

DOCUMENT TITLE:

GOOD PRACTICE REPORT FOR BULGARIA

**Project: Improving RD and business policy conditions for
transnational cooperation in the manufacturing industry**

Acronym: Smart Factory Hub

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PU	Public	
PP	Restricted to other Programme participants	
RE	Restricted to a group specified by the consortium	X
CO	Confidential, only for members of the consortium	

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1 INTRODUCTION

Regional Good Practice Report for Bulgaria contains five good practices collected using the Good Practice Template developed in D4.2.1.

The data in this report was collected during September – December 2017 as part of the project entitled “*Improving RD and Business Policy for Transnational Cooperation in the Manufacturing Industry – Smart Factory Hub (SFH)*”.

These five examples are the basis of the regional report, the Handbook tool report and the Good Practice Handbook, which together with the Mapping tool will allow project partners to present and promote specific smart manufacturing solutions. Based on the collected data, the Handbook tool report will be prepared by the UTC-N, WP4 leader.

The handbook will be available in electronic format on the web portal, while, for disseminating the work package, also 250 handbooks will be printed, which will be available to the participants at the closing dissemination event.

The data collected during this period will also be used for ex-ante evaluation.

ICT Cluster collected the following good practices cases:

No.	Name of the Good Practice	Classification ¹
1	IT Photovoltaic System - IT PS	Other: (Solar photovoltaic system)
2	KOMANDIR.NET	Other: (PLM) System
3	ALES – Automatic Laser Engraving System	Robotics
4	Sigma – modular system	Robotics
5	Computer Numerical Control (CNC) Machine –M550/M450/	Robotics

¹ According GOOD PRACTICE GUIDELINES

2 GP1: IT Photovoltaic System - IT PS ²

Photo of the contact person



IT Industrial Technologies

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Keywords : Photovoltaic, Solar, System, Electricity, Green, Cost Efficiency, Power Supply
Good practice applied in: (NACE code) : C26.4 - Manufacture of consumer electronics

Paste here the text form template which is written in: "Provide a concise description of the good practice being addressed"

Photovoltaic System installed on the roof and the parking lot of the factory providing electricity and lowering the company's expenses. The system is custom made from metal frames, photovoltaic panels, voltage invertors and switch, serving as both shelter and electricity provider.

2.1 GOOD PRACTICE DESCRIPTION

The high electricity expenses of the factory, made it necessary to find an alternative solution for power supply using new technologies.

The good practice is tied to the Smart factory hub's approach in relation to the cost efficiency of the production process.

The innovation is that the construction of the system is used also as a parking shelter and at the same time is a power supply provider reducing the electricity cost for the production by 50%
In Sofia region there is no other factory that is using solar electricity in the production process.

2.2 OBJECTIVE AND TARGET AUDIENCE

The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company only, but it could be implemented in small, medium and large manufacturing companies also in public institutions.

² Corresponding with Name or acronym field from Good practice questionnaire

2.3 METHODOLOGICAL APPROACH

The good practice is targeted cost efficiency of the production process.

The good practice is easy to be implemented. The company needs to identify the added value of using solar technologies in the production process. For implementing the good practice, the company needs to allocate financial resources for building a metal structure and installing photovoltaic panels at any open space near the company. The expenses depends on the size of the company.

2.4 VALIDATION PROCESS

The validation process was completed within the factory and comprised in the analysis and comparison of the power supply expenses before and after implementation of the system.

2.5 RESULTS / IMPACT

The implementation of the system has positive impact on company production process related to decrease of production costs.

2.6 SUCCESS FACTORS AND CONSTRAINTS

The technical and implementation limitations depends on the open area that the company has. Also the use of the good practice could be limited by national legal issues. The system is custom made and the financial investment is lower than the systems offered by other brands. The system could be improved with installing an accumulator for storing the produced energy when the factory is not working.

2.7 LESSON LEARNED & SUSTAINABILITY

The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost.

2.8 REPLICABILITY AND UP SCALING

The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost. The good practice could be implemented by every manufacturing company.

2.9 FINAL REMARKS

The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost.

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3 GP1: KOMANDIR.NET - Product Lifecycle Management (PLM) System³



Photo of the contact person

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Keywords : Product Lifecycle Management (PLM) System, Optimization, Management, Constant monitoring, Automated process, Remote access, Terminals, Cloud

Good practice applied in: (NACE code) : C25 - Manufacture of fabricated metal products, except machinery and equipment

The good practice is a system for manufacturing management aiming to optimize and digitalize the manufacturing process in the factory through:

- Automate the preparation of accompanying technological documentation in accordance with ISO 9001: 2000 (order documents, complete maps, route cards, etc);
- Automated transmission of tasks from one workplace/machine to another via computer terminals;
- Permanent monitoring of the condition of the parts and the nodes;
- Timing reports for each product at every operation;
- References for workers working on each operation for each detail according to ISO 9001: 2000;
- Remote access to production data with the ability to change the priority for order execution;

Others.

The system consists of network of computer terminals, cloud based server, and computers, smartphones, tablets etc.

KOMANDIR.NET system operates using Google apps.

3.1 GOOD PRACTICE DESCRIPTION

The SME created the good practice through finding the need of optimizing the manufacturing process and prioritising the order execution.

³ Corresponding with Name or acronym field from Good practice questionnaire

The good practice is strongly linked to the SFH approach by implementing a smart system for optimizing the ensuring production process and cost efficiency and quality assurance.

The network of terminals ensures good digital control over the production process. Being cloud based allows the system to be accessed remotely by any type of digital device. Using google apps makes the implementation cost low and compatible with wide range of devices.

The system is custom made so it is not known whether there is a competitor using similar system in their work process.

3.2 OBJECTIVE AND TARGET AUDIENCE

The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company only. However the system could be implemented in small, medium and large manufacturing companies;

Another systems that need visualisation, monitoring, control and prioritization of different kind of tasks/processes.

3.3 METHODOLOGICAL APPROACH

The good practice is targeted quality assurance of the production process.

Because of the remote use of free software on wide range of devices the system is easily implemented for the need of production lifecycle process management.

For implementing the good practice, the company needs to allocate financial resources for installing terminals on every step of the manufacturing process.

3.4 VALIDATION PROCESS

The validation process was completed in 6 months within the factory with help of some IT experts nearby, and comprised in the analysis and comparison of the work process and the before and after implementation of the system.

3.5 RESULTS / IMPACT

The implementation of the system has positive impact on company production process related to time optimization and order prioritizing.

3.6 SUCCESS FACTORS AND CONSTRAINTS

Because of low volume of data and performance needed form da system their limitations will be reached when the terminals (and relevant workplaces/machines) are more than 100, and/or the server DB/Internet connection to the cloud reach their limits, but this is subject of additional researches and tests.

The system is custom made and it could give an easy way for remote monitoring and reporting of the manufacturing process from the beginning (taking the order) to the finish (completing the order). The use of open source hardware and software reduces the cost of the system significantly.

The system could be improved with installing an audio and video connectivity on every terminal for faster and better management of the work process.

3.7 LESSON LEARNED & SUSTAINABILITY

The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the products and the positive feedback from the clients.

The system is sustainable because of their low cost not only for the establishing, but also for it's support and improvement, being in the same time high efficient and reliable.

