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# D.4.1.
# Green and Digital Best Practice Report

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# Table of Contents

# 1. Introduction

This deliverable is a document, gathering best practice cases in the areas of digital and green transformation as an idea catalogue for SMEs. It is therefore part of Work Package 4.

The main objective of this Work Package is to strengthen SMEs in ATM and manufacturing industries by leveraging opportunities in digitalization, green economy and sustainability.

In the first step, also can be seen as preparation for the following tasks, best practice examples have been collected to create awareness and show how competitiveness can be strengthened.

# 2. Purpose

The purpose of this document is, highlighting the opportunities for digitization and sustainability and raise awareness that green and digital measures can strengthen competitiveness. We have identified and prepared best practice examples of green and digital transformation with exemplary effects for interested companies of the vehicle and manufacturing industries and, above all, show positive effects on the resilience of companies.

For this purpose, implemented projects from the automotive, transport, and mobility sector as well as examples from other industries, especially on a global level, were gathered.

The best practices are summarized in this report and will serve companies as a starting point for sustainable and digital transformation.

Gathering best practices of further companies will be an ongoing process thru the project.

# 3. Best Practice Cases

Some of the following best practice cases were collected until the end of March 2023. Further best practices were and will be added continuously and published on the ECCP Platform.

## 3.1. New Dimension – Webinars increasing the motivation for transformation

| 1. General information | |
|---|---|
| **Short description of the company** *(that has implemented a case in the context of green and digital transition)* | Name of the company (or Anonymous) |
| | New Dimension |
| | Size of the company (number of employees, annual turnover) |
| | <50 FTE |
| | Business purpose and core products of the company |
| | Innovation ecosystem actor and process innovation specialist. |
| | Affiliated companies, if applicable/relevant |
| | |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☒ **Auxiliary chain** |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | Cluster, Innovation centre |
| **Duration of the practice case implementation** | Begin date + End date |
| | 1.1.2021 - 31.12.2022 |
| **Funded** | ☐ No<br>☐ Yes ☐ regional ☒ **national** ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case** *max. ¾ page* | Which problem is addressed and what triggered the introduction of the practice case? |
| | insufficient motivation of some people to support twin transition |
| | Please describe the solution |
| | A series of webinars with innovative approach describes trends and basics in digitalisation in production companies and systemic approach towards implementation of digital technologies in automotive and mobility ecosystem, primarily to SMEs. |
| | Please describe the achieved benefit and/or expected input |
| | The current state of technology for the digitalisation of industry is at a far greater level than the people who use it. Therefore, to help people get along better with and embrace these technologies, they will learn about the |

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|---|---|
| | systematic process of putting digital technologies into practice and can personally support the implementation of this change. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | The webinars were prepared in a series that built on each other, allowing participants to interact and exchange experiences. They were recorded and the recording is stored on YouTube, where it is available for playback to other interested parties. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | Only local aspects were addressed |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | Yes, the digital technologies have no borders, but this specific best practise was implemented only in Moravian Silesian region, the results were distributed among other industrial clusters in Czechia |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | 40min lesson and 20 debate, only to pay preparation and lecturer for each session |
| | Why is the practice case considered as good? Please provide explanation. |
| | We have found the best format for to people, which is 40min where they pay attention to the lecturer and 20 min for Q/A and experience sharing, whit the ability to see the record of the webinar in YouTube and digest the information. |

| **3. Learnings, transferability of the development/implementation of the solution?** | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | Definition of right content and sequence of the lessons and tailor made it to the audience level. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | Definition of right target groups and potential attendees, duration of webinar max 1 hour and record available afterwards. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | Yes, the format successful |

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| **Contact details** | RESIST – Project partner |
| | AUTOKLASTR |

