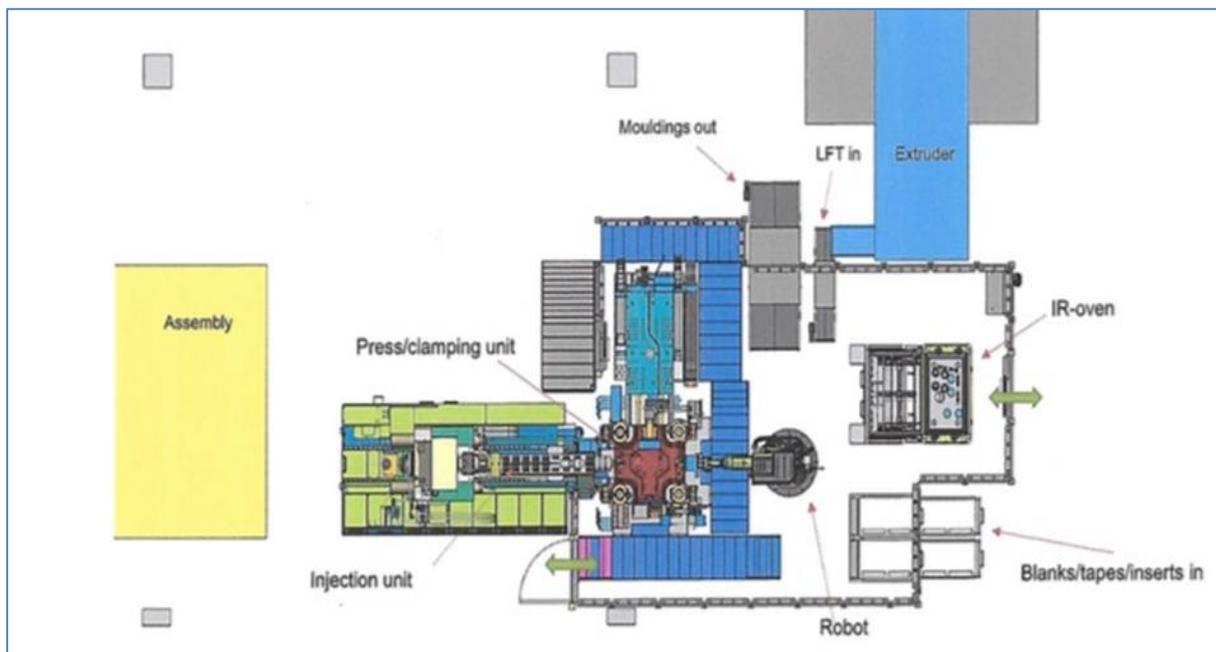


Pilot Plant for Multi-Material Engineering of Cost Efficient Structural Lightweight Thermoplastic Applications



Automotive Research “Smart Production Centre”

The Smart Production Center (or SPC) is a so-called 'shared facility' that, as a fully-fledged (TRL7) pilot plant, strives for an inspiring hybrid work, learning and research environment in which Multi-Material Engineering and Digital Twinning & Automation are the connecting basic blocks. An environment that is mainly driven by practical questions and projects from the business community and that focuses specifically on application development and production process optimization of cost-efficient lightweight thermoplastic (semi) structural parts in the (e-)Mobility¹ sector. An important element in this is the approach to use long fiber thermoplastic material (LFT) as a basis. LFT material is suitable for volume production and can be used cost-effectively.



The center is an initiative and part of the HAN research group Automotive Research and therefore part of the Academy of Engineering & Automotive (AEA). The SPC is currently located at the IPKW industrial estate in Arnhem. From 2021, the SPC will commit to the ConnectR initiative (www.connectr.nu), also located on the IPKW. Within ConnectR, the SPC will play a prominent role in developing cost-efficient lightweight applications that fundamentally contribute to energy savings and range extension of EVs (Electrical vehicles). In addition, the SPC will play an important role in linking (inter)national, regional companies and anyone who jointly wants to gain access to research, development or training.

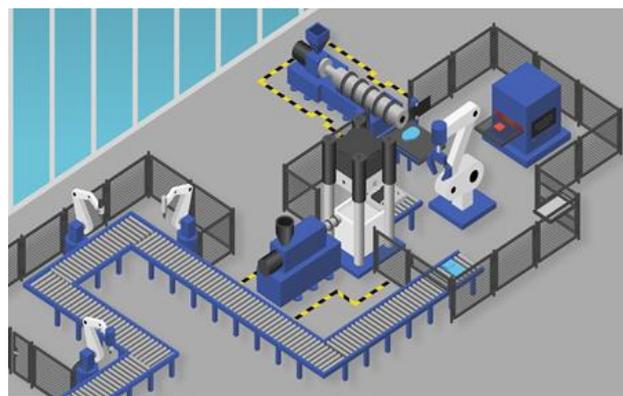
Objective SPC

The SPC has three main objectives:

- Business support in application development (TRL4-TRL7) in eMobility and industry (design/manufacturing/testing/optimization);
- Providing a practical training environment for students, researchers & teachers and business professionals;
- Providing knowledge dissemination specifically in the field of Multi-Material Engineering of cost-efficient lightweight thermoplastic composites and associated production optimization

These objectives cannot be seen separately from each other, they reinforce and accelerate each other and must be seen and treated as one cooperative system with multi-material engineering and automation as the connecting factor. This as a driving force behind application development for practical problems presented by the industry. In this way, the SPC can contribute to the industry in order to accelerate and thoroughly go through the innovation process (TRL levels 4 – 7, also called 'valley of death').