3.8 REPLICABILITY AND UP SCALING

The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the product and the positive feedback from the clients

The good practice could be implemented in every company where there is a need of monitoring a numerous process at once and optimizing the time for completing certain tasks

3.9 FINAL REMARKS

The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the product and the positive feedback from the clients

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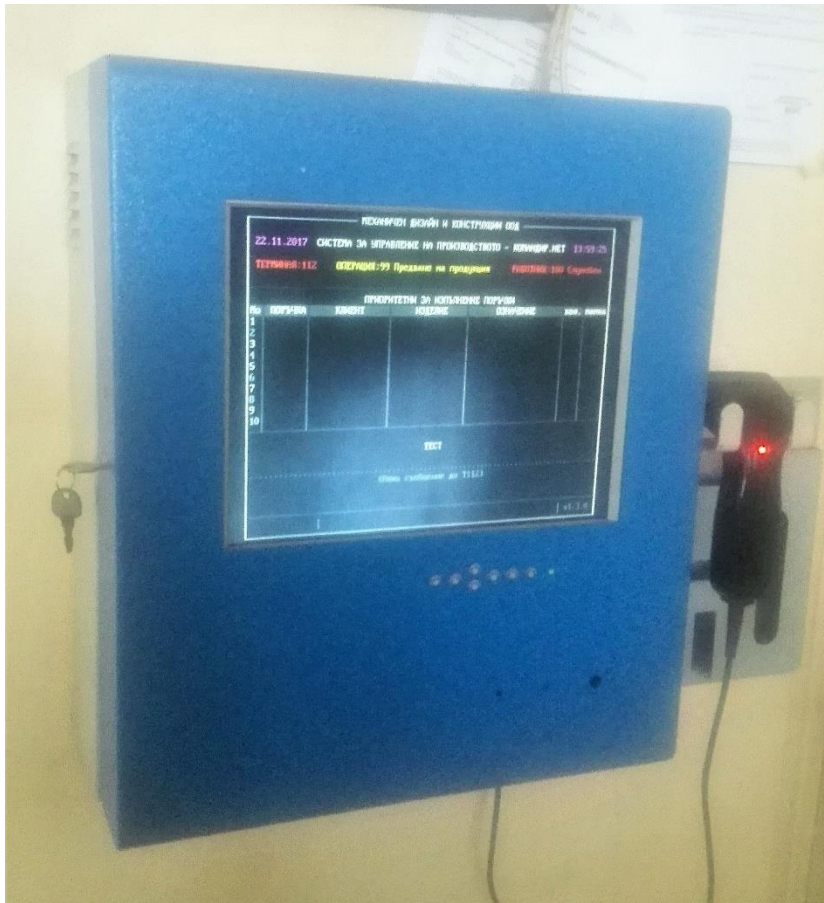
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www.komandir.net







4 GP3: ALES – Automatic Laser Engraving System⁴



Photo of the contact person

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Keywords : Laser, Stepper motor, Arduino, Automation

Good practice applied in: (NACE code) :

C25 - Manufacture of fabricated metal products, except machinery and equipment

The system is a good practice for implementing automatic technologies in a hand process in order to optimize the process and increase the productivity of the company. The good practice consist of a laser, a metal disc with slots for placing the metal plates, which is rotated by a stepper motor, controlled by an Arduino computer.

4.1 GOOD PRACTICE DESCRIPTION

The idea and the creation of the good practice came with the need of the factory to be competitive on the market. The automation of the process increase the productivity and reduce the production cost.

Implementing computer in the manufacturing and automation of the production process is the base of the SFH approach. Self-operating system improves the production process, cost efficiency as well as the risk management.

The technical solution if the good practice is simple, but effective. Arduino computer controls the stepper motor rotating the metal disc allowing the laser to brand higher number of products in smaller amount of time.

The system is custom made so it is not known whether there is a competitor using similar solution for the process production.

⁴ Corresponding with Name or acronym field from Good practice questionnaire

4.2 OBJECTIVE AND TARGET AUDIENCE

The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company in order to increase the productivity and optimize the production process. The system is applicable for SMEs and Large companies.

4.3 METHODOLOGICAL APPROACH

The automation of the production process increase the productivity and lowers cost for manufacturing.

The consistency of the stepper motor ensures the quality of the laser engraving.

The automation of the production require human intervention only when the process is finished. This ensures the safety of the worker since the laser is harmful for the human sight.

The simplicity of the system allows easy implementation.

The needed resources for implementation are financial for buying the necessary technologies and personnel for programming the functionality and calibrating the laser with the motor.

4.4 VALIDATION PROCESS

The validation process was completed within the work process in the factory and comprised in the analysis and comparison of the productivity before and after implementation of the good practice.

4.5 RESULTS / IMPACT

With the implementation of the good practice the increase of the production is nearly 200% as well the automation process saves the personnel time.

4.6 SUCCESS FACTORS AND CONSTRAINTS

The limitations from technical point are the size of the metal product and placing it in horizontal position for engraving. No limitation in implementation.

Since the system is custom made there is no other known system for this type of production. The system is easy to work with and the automation process has low power consumption.

The system have been improved with a visual and sound signal indicating the finishing of the process. The further automation of the whole process will be a good way for improving the impact of the good practice – automatic unload of the finished products and setting the metal plates for the next batch.

4.7 LESSON LEARNED & SUSTAINABILITY

The automation of the process because of the good practice saves time, less personnel needed, increases productivity with all that the factory has increased its competitiveness.

4.8 REPLICABILITY AND UP SCALING

The solution is a good example of implementing smart technologies in order to increase the productivity and save time in the work process.

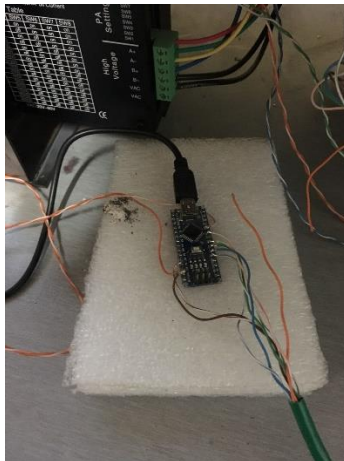
4.9 FINAL REMARKS

Creating and implementing the good practice in the work process increased the productivity and the competitiveness of the manufacturer.

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5 GP4: Sigma – modular system ⁵

Photo of the contact person



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Keywords : Microelectronics, Co-bots, Modular, Automation

Good practice applied in: (NACE code) : C26.4 - Manufacture of consumer electronics

The system Sigma is a modular printing system which consists of flexible conveyor belt and collaborative robots (co-bots)

5.1 GOOD PRACTICE DESCRIPTION

The Sigma system was developed in evolutionary way with the need of the company to increase the productivity.

The developing of a system like Sigma and integrating robots in the work process increase the production process, assure quality as well as cost efficiency.

Collaborative robots (co-bots) integrated in the production increases speed and the precision of manufacturing which is critical in microelectronics components

5.2 OBJECTIVE AND TARGET AUDIENCE

For now the system is developed and used for the benefits of the company in Sofia, Bulgaria.

The good practice could be useful for companies that need quality precise manufacturing.

5.3 METHODOLOGICAL APPROACH

The cost efficiency of the system shows in the lowering the personnel needed for production as well as the expenses for maintaining the co-bots is lower than a minimum wage.