## 3.2. TastyAIR – Lego Games-App for Lean and Logistics - processes

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | Tasty Air |
| | Size of the company (number of employees, annual turnover) |
| | <20 FTE |
| | Business purpose and core products of the company |
| | Augmented and Virtual reality programs for industry |
| | Affiliated companies, if applicable/relevant |
| | |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☐ **Auxiliary chain** |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | Cluster, Innovation centrum, VET schools |
| **Duration of the practice case implementation** | Begin date + End date |
| | 1.1.2020 31.11.2022 |
| **Funded** | ☐ No<br>☐ Yes ☐ regional ☐ national ☐ **EU** |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case** max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | Classic lego games for lean processes and basic logistics are very good, but they are very demanding to prepare because they contain a lot of manuals and small parts that are often lost, all of which is lost when using a lego game on a tablet. |
| | Please describe the solution |
| | Android application for teaching LEAN processes and basics of legistic |
| | Please describe the achieved benefit and/or expected input |
| | In a short period of time, students will understand the basics of lean processes and logistics in a very innovative game and a very student-friendly game engine environment on a tablet |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | Classic lego game with pieces was transformed into digital game |

| | |
|---|---|
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | A team of 4 patners from Czehia, Spain and Portgual was involved. |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | Yes the project was piloted in Portugal, Spain and Czechia. |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | The core was to find a great game developer with willignes to learn how logistic and lean processes works, which might be very far away from what IT guys do. |
| | Why is the practice case considered as good? Please provide explanation. |
| | We considered this practise as a good example of integration a small company into a EU funded project with has significant impact on learning innovations in VET schools. |

| **3. Learnings, transferability of the development/implementation of the solution?** | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | Most difficult was the specification of scope of the project. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | A great cooperation within clusters, industry and VET Schools in Erasmus project. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | this type of project can be very well transferred to any educational needs that need to be digitalized and presented in a playful way to vocational high school students through gamification; the combination of a cluster, an industrial enterprise and a high school seems ideal |

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| **Contact details** | RESIST – Project partner |
| | AUTOKLASTR |

## 3.3. XOIA Extending Reality S.L – Augmented Factory

| 1. General information | |
|---|---|
| **Short description of the company** *(that has implemented a case in the context of green and digital transition)* | Name of the company (or Anonymous) |
| | *XOIA* Extending Reality S.L |
| | Size of the company (number of employees, annual turnover) |
| | 15 employees |
| | Business purpose and core products of the company, |
| | Development of augmented and virtual reality solutions. Products of the company: Augmented reality catalog, creation of technical manuals in augmented reality |
| | Affiliated companies, if applicable/relevant |
| | |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☒ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | Businees Factory AUTO Acelerator |
| **Duration of the practice case implementation** | Begin date + End date |
| | 10 months from to implement a solution in 4 companies |
| **Funded** | ☐ No<br>☒ Yes ☒ regional ☐ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case** max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | Procedures not standardized or digitized.<br>· Manuals in PDF: Difficult access in real time from the position<br>Long and expensive training of new staff<br>· Need for support and training for new profiles.<br>· Knowledge is lost due to retirement or staff turnover |
| | Please describe the solution |
| | AUGMENTED FACTORY: Our no-code platform for creating and viewing technical manuals in augmented reality. It enables technical personnel to execute complex procedures in machinery or environments with more agility, optimizing times and avoiding errors, as well as executing with solvency those that are not generate and update in real the immersive content manuals without the need for programming knowledge or 3D content generation.<br>The contribution of value and differential of AF with respect to other market solutions in the same line, is our No code platform, with which anyone without great digital skills can use the tool with a small learning curve and thus our clients Be autonomous when it comes to creating your own instructions, |