Practical problems and questions are translated into (research) projects that are carried out on the one hand via subsidy channels and/or on the other as paid work. In addition, the aim is to create a membership model to realize a basic source of income together with the provision of workshops, training and courses.



¹ Lightweight solutions are particularly important for reducing energy consumption in the aforementioned e-Mobility sector as a result of the battery weight, so that lower CO2 emissions can be achieved and a greater range (range)

Vision SPC

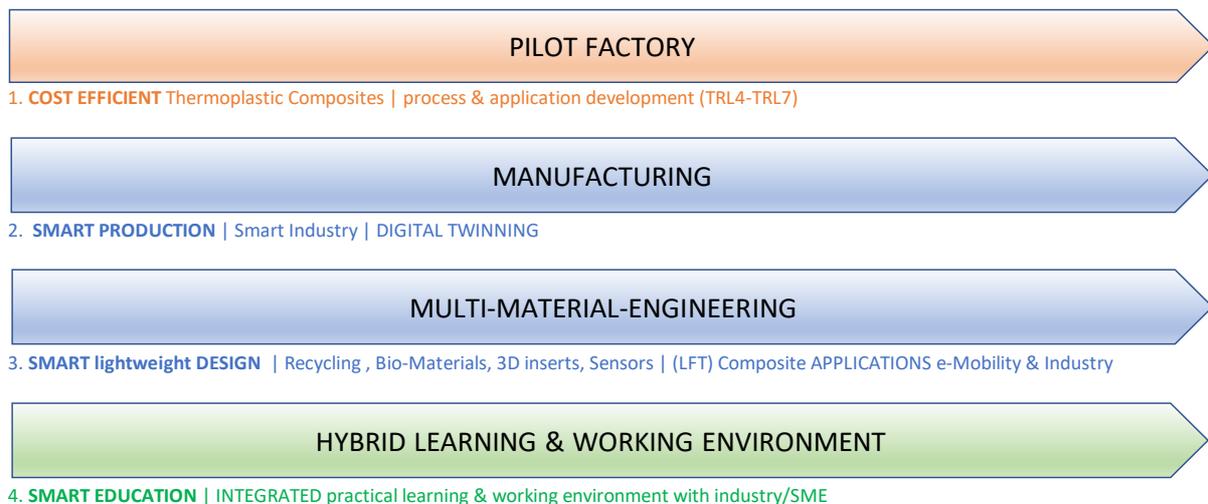
In 2026, the Smart Production Center will be the name for Multi-Material Engineering for application development and efficient production of lightweight cost-efficient thermoplastic composite applications in a hybrid learning and working environment in collaboration with SME/industry. It is a dynamic learning community, which, through this collaboration, is innovative for the business community as well as for higher education.

Mission SPC

The Smart Production Center is a catalyst or connector of practical knowledge. The center creates, shares and applies its knowledge. In addition, the center trains students, teachers, researchers and people from the business community within an open, equal, inspiring and practical learning and working environment. The questions of the business community, education and research are central to this, and joint efforts are made to create a sustainable world through practice-oriented projects.

Themes SPC

The Smart Production Center has four main themes in mind to support SME/industry in its application developments and the reinforcement of practice-oriented education:



The defined themes include various program lines such as "application of recycled materials, bio-materials and/or application of 3D Printed inserts", which can be flexibly implemented and made more specific depending on market demands.

The approach of the program lines is to focus on practical solutions and developments supported by more fundamental research from HAN and universities. The approach of the SPC is to divide the focus in such a way that:

- 20% of the projects to be carried out are at TRL 3 (master level),
- 80% of the projects to be carried out are market-oriented, application development, tangible results and are at TRL level 4 to 7 (bachelor's level),

SPC Financial

Introduction

At the moment, the SPC has already made a start by installation of a 200-ton press and a 6-axis robot with a periphery of a metal conveyor belt, suitable for a continuous oven and a delta robot. The current production setup is therefore suitable for small experimental projects. However, the ambition is higher and this requires more (necessary) structural support from SMEs/Industry. This ambition is defined in this context as SPC 2.0, with the aim to have the required hardware/production cell available by Q4/2023.

Investment (CAPEX)

This step forward requires an investment for hardware/equipment estimated at €3.2 million. The SPC hopes to be able to shape this innovation through a subsidized project. This means that the (local) governments can finance a maximum of 50% of the total costs, and that an own contribution is also requested from SMEs and industry.

Budget (OPEX)

The HAN has committed itself to pay the rent amounting to €120 k per annum.

Based on the current workforce of 3 FTE and increasing to 8 FTE in 2026, it is estimated that an OPEX is required that, including energy consumption and small tenders, will amount to €0.8 - 1 million per annum in 2026 (incl. rent).

Within the budget model, the aim is to use 60% of the time/capacity as a learning environment and on development projects, while the remaining 40% is used for small (serial) prototype production or projects commissioned by the business community.

Finally

The aim is to achieve cost neutrality with regard to the operational annual costs 5 years after the start of the SPC. In order to submit the innovation process and the subsidy application with the greatest possible chance of success, the SPC is looking for 5 to 6 parties/companies that want to participate in the project as partners. An SPC 2.0 application fee of €2,000 per party is requested in addition to commitment to support the SPC for the next 3-5 years.