The precision of the robots is far better than the human production which assures better quality especially in the sector electronic components.

⁵ Corresponding with Name or acronym field from Good practice questionnaire

Because of the modular character of the system the good practice could be easily implemented, and customize for the needs of the company

The main resources used for developing the good practice are financial as well as timespan of 3 years for creating testing and validation

5.4 VALIDATION PROCESS

The evolutionary way of developing Sigma system started the validation process from the beginning. The Validation methods used are lean manufacturing as well as value stream mapping.

5.5 RESULTS / IMPACT

The impact on the company has been positive. Reducing the needed personnel for the same task from 9 to 2 and at the same time increasing the production.

5.6 SUCCESS FACTORS AND CONSTRAINTS

There are no technical or implementation limitation known at this moment.

The modular characteristic of the good practice is the biggest advantage which allows the quick modification of the system and quick development of new products

The Sigma system could be improved with sensors for quality control and tracking the production process

5.7 LESSON LEARNED & SUSTAINABILITY

Sigma is a great examples how automation and implementing co-bots in production allows more precise production without slowing the production process.

Being modular system Sigma is flexible and easily customizable in order to be able for quick new product development and manufacturing. Every module of the system could be

5.8 REPLICABILITY AND UP SCALING

The system could be customize for the need of the SME and by implementing co-bots in production allows more precise production without slowing the production process

Sigma system could be implemented in every SME or Large manufacturer that need precise fast production.

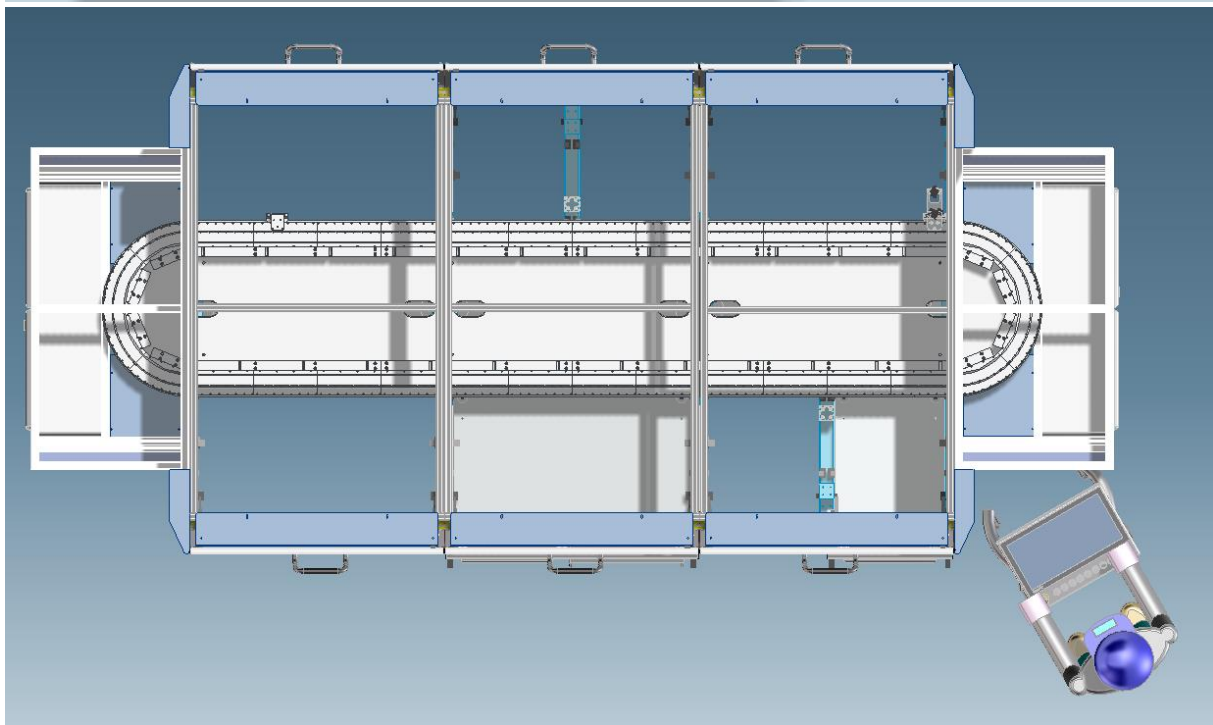
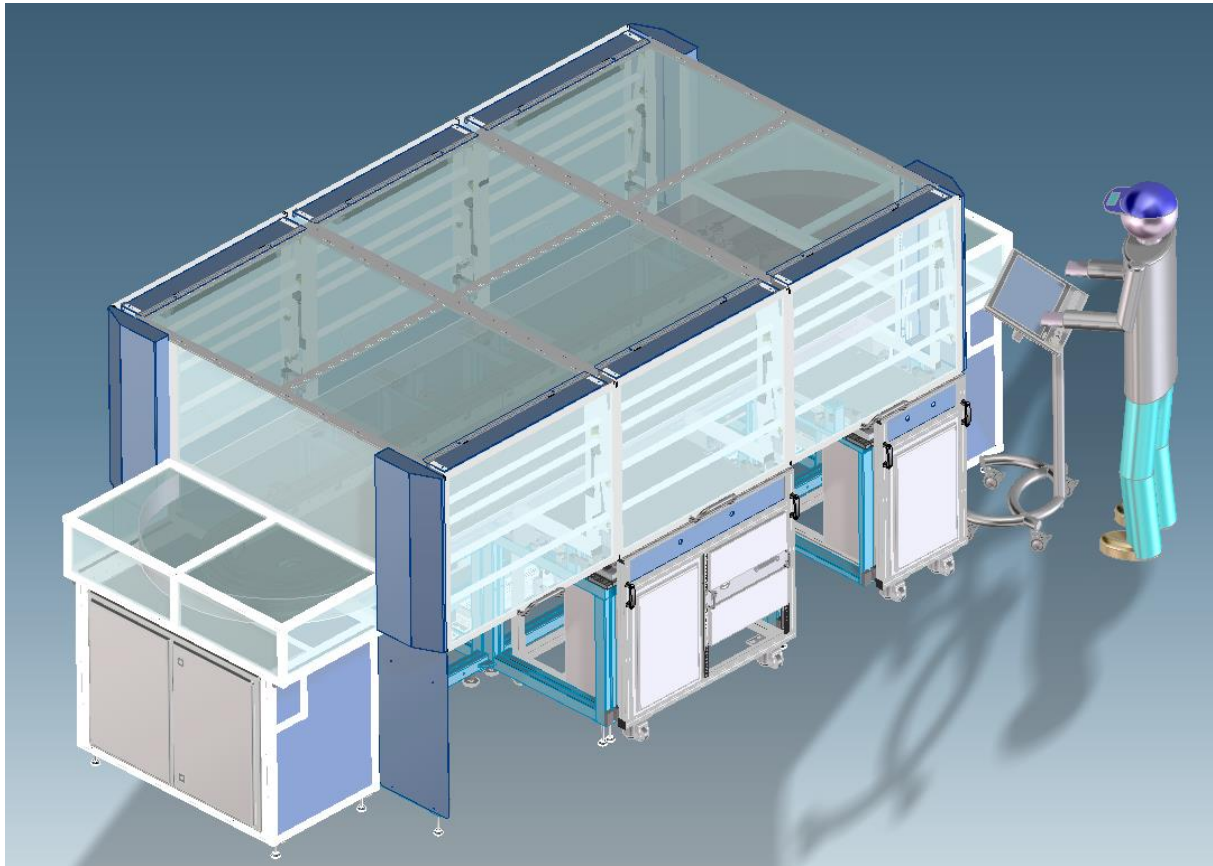
5.9 FINAL REMARKS