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|---|---|
| | manuals and procedures digitally, thanks to a very intuitive, immersive and agile-to-use 3D editor, specially designed for industrial processes and the users to whom it is directed.<br>Likewise, we have developed a system that allows us to easily apply artificial intelligence for the recognition of the industrial work environment itself, work cells, machines or complex industrial products and therefore does not depend on the installation of visual markers. In other words, access all the technical, training or operational information at a glance through a smartphone, tablet or HoloLens 2 device. |
| | Please describe the achieved benefit and/or expected input |
| | It has been possible to have a training for the positions of the plant that allows to carry out the training outside the production line, without the need for specialist trainers who must stop doing their usual tasks to train new workers. Furthermore, the training presents different levels of difficulty and an automated evaluation and certification system of workers at the end of their training. Adaptation difficulties are detected in certain operators.<br>- Training times are minimized.<br>- Indicators of non-ok parts are improved in new operators.<br>- The work of operators undergoing training at the plant is made possible, minimizing the needs of supervisors. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | We have developed a no-code platform that allows any technician to generate, in a simple and autonomous way, technical procedure manuals, such as maintenance, operations, door ready, etc., in augmented reality that are displayed on the machines or work environment where they are located. they are going to execute This allows any operator, from any part of the world, to have immediate access to the most complex technical knowledge and, at the same time, execute these procedures, with guarantees, safely and in less time, even if they have little or no experience. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | The problem has been resolved locally in different sectors but it can solve many more cases. |
| | Does the solution have an impact on international level, e.g., other companies' branches, affiliated companies or suppliers/customers? |
| | NO |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | Estimate around €120.000; Duration of the project 3 and a half months<br>Staff to implement the solution 6 people full-time |
| | Why is the practice case considered as good? Please provide explanation. |
| | With this project we wanted to change the paradigm of training and technical support in industrial companies or machinery manufacturers, conserving, centralizing and transferring knowledge immediately to any part of the world, in the most visual and simple way possible.<br>Objectives:<br>50-85% reduction in the time required for physical training in the workplace.<br>Reduction of the participation of expert operators during training.<br>Objective evaluation of the training/selection process in relation to:<br>• Average time required.<br>• Time needed to pass the entrance test. |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | Due to the variety and particularities of each of the technologies available to the factories (cold stamping, welding by resistance, machining, shot blasting, etc.), the formation, the training and qualification of personnel for work in each one of them is key to achieve efficiencies, standards of safety and quality required in each installation. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | We would ask you to provide us with 3D models to identify operations adaptable to this kind of technologies<br>- Digitization of procedures. Very manual operations with organic movements such as tactile review<br>- - Training and adaptation of users to the new tool. I know observes learning curve and speed increase in operations with the use.<br>We would also ask There was no CAD of the containers of the parts to be used and to through a location map and audiovisual material, was necessary to replicate the space to train the use of equipment, also validating the ergonomics of the workplace for the operational operation. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | AUGMENTED FACTORY has been successfully applied to create technical manuals that guide operators during the supervision, control and maintenance of industrial processes. These manuals using visual elements overlapping the image of the real world captured by a camera, manage to improve the industrial process reducing economic costs, training time and operator accidents. AR manuals promise easier updates, improved storage, and an easier transition than bulky paper manuals. These features help companies reduce costs and stay up-to-date with rapid product changes. Primarily, AR manuals streamline and simplify the delivery of converted documents to clients in their native languages. AR manuals also help users avoid mistakes and save time. |

| **Contact details** | *RESIST – Project partner* |
|---|---|
| | *CEAGA* |

## 3.4. InyCom S.A – Sustainable energy management

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | Instrumentación y Componentes S.A |
| | Size of the company (number of employees, annual turnover) |
| | 900 |
| | Business purpose and core products of the company |
| | Digital solutions for Industry |
| | Affiliated companies, if applicable/relevant |
| | Inycom is a Spanish technology company . Founded in 1982, Inycom has a long recognized experience, core business consists in providing high quality technology solutions and services in different fields including Information and Communications Technologies, Energy, Digital Businesses, Laboratory and Healthcare, Biotechnology, and turnkey Engineering projects. The focus on innovation is one of the keys of its successful history, and the one enhancing the added value offered to its clients. |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☒ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | BFA (Business Factory Auto) and Internal Innovating Program |
| **Duration of the practice case implementation** | Begin date + End date |
| | 2019-2022 |
| **Funded** | ☒ No<br>☐ Yes ☐ regional ☐ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case**<br>max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | The cost of energy is an issue for businesses and sustainability is a necessity. We need to understand how much energy each type of production consumes, and we must also value sustainability in an objective way. |
| | Please describe the solution |
| | Innetik is service with a SaaS solution that promotes energy intelligence and sustainability of operations that allows understanding the impact of productive activity in a unitary way and with a simple global understanding for own use or third parties. |
| | Please describe the achieved benefit and/or expected input |
| | Innetik allows you to eliminate the initial CAPEX of monitoring solutions, as well as provide a team of experts for analysis during data exploitation. We differentiate ourselves from other platforms that only offer monitoring with our algorithm-based analysis systems as well as specific functionalities for sustainability. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | Innetik offers its customers an energy analysis platform with complementary functionalities such as the detection of anomalies in consumption and the monitoring of product carbon footprint in real time or the certification of renewable energy adhered to the product with unit traceability by blockchain. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | The challenges of the project have been solved by the researchers of the Inycom and Inycom Innova project. |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | During the initial phases of the market Innetik will be tested in Spain, but its development projection is international in the coming years. |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | It is complex to give an exact figure since the knowledge of many internal technologists to INYCOM has been involved but the project has been estimated at an initial impulse for development of € 100,000 of own founding and a team of 6 people. |
| | Why is the practice case considered as good? Please provide explanation. |
| | We have achieved functional results that are already on the market especially in the first phase of the project with Connetik which is the plug & data hardware platform that offers monitoring support to Innetik. Regarding the second phase of development there are also good results in relation to the anomaly detection algorithms and the unitary certification of renewable energy with blockchain being in the final phase of impulse. Finally, the real-time carbon footprint monitoring module has already been incorporated into Connetik (phase 1) and is already on the market. |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | In algorithm training it has been a complex issue during the project but the capacity of our researchers has solved it successfully. We have also encountered problems in the automation and integration of data due to not having and testing infrastructure in our demonstrator company, this situation we have solved with our own means. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | We have learned that the integration of this type of solutions in target companies depends to a large extent on the digital maturity of production systems and software that is sometimes obsolete. That is why we are working on new developments that solve this gap. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | The problem of sustainability is a global problem and the search for efficiency in the operation is a challenge that is always active, more with the energy costs of recent years, so we consider that project knowledge can be extrapolated internationally and the problem to be solved will be common. |

