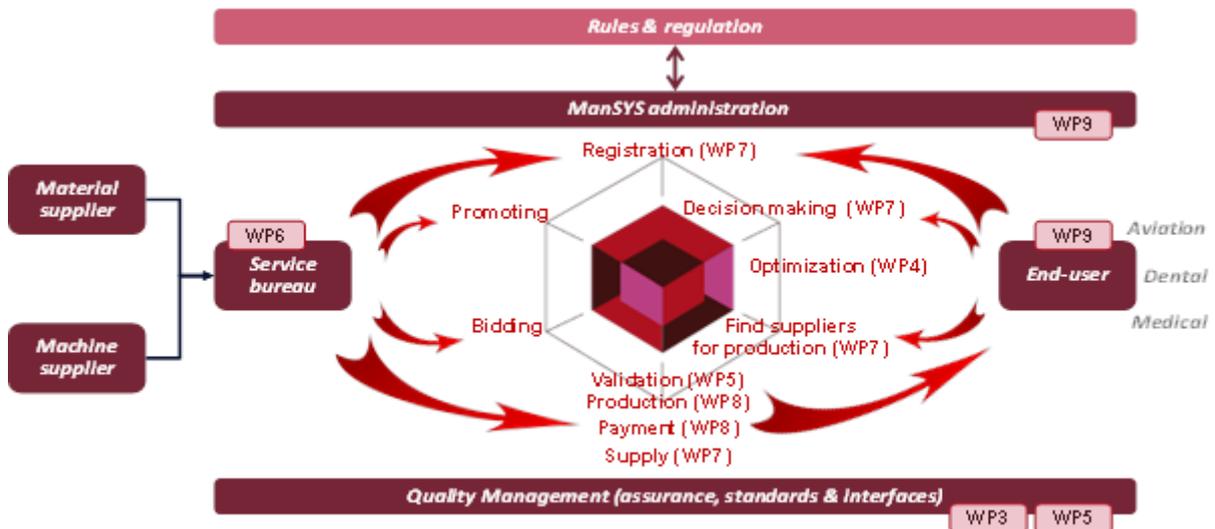


Figure 1: ManSYS platform environment

ManSYS (platform & administration office)

To secure continuous and high quality delivery of the ManSYS services an administration office will be set up. The administration office performs a range of tasks, including but not limited to:

- Maintenance of the technical aspects of the platform.
- Registration of Service Bureaus and end-users.
- Operational tasks such as answering questions, providing general information, etc.
- Tactical/strategic tasks such as marketing & communication and business development
- Auditing Service Bureaus on conformance with quality aspects.
- Interpreting and incorporating (changing) rules and regulations on all levels.

Service Bureaus

Service Bureaus are the businesses on the “supplier side” of the ManSYS platform. They are the manufacturer of the AMT parts and the supplier of additional services such as design optimization, design validation (built recipes) and post-processing.

Service Bureaus can register to the platform via the ManSYS administration office. Their registration profile forms the basis for the matchmaking process. Here, the available types of machines, materials and additional services are listed. The administration office monitors if the listed qualifications are valid, to ensure a high quality level of suppliers.

Customer driven activities of Service Bureaus are logged to ensure a transparent process w.r.t. quality assurance. This also includes logging of material batches (virgin as well mixed). The material suppliers are out of scope of the ManSYS platform. The Service Bureau is therefore responsible to assure quality at their inbound side.

The added value of the ManSYS platform for Service Bureaus is the ability to supply AMT services and parts in a controlled European environment. A Service Bureau has the possibility to tender to a broad group of demanding customers. This saves time and effort in approaching and farming customers. The free market environment ensures that the Service Bureau keeps improving his processes, resulting in a greater performance and lower cost for their customers.

Next to the classification of Service Bureaus according to their capabilities (market, materials, geographical location, production methods etc.) a classification according to Tracey & Wiersema will be used to link an end-user with a set of Service Bureaus. Based on the information gathered in the decision making module at the platform an end-user will be linked with the appropriate Service Bureaus.

Operational excellent Service Bureau	No-nonsense, fast, reliable and cost efficient production of part(s), based on fully developed and ready-to-use part specifications and build recipe.
Customer intimate Service Bureau	Capable of assisting end-user to enter the AM market by e.g. helping to optimize design for AM or other parameters.
Thought/product leader Service Bureau	Specialists in one or more market application. Capable of providing tailor made solutions to complex design or production challenges.

End-users

End-users form an important group of stakeholders for the platform, as they are the demanding side of the supply chain. They provide work to the Service Bureaus by a tendering procedure. A tendering procedure is a modern and common approach to divide capacity and resources in a market. Besides sourcing AMT parts, the End-Users are able to source AMT services as well. One can think of design optimization, design validation (built recipes) and post-processing.

End-Users can register to the platform via the ManSYS administration office. The End-User registration profile forms the basis for the matchmaking process (i.e. based on their end-market and specific requirements w.r.t. certifications).

Currently, there are three end-users; from the dental, aviation and medical market. They are represented by Wisident/TwoCare, Smith & Nephew and GE Marmara Technology Center.

In the future, it is foreseen that the group expands, creating a community of end-users in a range of different end-markets. This community is able to use the platform for:

- finding suppliers for optimization, validation and production of parts
- sharing best practices regarding design and production of parts, to facilitate the Co-evolution of better or new products
- finding general information about design optimization, production methods and standards.

The added value of the ManSYS platform for End-Users is the ability to source AMT services and parts in a controlled environment. Registered suppliers (Service Bureaus) are screened and monitored to assure quality in product and process. The presence of multiple Service Bureaus ensures a “free market” environment by applying a bidding procedure, resulting in fair prices. It also creates the possibility to source locally, leading to a reduction in lead time and logistical (CO2) footprint.