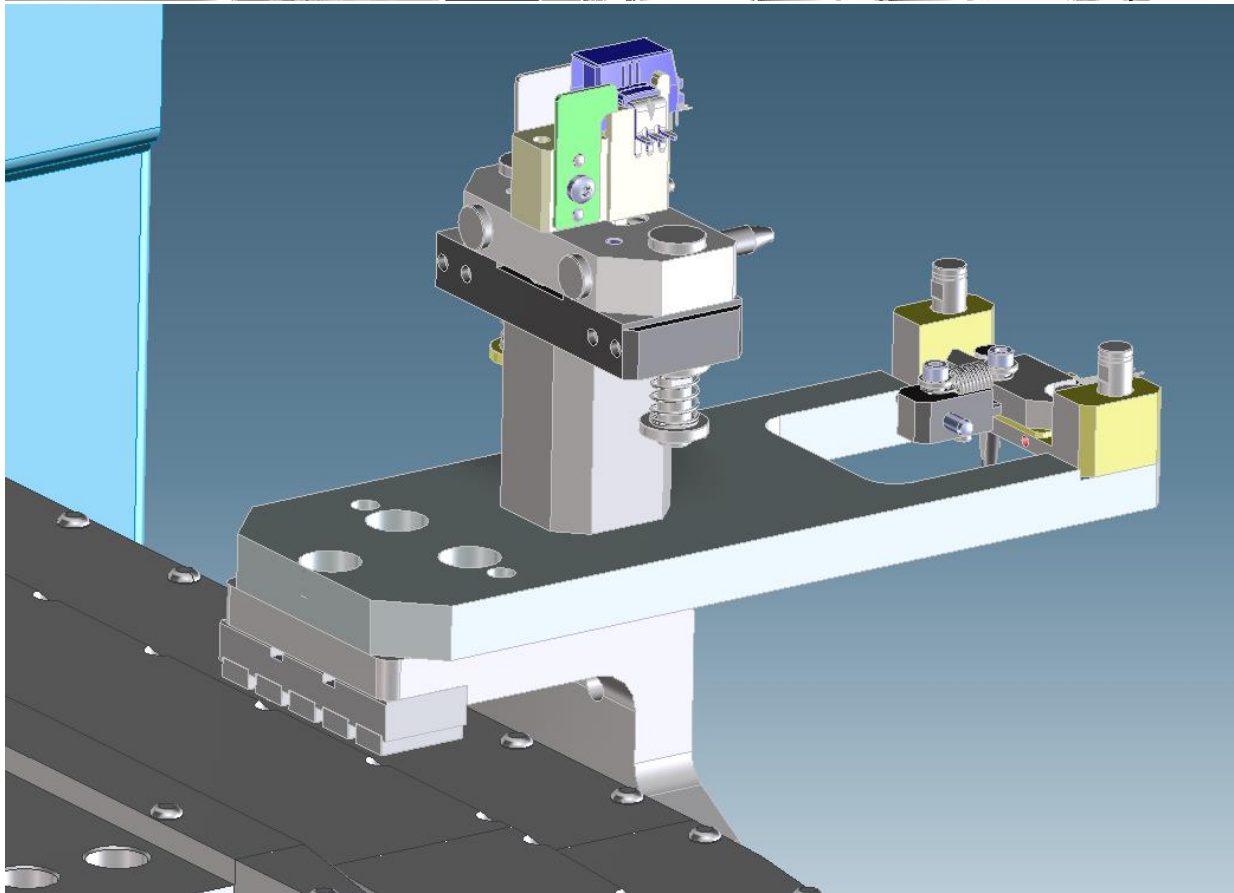
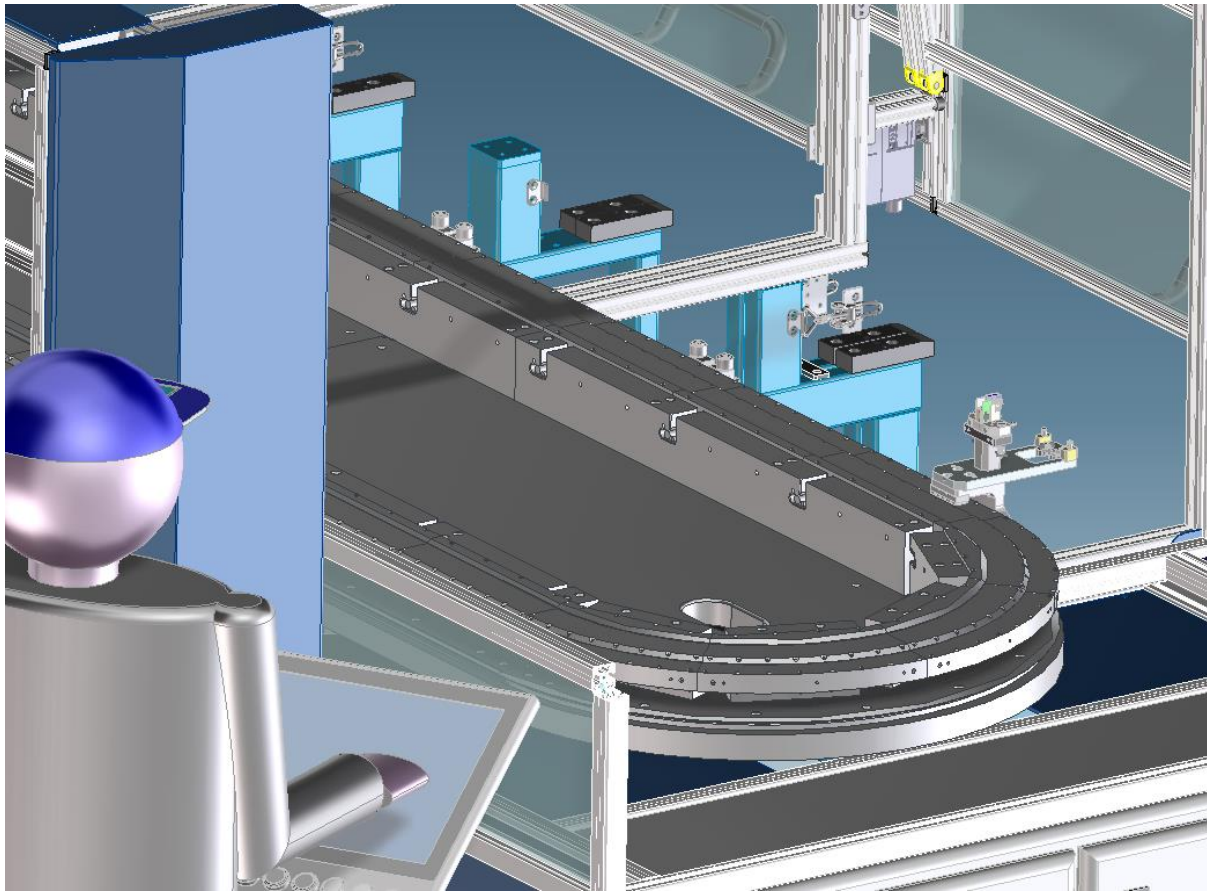
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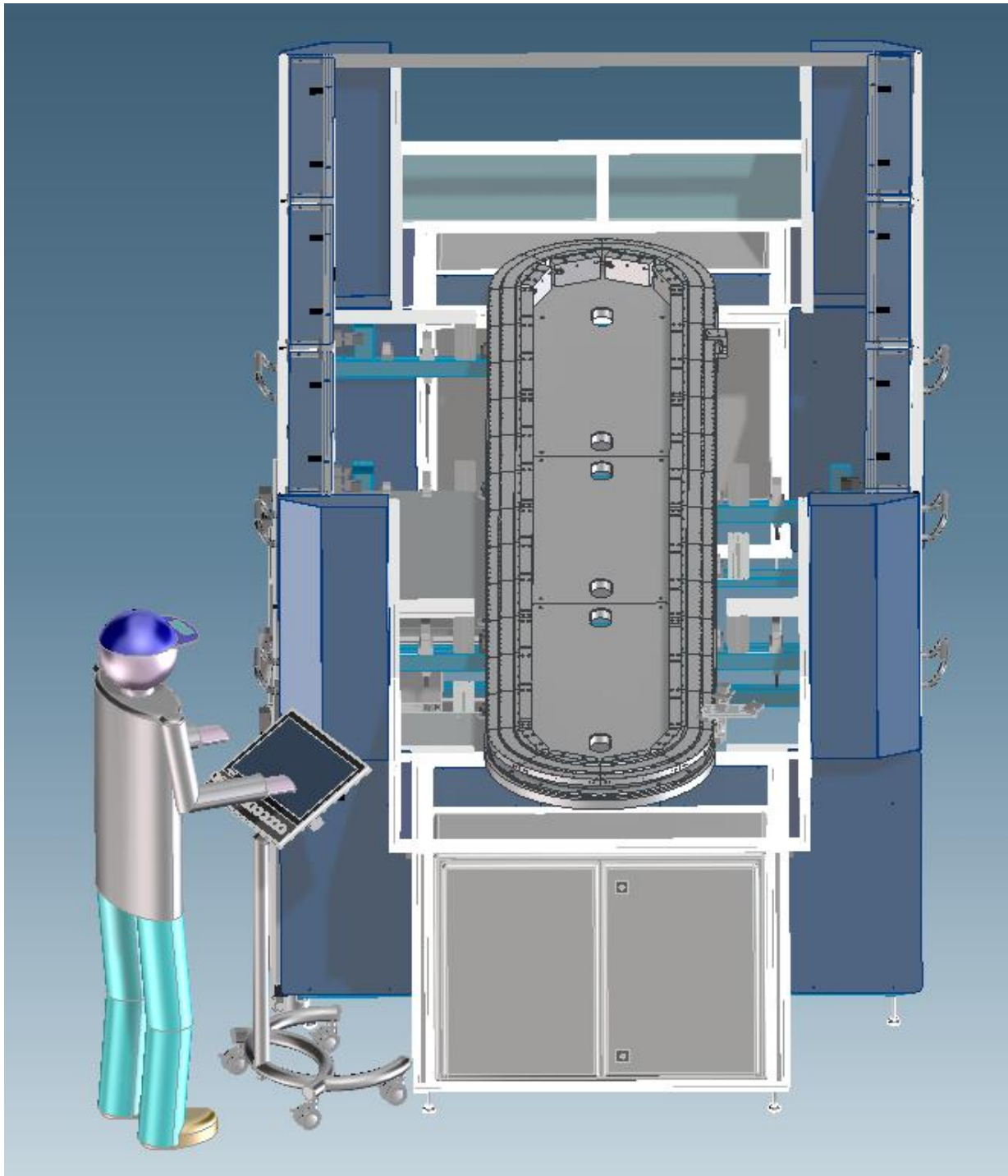