| **Contact details** | RESIST – Project partner |
|---|---|
| | Benito.grande@inycom.es |

## 3.5. STREIT MECANIQUE – Digitalisation of the shop floor information flow

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | STREIT MECANIQUE |
| | Size of the company (number of employees, annual turnover) |
| | 150 people, 30 M€ |
| | Business purpose and core products of the company |
| | Machining and assembling parts for automotive mainly |
| | Affiliated companies, if applicable/relevant |
| | STREIT GROUPE gathers 4 plants : STREIT MECA, STREIT TECHNICAL CENTER (engineering), STREIT NOVA in Serbia, STREIT MEXICO |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☒ Tier 2 ☐ Tier 3 ☐ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | / |
| **Duration of the practice case implementation** | Begin date + End date |
| | 2018 + still in process |
| **Funded** | ☐ No<br>☐ Yes ☒ regional ☒ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case**<br>max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | Feedback from plant was only done with papers. It was difficult to control and share them, and there was no way to have long term data. Thus, operator spent a lot of time finding his team leader, who needed to go to maintenance office to put a paper bill to ask for intervention.<br>The introduction of an ERP (X3) was the starter to build an interface between worker and database, because none was provided by X3 when we bought this solution. |
| | Please describe the solution |
| | We put PCs on each cell of the workshop, and developed an internal solution using Excel + SQL connectors (with all data in X3). Operators could then directly send to X3 data of stock movements + quantity produced + times of failure.<br>Then ANDON system was developed, to let operators send an alarm every time something's wrong on a machine. Then, everybody knows the status of each machine in the plant, real time |
| | Please describe the achieved benefit and/or expected input |
| | Everybody in the plant (top management, method technicians, production manager, people working from home, etc.) can read data from cells they are following, real time.<br>Target for each operation of each part number is recorded in only 1 cell (in the routing in X3), and shared to everybody. Then, it can be adapted easily in case of change on the process, and operators will immediately know how many parts are required per shift.<br>We save a lot of time in terms of reactivity, and management of priorities. Before, operators could spent more than 5 min to get someone to help him. Now it's less than 2 min, and even less if his machine is in top prority. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | Developing internal solution allowed real time and continuous changes to adapt solution to what was needed exactly. It was built brick after brick during 3-4 years, keeping what was necessary, and leaving what was actually not useful.<br>Then, after prototyping on Excel, more sustainable application are used (no-code web app, MES). Defining what is required was easier, having already an efficient solution in use. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | Local |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | We developed same solution in our Serbian plant, copying the French one. |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | 1 PC per cell (standard one) with Excel + explorer<br>0,5 people full time to develop, train and maintain. |
| | Why is the practice case considered as good? Please provide explanation. |
| | A failure in the data network sometimes happens. Then managers are lost without data, and realize how they became dependent of them to manage the workshop ! |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | Developing internal solution makes it work in a "prototype way" during few years, until a more sustainable solution is found. That means man-dependence and lots of corrections to make. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | Operators are ready to leave paper and use computers. Their global use of smartphone make them efficient on web-app, almost without training.<br>Using web apps instead of Office allows not to be dependant from PC configurations.<br>Digitalization offers so many possibilities, that once the interface is set up, we frequently find new ideas of development that can be useful daily. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | In order to put the operator in the centre of the plant, we must give him all tools available to share information, all information he needs to perform, and warn people that may support him. In that approach, we realize digitalization is really powerful to let him concentrate on the added value of his work. |

