cecimo
European Association of the Machine Tool Industries and related Manufacturing Technologies

CECIMO contribution to the European Commission Public Consultation on the Sustainable Product Initiative

Introduction

The transition towards sustainable and circular manufacturing brings a considerable change in most industries. It demands a gradual shift towards new practices and technologies that minimise their environmental impacts and preserve energy and natural resources.

The concept of circular economy *is "based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems" (Ellen MacArthur Foundation).* This concept includes other practices such as recyclability, repairability, durability and reusability, which allow products to be more sustainable without a loss of quality, safety, or strength.

Creating a business model that encompasses these "practices" and ensures economic gains to the manufacturer still poses a number of challenges. Even if there are different existing successful business models, they remain sector-specific (for example, textile or construction sector), and they are difficult to apply in other sectors.

Key enabling technologies for the product sustainability

The use of key enabling technologies can help the manufacturing industries respond to environmental, societal and economic challenges and develop new sustainable products.

Machine tools

Machine tools are key enabling technologies that directly impact the productivity and the competitiveness of almost every manufacturing process. They are used to manufacture different objects such as home appliances, bicycles, cars, planes, medical devices and wind turbines. Therefore, this technology has a big role in the transition towards more circular and sustainable manufacturing.

Machine tools can be considered sustainable products. They are designed to last, with ease of maintenance in mind (retrofitting and remanufacturing are standard practices in the sector). Although each machine tool can be considered a unique product, around 83% of the machine tool is made from metallic materials, allowing high recycling levels and high reuse levels of the materials, to produce new products in an almost never-ending loop, without loss of quality.

Data provided to CECIMO by different machine tool manufacturers also shows that, on average, 80% of the machine tools are still in service ten years after their installation, while 65% of them are still in service after 20 years. This clearly shows that machine tools possess great durability and a long lifetime.

Additive Manufacturing

Additive Manufacturing (AM) proposes a novel paradigm for design, manufacturing, and business models based on design freedom, localised value chains, waste production and material consumption reduction.

AM can reduce waste in the production process since they only use the necessary material to produce a part. AM supports circular design strategies by creating opportunities to extend a product's lifespan and by enabling repair or upgrades, even if these products were not originally designed for ease of repair or upgrading.

Current industrial applications of AM are designed to enable a closed-loop circulation of materials, facilitating a more sustainable production system. In metal AM, more than 95% of the unused powder can be locally filtered and reused directly, while the remaining 5% can be used to produce virgin powder. This process does not impact material properties.

AM makes repairs and remanufacturing easier and more cost-effective. It allows spare parts to be printed on-demand and closer to where they are needed. This helps reduce inventory waste and products' carbon footprint, and extend the lifetimes of those products requiring spare parts that would otherwise be difficult to obtain.

Sustainable Product Initiative

The Sustainable Products Initiative, proposed by the European Commission (EC), will establish sustainability and bring substantial changes in product design, production processes, and consumers' rights.

It is essential to avoid a one size fits all approach. The requirements need to be set on a product group-specific basis, easily measurable and harmonised at European Union (EU) level. The manufacturing sector needs to continue to be an active player when developing such initiatives (in particular the digital product passport), providing information on value chains, standards and material specifications. This will ensure that the Sustainable Products initiative will set requirements and parameters that can bring clear and significant improvements without negatively impacting the industry's competitiveness.

Any regulatory review or new instrument (for example the digital product passport) should not add any administrative and bureaucratic burden for manufacturers or require them to collect information that is already available in other databases again (for example REACH and the SCIP Database).

CECIMO Recommendations

Taking a sustainable path will require fundamental changes throughout different value chains, impacting product design, material use, production processes, business models and waste management. With the appropriate approach, this could boost technological, financial, social, and organisational innovation, as well as create a more sustainable industrial ecosystem.