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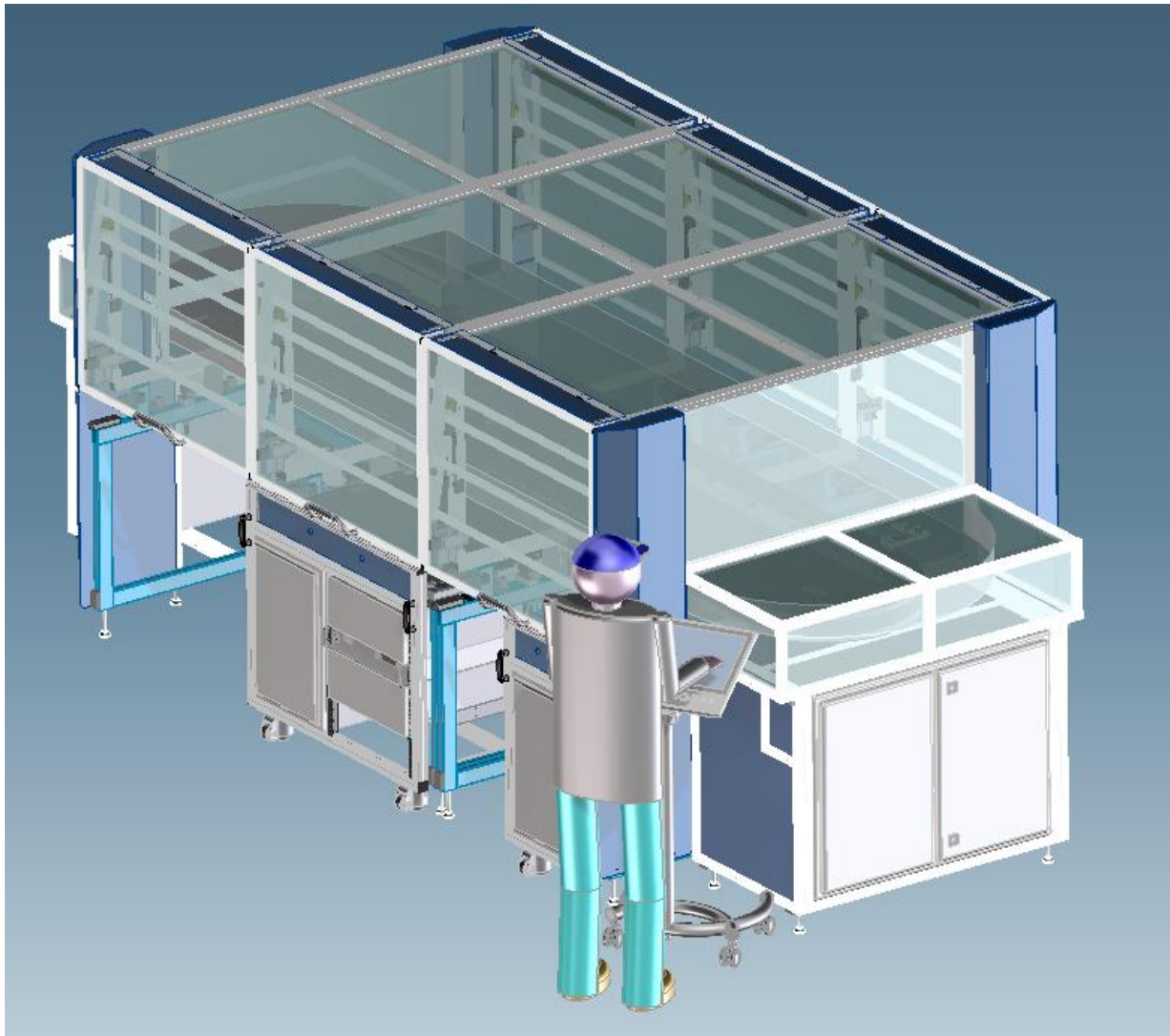
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6 GP5: Computer Numerical Control (CNC) Machine – M550/M450/⁶