| | |
|---|---|
| **Contact details** | RESIST – Project partner Pole vehicule du future |

## 3.6. AGS-Engineering GmbH – Automated Welding in Batch Size One

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | AGS-Engineering GmbH |
| | Size of the company (number of employees, annual turnover) |
| | 55 people, 7.5 M€ |
| | Business purpose and core products of the company |
| | Automation & robotics, special machines, industrial data, retrofit |
| | Affiliated companies, if applicable/relevant |
| | - |
| **Position in the value chain** | ☐ OEM ☒ Tier 1 ☐ Tier 2 ☐ Tier 3 ☒ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | Kuka & Fronius as component and partial solution suppliers |
| **Duration of the practice case implementation** | Begin date + End date |
| | 2020-2021 |
| **Funded** | ☒ No<br>☐ Yes ☐ regional ☐ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case**<br>max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | The aim of the project was to automate welding processes up to batch size 1. Time and resource savings, despite programming effort for the first prototype in each case, which at batch size 1 simultaneously represents the finished product. |
| | Please describe the solution |
| | This solution combines the best of robotics and welding technology with DELFOI's CAD-CAM software. This enabled automatic path generation through geometry-based robot programming. Which enables the programming of a weld seam with only one mouse click. For complex welds with corners and gaps, a topology analysis is performed. Problems are analyzed using the check function. |
| | Please describe the achieved benefit and/or expected input |
| | A practical comparison with manual welding provides the proof: some of the first prototypes showed significant time savings of up to 50%. For recurring parts, the programming effort is also saved. "Using the software is very easy and is quick to learn, even for newcomers to offline programming. Very practical, ready-made templates significantly shorten the programming time. In addition, possible collisions are detected in advance by means of simulation and a so-called path check, which checks each individual welding position within seconds. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | The interaction of the solutions from KUKA, Fronius and DELFOI - but above all the know-how in offline programming and in the implementation of programming. This saves resources. Automated welding in batch size 1 with less time than manual welding. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | Local |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | The solution can be used internationally and in any industry that require welding |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | Upon request |
| | Why is the practice case considered as good? Please provide explanation. |
| | This solution is a technological masterpiece and saves resources in terms of employees, time and materials. It is consistent in terms of quality, thus increasing the company's competitiveness. |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | To optimize the interaction of the individual components and especially the connection of the CAD CAM solution from DELFOI to Kuka (offline programming). In this area, improvements were necessary in the model transfer in order to optimize the programming of welding tracks. Likewise, the optimization of model referencing using Fronius "Touchsense" in order to obtain an optimal weld seam. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | The virtual commissioning of the plant, i.e. the simulation with the real data, was the prerequisite for the successful creation of the plant at that time and is now state of the art in the development of our plants. In the meantime, the VIBN is carried out for each of our plants. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | If a company in these sectors have many different parts in small batch sizes (down to batch size 1) this technology package would be a perfect welding solution. |

| | |
|---|---|
| **Contact details** | RESIST – Project partner: Business Upper Austria – Mechatronics Cluster |