The following points should be considered to speed up the development towards more sustainable products and assist manufacturing in this transition:

1. Adopt the concept: "design for remanufacturing and repairing"

Many products do not have a design that facilitates certain processes such as disassembly, cleaning, reprocessing, or reassembly. Integrating remanufacturing and repairing in the design process can improve product durability and allow an easier execution of the task. To facilitate the adoption of this concept, it would be beneficial to use (whenever available) or develop dedicated guidelines or standards that can ensure products' compliance with regulatory requirements, increase their remanufacturing and repairing rates and lower the overall manufacturer environmental impact.

AM represents an excellent tool for companies that wish to adopt this concept. AM has minimal shape and geometric constraints, allowing the production of alternative optimised complex parts that have a lighter weight, enhanced durability and repairability, and improved functionality.

This can reduce the consumption of both energy and natural resources during the use phase minimising its impact on the environment. An example of such functional improvement is the consolidation of several components within an assembly and the creation of new material structures. There are examples in the aerospace sector of components that combine 20 parts into one, offering five times the durability and 25% less weight.

2. Digitise the company's spare parts inventory

Digital inventory allows companies to catalogue and store part of their products online instead of maintaining large physical inventory. Such a solution would enable manufacturers to have a digital file management system that gives instant access to design files, facilitating more agile, on-demand production.

The development of a digital inventory would enable faster access to repairing and spare part replacement options. Furthermore, if combined with the power of blockchain technology to protect the Intellectual Property of the digital file, this kind of solution can enable the development of local manufacturing and repairing networks. Moreover, the adoption of digital inventory can reduce warehousing and transport costs and lower demand spare parts, thus reducing costs for the manufacturers.

3. Incentivise sustainable production practices such as repairing, retrofitting, remanufacturing

Adopting sustainable manufacturing to increase product sustainability will need a transitional period in which incentives will support and promote the shift towards different production processes or value chains.

Digital and advanced manufacturing technologies play an essential role in the promotion of repairing, retrofitting, remanufacturing as they improve product performance and ensure better monitoring, transparency, and data-driven operation.

Promoting such solutions is important to create a policy and financial incentives framework that can guide and facilitate the manufacturers and consumers' green transition (e.g. tax break for integrating new green technologies in the production line).

Among the solutions suggested by the EC, it will be crucial that the introduction of product sustainability initiatives would be supported by:

- Improvement of access to finance for the production and consumption of more sustainable products
- Recognition of voluntary commitments by producers to increase the sustainability of their products
- Better use of standardisation to promote sustainability

4. Support circular business models

Business models play an important role in aligning value creation activities with opportunities to capture economic value.

Existing and future business models will need clear targets set at the EU level that measure these models' adoption rates and their impact on industry competitiveness. Furthermore, to increase the adoption of such business models, it will be critical to disseminate information (e.g. on the cost-effectiveness of such models) and monitor value chain challenges that could impact the sector's economic performances.

Two business models, among those one indicated by the EC, that could help with the transition towards faster development of more sustainable products are:

- On-demand production

Different sectors face the issue of stocking hundreds of thousands of spare parts. Therefore, there could be an excellent opportunity to develop new business models, which look at the digitalisation of inventories and distributed manufacturing facilities to provide a better service. This model ultimately allows greater flexibility, ease of production for small batches of parts, minimises warehouse stockpiling without limiting production volumes.

It must be noted that this model offers a smaller margin for error making inventories and makes manufacturers more dependent on supply chains to uphold their obligations. Therefore, effective implementation would require greater coordination across the supply chain.

- Product service system

Product-Service Systems has become an attractive business concept that creates high added value by integrated products and services, supporting networks and infrastructure. The system includes product maintenance, parts recycling and eventual product replacement, resulting in lower environmental impact over the product’s life cycle.

This business model can help both companies and customers. It allows creating a more customised and high-quality supply. It also opens new market opportunities and creates a competitive advantage by providing alternatives to standardisation and mass production. In addition to that, it provides better access to information about the product’s performance during its use.