Photo of the contact person

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Keywords : Computer Numerical Control, CNC, Metal products, Foundry industry Automation, Precision, Productivity

Good practice applied in: (NACE code) : C28 - Manufacture of machinery and equipment n.e.c.

The CNC – machine RAIS model M550 and M450 are computer operated drilling and cutting machines designed for manufacturing metal parts for the foundry industry.

6.1 GOOD PRACTICE DESCRIPTION

Driven by the need to increase the productivity and stay competitive, the company implemented the CNC machines in the production process.

Implementing the CNC machines in the manufacturing allows faster production and quality assurance.

The Computer Numerical Control Machines are controlled by a computer. Coordinates are uploaded into the machine controller from a separate CAD program. Being controlled from a computer the machines produce consistent and high-quality work.

CNC Machine M550 has more than 50 nozzles allows wide spectre of metal processing. M550 also has automatic rotator for 3D processing.

CNC Machine M450 don't has such a high precession as M550, but has drilling with integrated cooling which reduces the time for deep drilling and increase the productivity.

6.2 OBJECTIVE AND TARGET AUDIENCE

Both machines are bought and used for the benefits of the company in Sofia, Bulgaria.

The good practice could be useful for companies in the foundry industry.

⁶ Corresponding with Name or acronym field from Good practice questionnaire

6.3 METHODOLOGICAL APPROACH

The CNC machine can produce a one-off as effectively as repeated identical production and can reduce waste, frequency of errors, and the time the finished product takes to get to market which reduces manufacturing costs

The CNC machines characterize with high precision work and improves products quality. Automation and precision are the key benefits of cnc machines. All ball screws - high precision, class P3, Ø40 mm OD, with a double nut, pre-loaded to control backlash. High precision of positioning and smooth operation.

Fully enclosed electrical cabinet with heat exchanger, accordance to CE requirements.

The implementation of CNC machines in the factories is easy and the benefits are instantly visible. Financial resources are needed for the implementation are in regards of acquiring of the machines. The easy use of the system allows one worker per machine for operating the production process.

6.4 VALIDATION PROCESS

The CNC Machines are bought with certificate for validation form RAIS Ltd. from Pazardjik, Bulgaria.

6.5 RESULTS / IMPACT

The impact of the good practice is good with increased production and quality. The personnel for the manufacturing is reduced since the process is automated

6.6 SUCCESS FACTORS AND CONSTRAINTS

The models of the CNC machines are not the latest out on the market, however the factory is ready to implement newer models in their production.

The stability of machines manufactured by RAIS outperforms all others in this frame size. Precision linear guides and ball screws from "Bosch Rexroth" are built-in. The machines are designed and implemented in full production by the company experts. Precision in assembly, test and control means provides quality on each machine, meeting the requirements of EN ISO standard for machining centres. The Management System Quality creates all the prerequisites to meet customer requirements.

The company has already planned to acquire newer model of the CNC machines M700 for greater precision and higher quality products

6.7 LESSON LEARNED & SUSTAINABILITY

The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.

6.8 REPLICABILITY AND UP SCALING

The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.

The CNC machines are ready to be implemented in SMEs for producing metal components for machinery.

6.9 FINAL REMARKS

The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.

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List of attachments:

CNC M550

<http://www.raisbg.com/page.php?15>







CNC M450

<http://www.raisbg.com/page.php?13>





7 LESSON LEARNED

Lessons learned from the perspective of the companies who provided the good practice information


Every SME that have implemented smart technologies in their companies experience direct benefits in the field of energy efficiency, cost reduction, increase production, quality assurance, which increase their competitiveness.


The companies are open for implementing smart technologies and automation of the production process but the main obstacle, that the companies have with implementing smart technologies are financial, however a good technologies have very high investment return.

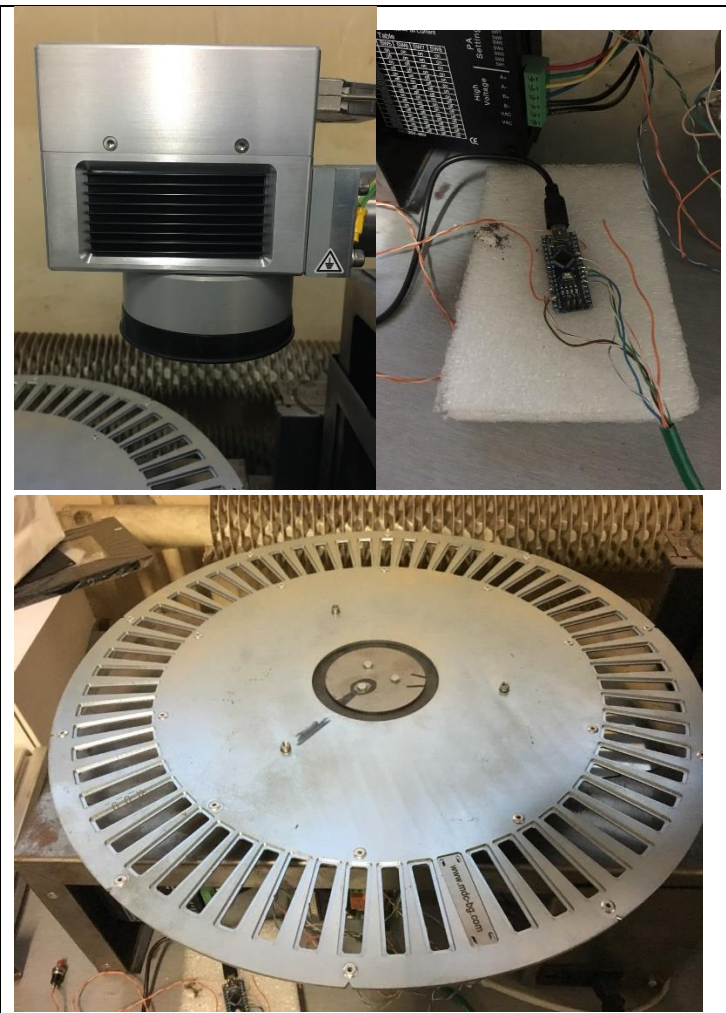
Lesson learned from the perspective of the partner


The SME's in Bulgaria mainly develop their own technologies, leaded by the need of staying relevant and competitive on the market. Because of this most of the technologies are custom and flexible in order to fit the specific need of the company. The automation of the production process does not lead to reduction of personnel, but they are redirected to new tasks leading to development of new products and services as well as growth and expansion of the company.