## 3.7. SEMA Maschinenbau GmbH – Virtual commissioning

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | SEMA Maschinenbau GmbH |
| | Size of the company (number of employees, annual turnover) |
| | 210 MA, 30 Mio Turnover |
| | Business purpose and core products of the company |
| | Full-service provider for machine components, automation, and service worldwide |
| | Affiliated companies, if applicable/relevant |
| | |
| **Position in the value chain** | ☐ OEM ☒ Tier 1 ☒ Tier 2 ☐ Tier 3 ☐ Auxiliary chain |
| **Implementation of the practice case supported by …** | University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | Machineering GmbH |
| **Duration of the practice case implementation** | Begin date + End date |
| | 2016 until 2017 |
| **Funded** | ☐ No<br>☐ Yes ☐ regional ☒ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case**<br>max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | Project lead times too long, design errors or conceptual errors, cycle time analyses were very inaccurate |
| | Please describe the solution |
| | Virtual commissioning requires that the design and programming are partly carried out in parallel, which in turn enables the system to be simulated with iPhysics software even before mechanical production.<br>Errors in the design/concept/programming become apparent. The real controller with the real program controls the virtual machine (SIL) - innovation since 2023: the real controller has been replaced by a virtual one and SIL² has thus been implemented. |
| | Please describe the achieved benefit and/or expected input |
| | Clarity of processes, project lead time reduced by approx. one month - especially commissioning is shortened as a result. Despite additional expenditure for simulation - low overall expenditure. Collisions are easily recognizable; customer contact and sales and customer satisfaction are increased |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | Less damage during commissioning, test runs, less travel time, therefore less CO2 emissions. Testing the machine in virtual space saves energy costs. Completely automatic collision analysis - stop in the event of a collision. Program or feasibility for machining several workpieces (rotary transfer machines) can be tested.<br>Digital twin for the machine enables predictive maintenance in the future |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | regional level & bavarian |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies, or suppliers/customers? |
| | In future, customers will be able to use the digital twin and monitor the machine. |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | HR 1 Person year, Software ca 30k € |
| | Why is the practice case considered as good? Please provide explanation. |
| | Because the project was able to fulfil most expectations and thus increase adaptability and resilience. |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | At the beginning - different ideas of what exactly the solution should be able to do Finity element analysis, motor designs, etc. cannot be implemented directly - separate simulations are necessary for this - computing times - software; change of organization - rethinking and reorganizing processes was a challenge. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | There was previously only limited good communication between the assembly, design, e-design and control technology departments - this has been improved by the new parallel process. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | This solution can be used in all countries and industries - especially in machine and plant construction - but the VIBN can also be used in special machine construction - SW works with all common PLCs, and the human factor can also be considered. |

| **Contact details** | RESIST – Project partner |
|---|---|
| | Mechatronics Cluster – Business Upper Austria |

## 3.8. framag Industrieanlagenbau GmbH – Digital twin in the development process

| 1. General information | |
|---|---|
| **Short description of the company** (that has implemented a case in the context of green and digital transition) | Name of the company (or Anonymous) |
| | framag Industrieanlagenbau GmbH |
| | Size of the company (number of employees, annual turnover) |
| | 111 Employees, 17 Mio. € Turnover (2017) |
| | Business purpose and core products of the company |
| | Production of machine tools for metalworking |
| | Affiliated companies, if applicable/relevant |
| | - |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☒ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | RISC Software GmbH, Mechatronics Cluster – Business Upper Austria |
| **Duration of the practice case implementation** | Begin date + End date |
| | 12/2019 – 6/2021 |
| **Funded** | ☐ No<br>☒ Yes ☒ regional ☐ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case**<br>max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | The process for the development of machines and systems, in this case the development of sawing machines, was set up in such a way that the different technical departments worked sequentially and therefore very independently and without close exchange during the development phase. This can result in additional work at the customer side to achieve an optimal technical solution. |
| | Please describe the solution |
| | The modelling of a digital twin of the plant, which includes physical parameters in addition to the 3D representation, made it possible for the various development departments to work efficiently, largely in parallel.<br>Through the iPhysics software, the sawing sequence can be simulated in this way deviations can be detected, and countermeasures can be taken at an early design stage.<br>The Virtual Commissioning made also possible by the Digital Twin |
| | Please describe the achieved benefit and/or expected input |
| | The quality of the machine is higher than before, the time to market/customer is also less than before, the riscs that belongs to the commissioning of the machine are significant lesser than before. |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | By using the digital twin, future sawing projects can already be checked in the pre-project phase to see whether the machine concept meets the customer's requirements. By mapping the machine, the tool and the sawing sequence as a combined and complete digital twin, specifications such as cycle times to be achieved non-productive times such as material handling and other things can be checked in advance. Thus, the customer can be offered an absolutely unrivalled level of security that his machine investment will also meet the set requirements. This added value will secure framag's role as technology leader in the field of circular saws also in the future and first feedback from customers confirm the relevance of this topic. |
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | On a local level with a software tool from a German SME |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | The solution is transferable to every industry with a mechatronical product portfolio which has complex requirements. |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | About 150k € internal and external personal cost were running into this project |
| | Why is the practice case considered as good? Please provide explanation. |
| | The findings from the project can also be transferred to other product areas at framag. By detecting the wear, the process can be kept in an optimal range and thus resources can be saved. |