1 TEMPLATE FOR GOOD PRACTICE DOCUMENTATION

Element	Guiding questions	Answers
INTRODUCTION		
Company information	Data identification, logo, contact person, possible representative image(s).	<p>Mechanic Design and Construction Konstantin Kamberov - CEO www.mdc-bg.com ul. "Magnaurska shkola" 13, 1784 7-Mi Kilometerar, Sofia tel: +359 2 974 47 48 email: info@mdc-bg.com</p> 
Name and brief description.	Name or acronym: what is the name that captures the essence of the good practice	ALES – Automatic Laser Engraving System
	Provide a concise description of the good practice being addressed	The system is a good practice for implementing automatic technologies in a hand process in order to optimize the process and increase the productivity of the company. The good practice consist of a laser, a metal disc with slots for placing the metal plates, which is rotated by a stepper motor, controlled by an Arduino computer.
GOOD PRACTICE DESCRIPTION		
Detailed description	How did the SME create good practice / new product?	The idea and the creation of the good practice came with the need of the factory to be competitive on the

Element	Guiding questions	Answers
	<p>What is the relationship to SFH approach: novel technology, production processes, HRM or cost efficiency, quality assurance, risk management?</p> <p>Describe what are the technical solutions and innovations: of the good practice</p> <p>Highlights (or keywords) of the Best Practice</p> <p>Good practice applied in : (NACE code)</p>	<p>market. The automation of the process increase the productivity and reduce the production cost.</p> <p>Implementing computer in the manufacturing and automation of the production process is the base of the SFH approach. Self-operating system improves the production process, cost efficiency as well as the risk management.</p> <p>The technical solution if the good practice is simple, but effective. Arduino computer controls the stepper motor rotating the metal disc allowing the laser to brand higher number of products in smaller amount of time.</p> <p>Laser, Stepper motor, Arduino, Automation</p> <p>C25 - Manufacture of fabricated metal products, except machinery and equipment</p>
Benchmarking	How does your solution related to others provided by competitors	The system is custom made so it is not known whether there is a competitor using similar solution for the process production.
Additional information's / materials	Provide additional information if existing such as case studies, datasheets, whitepapers, awards and other relevant information. Electronic sources (websites, social media, pictures, videos) are encouraged to be included in this section. Training manuals, guidelines, technical fact sheets, posters, pictures, video animations, audio documents, 3D files, and/or other material about the Good practice implementation (if existing).	




Element	Guiding questions	Answers
		
OBJECTIVE AND TARGET AUDIENCE		
Geographical coverage and target audience	<p>What is the geographical range where the good practice has been used / tested / validated: country, region, Danube Region if is relevant and possible</p> <p>Specify also the target audience/potential customers and stakeholders (stakeholders can affect or be affected)</p>	<p>The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company in order to increase the productivity and optimize the production process</p> <p>Small, medium manufacturing companies.</p>
Targeted customers and scale of use	<p>Select the target group of customers:</p> <ol style="list-style-type: none"> 1. SMEs (<250 employees) 2. Large companies 3. Public institutions 4. End customer (Business to Customer) <p>Other, please specify</p>	<p>SMEs (<250 employees)</p>


Element	Guiding questions	Answers
METHODOLOGICAL APPROACH		
Managerial aspects	Cost efficiency of the good practice, if applicable	The automation of the production process increase the productivity and lowers cost for manufacturing.
	Quality assurance aspects, if applicable	The consistency of the stepper motor ensures the quality of the laser engraving.
	Risk management aspects, if applicable	The automation of the production require human intervention only when the process is finished. This ensures the safety of the worker since the laser is harmful for the human sight.
Implementation guidelines	How can the Good practice be implemented?	The simplicity of the system allows easy implementation.
	What resources are necessary for implementation (personnel, finance, infrastructure and timespan)?	The needed resources for implementation are financial for buying the necessary technologies and personnel for programing the functionality and calibrating the laser with the motor.
VALIDATION PROCESS		
Validation	Provide a brief description of the good practice validation process.	The validation process was completed within the work process in the factory and comprised in the analysis and comparison of the productivity before and after implementation of the good practice.
RESULTS / IMPACT		
Solution impact	What has been the impact (positive or negative) of this good practice on the beneficiaries	With the implementation of the good practice the increase of the production is nearly 200% as well the automation process saves the personnel time.
SUCCESS FACTORS AND CONSTRAINTS		

Element	Guiding questions	Answers
Limitations and Strong points	Describe limitations, both from the technical and implementation point of view	The limitations from technical point are the size of the metal product and placing it in horizontal position for engraving. No limitation in implementation.
	Selling points – list the real or perceived benefit of a good practice that differentiates it from the competing brands and gives its client a logical reason to prefer it over other brands	Since the system is custom made there is no other known system for this type of production. The system is easy to work with and the automation process has low power consumption.
Need assessment	What else would be needed in order to improve the impact of the Good practice	The system have been improved with a visual and sound signal indicating the finishing of the process. The further automation of the whole process will be a good way for improving the impact of the good practice – automatic unload of the finished products and setting the metal plates for the next batch.
LESSON LEARNED		
Lessons learned	What are the key messages and lessons learned to take away from the good practice experience	The automation of the process because of the good practice saves time, less personnel needed, increases productivity with all that the factory has increased its competitiveness.
SUSTAINABILITY		
Sustainability of Good Practice	Describe aspects related to sustainability of the Good Practice, if applicable	N/A
REPLICABILITY AND UP SCALING		
Replicability and further application	How can the solution / good practice be useful for other SMEs?	The solution is a good example of implementing smart technologies in order to increase the productivity and save time in the work process.
	What are the possibilities of extending the good practice more widely?	

Element	Guiding questions	Answers
FINAL REMARKS		
Conclusion	Conclude specifying / explaining the impact and usefulness of the good practice.	Creating and implementing the good practice in the work process increased the productivity and the competitiveness of the manufacturer.
Disclaimer Acknowledgements	/ Address any legal loose ends or limitations for dissemination, certify the use of this information for dissemination, online and printed (Yes/No)	NO

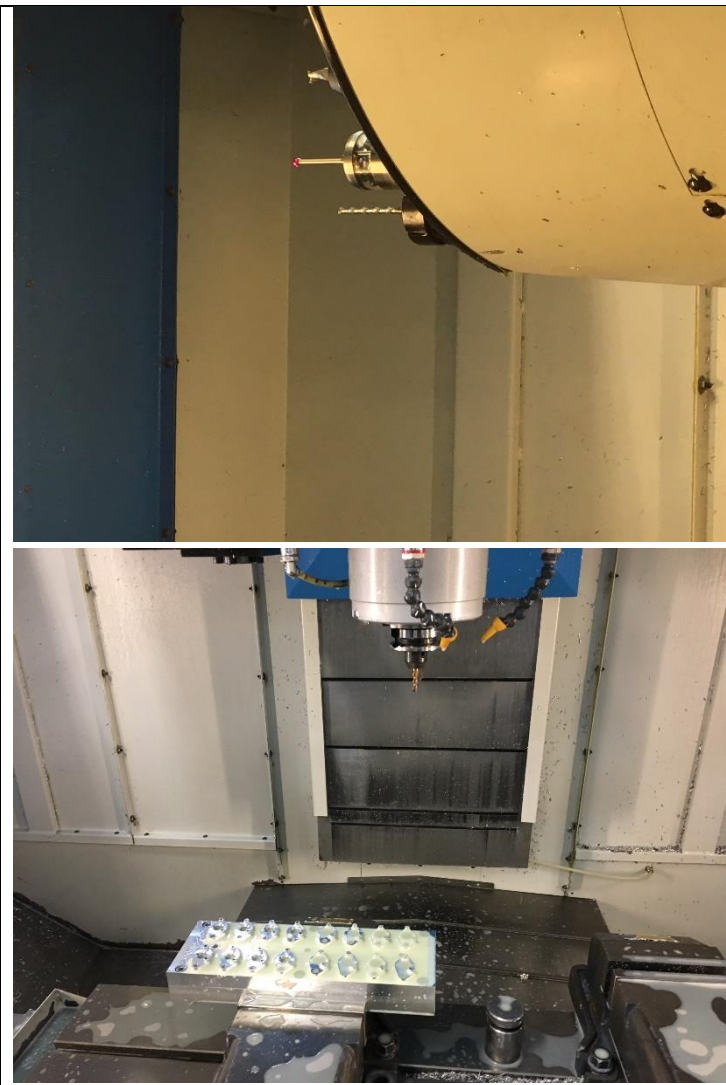
2 TEMPLATE FOR GOOD PRACTICE DOCUMENTATION