| 3. Learnings, transferability of the development/implementation of the solution? | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | The biggest difficulties arose in the transition from a sequential to a parallel way of working, as employees had to adjust to a new way of working. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | Higher product quality can be achieved by running engineering processes parallel instate of in a sequence. This was made possible by the introduction of a virtual commissioning model, which represents the digital link (digital-twin) between the disciplines. |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | This application is, as already described, transferable to many industries. Not only in the field of mechanical engineering, but also as a manufacturing company, this approach can be part of a retrofit project and the current possibilities in the field of digitization and resource conservation should be considered when purchasing a new machine. |

| **Contact details** | RESIST – Project partner |
|---|---|
| | Mechatronics Cluster – Business Upper Austria |

## 3.9. Core Logic – Fleet Management

| 1. General information | |
|---|---|
| **Short description of the company** *(that has implemented a case in the context of green and digital transition)* | Name of the company (or Anonymous) |
| | Core Logic |
| | Size of the company (number of employees, annual turnover) |
| | 50 |
| | Business purpose and core products of the company |
| | Software house, software development |
| | Affiliated companies, if applicable/relevant |
| | |
| **Position in the value chain** | ☐ OEM ☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☐ Auxiliary chain |
| **Implementation of the practice case supported by …** | if applicable<br>e.g.<br>University, private R&D institution, …<br>Solution provider, Supplier, Customer, or other company, …<br>Consultant, Business Support organization, or Chamber of Commerce, … |
| | *private* |
| **Duration of the practice case implementation** | *Start date + End date* |
| | *12-2021+04-2022* |
| **Funded** | ☒ No<br>☐ Yes ☐ regional ☐ national ☐ EU |

| 2. Detailed description | |
|---|---|
| **Summary of the best practice case** max. ¾ page | Which problem is addressed and what triggered the introduction of the practice case? |
| | Limited fleet service availability (lack of vehicles in zones with high demand – service not available for customers) |
| | Please describe the solution |
| | Relocation module based on A.I. technology predicts supply of cars and users' demand and shares suggestions to main systems in real time. |
| | Please describe the achieved benefit and/or expected input |
| | Implementing solution increased fleet availability 13-15% |
| | What are the innovations in the field of digitalization and/or sustainability? |
| | Higher service availability, increase usage of fleet, transparency, opportunities to save the money |

| | |
|---|---|
| | Has the problem been solved on a local level or have international experts, etc. been involved in the innovations? |
| | Local level |
| | Does the solution have an impact on international level, e.g. other companies' branches, affiliated companies or suppliers/customers? |
| | Not at the moment |
| | Please estimate funding/financial resources, human resources and other resources needed to implement the solution. |
| | 20 000 Euro's |
| | Why is the practice case considered as good? Please provide explanation. |
| | Predicting cars supply provides better coverage for high demand zones, brings service on higher level without investing in additional fleet purchase |

| **3. Learnings, transferability of the development/implementation of the solution?** | |
|---|---|
| **Difficulties occurred + solved** | Which difficulties arose during the implementation and how were they solved? |
| | Not enough data for machine to create algorithm for sufficient prediction. Implementation expanded in time. Took longer time for implementation than expected, more data was deeded for longer time frame. |
| **Lessons learnt** | What are the lessons learnt within the company? |
| | A.I. technology in this case may help to reduce fleet size |
| **Transferability to SME in the vehicle / manufacturing sector in other regions or countries?** | Please briefly elaborate transfer potential – why do you consider this solution (or some aspects of it) as being potentially interesting for other regions to learn from, or other companies to apply similar approach? |
| | Lesser investment and less cars may create better coverage in zones for high demand. Better service for end users with less fleet. Fleet optimalisation |

| | |
|---|---|
| **Contact details** | Company |
| | Core Logic, 30-065 Krakow, Radwanskiego 15/1<br>Kris Zadlo: kzadlo@core-logic.com |