Element	Guiding questions	Answers
INTRODUCTION		
Company information	Data identification, logo, contact person, possible representative image(s).	 <p>SPESIMA GmbH Address: Bul. Asen Yordanov 9, Sofia 1592, Bulgaria Phone: +359 (2) 973 87 62 Fax: +359 (2) 979 09 45 Email: info@spesima.eu Web: www.spesima.eu</p>
Name and brief description.	Name or acronym: what is the name that captures the essence of the good practice	Computer Numerical Control (CNC) Machine – M550/M450/
	Provide a concise description of the good practice being addressed	The CNC – machine RAIS model M550 and M450 are computer operated drilling and cutting machines designed for manufacturing metal parts for the foundry industry.
GOOD PRACTICE DESCRIPTION		
Detailed description	How did the SME create good practice / new product?	Driven by the need to increase the productivity and stay competitive, the company implemented the CNC machines in the production process.
	What is the relationship to SFH approach: novel technology, production processes, HRM or cost efficiency, quality assurance, risk management?	Implementing the CNC machines in the manufacturing allows faster production and quality assurance.
	Describe what are the technical solutions and innovations: of the good practice	The Computer Numerical Control Machines are controlled by a computer. Coordinates are uploaded


Element	Guiding questions	Answers
	Highlights (or keywords) of the Best Practice Good practice applied in : (NACE code)	into the machine controller from a separate CAD program. Being controlled from a computer the machines produce consistent and high-quality work Computer Numerical Control, CNC, Metal products, Foundry industry Automation, Precision, Productivity, C28 - Manufacture of machinery and equipment n.e.c.
Benchmarking	How does your solution related to others provided by competitors	CNC Machine M550 has more than 50 nozzles allows wide spectre of metal processing. M550 also has automatic rotator for 3D processing. CNC Machine M450 don't has such a high precession as M550, but has drilling with integrated cooling which reduces the time for deep drilling and increase the productivity.
Additional information's / materials	Provide additional information if existing such as case studies, datasheets, whitepapers, awards and other relevant information. Electronic sources (websites, social media, pictures, videos) are encouraged to be included in this section. Training manuals, guidelines, technical fact sheets, posters, pictures, video animations, audio documents, 3D files, and/or other material about the Good practice implementation (if existing).	CNC M550 http://www.raisbg.com/page.php?15 







Element	Guiding questions	Answers
		 <p>CNC M450 http://www.raisbg.com/page.php?13</p> 


Element	Guiding questions	Answers
		
OBJECTIVE AND TARGET AUDIENCE		
Geographical coverage and target audience	<p>What is the geographical range where the good practice has been used / tested / validated: country, region, Danube Region if is relevant and possible</p> <p>Specify also the target audience/potential customers and stakeholders (stakeholders can affect or be affected)</p>	<p>Both machines are bought and used for the benefits of the company in Sofia, Bulgaria.</p> <p>The good practice could be useful for companies in the foundry industry</p>
Targeted customers and scale of use	<p>Select the target group of customers:</p> <ol style="list-style-type: none"> 5. SMEs (<250 employees) 6. Large companies 7. Public institutions 8. End customer (Business to Customer) 	<ol style="list-style-type: none"> 1. SMEs (<250 employees) 2. Large companies


Element	Guiding questions	Answers
	Other, please specify	
METHODOLOGICAL APPROACH		
Managerial aspects	Cost efficiency of the good practice, if applicable	The CNC machine can produce a one-off as effectively as repeated identical production and can reduce waste, frequency of errors, and the time the finished product takes to get to market which reduces manufacturing costs
	Quality assurance aspects, if applicable	The CNC machines characterize with high precision work and improves products quality. Automation and precision are the key benefits of cnc machines. All ball screws - high precision, class P3, Ø40 mm OD, with a double nut, pre-loaded to control backlash. High precision of positioning and smooth operation.
	Risk management aspects, if applicable	Fully enclosed electrical cabinet with heat exchanger, accordance to CE requirements.
Implementation guidelines	How can the Good practice be implemented?	The implementation of CNC machines in the factories is easy and the benefits are instantly visible
	What resources are necessary for implementation (personnel, finance, infrastructure and timespan)?	Financial resources are needed for the implementation are in regards of acquiring of the machines. The easy use of the system allows one worker per machine for operating the production process.
VALIDATION PROCESS		
Validation	Provide a brief description of the good practice validation process.	The CNC Machines are bought with certificate for validation form RAIS Ltd. from Pazardjik, Bulgaria
RESULTS / IMPACT		


Element	Guiding questions	Answers
Solution impact	What has been the impact (positive or negative) of this good practice on the beneficiaries	The impact of the good practice is good with increased production and quality. The personnel for the manufacturing is reduced since the process is automated
SUCCESS FACTORS AND CONSTRAINTS		
Limitations and Strong points	Describe limitations, both from the technical and implementation point of view	The models of the CNC machines are not the latest out on the market, however the factory is ready to implement newer models in their production.
	Selling points – list the real or perceived benefit of a good practice that differentiates it from the competing brands and gives its client a logical reason to prefer it over other brands	The stability of machines manufactured by RAIS outperforms all others in this frame size. Precision linear guides and ball screws from "Bosch Rexroth" are built-in. The machines are designed and implemented in full production by the company experts. Precision in assembly, test and control means provides quality on each machine, meeting the requirements of EN ISO standard for machining centres. The Management System Quality creates all the prerequisites to meet customer requirements.
Need assessment	What else would be needed in order to improve the impact of the Good practice	The company has already planned to acquire newer model of the CNC machines M700 for greater precision and higher quality products
LESSON LEARNED		
Lessons learned	What are the key messages and lessons learned to take away from the good practice experience	The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.

Element	Guiding questions	Answers
SUSTAINABILITY		
Sustainability of Good Practice	Describe aspects related to sustainability of the Good Practice, if applicable	N/A
REPLICABILITY AND UP SCALING		
Replicability and further application	How can the solution / good practice be useful for other SMEs?	The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.
	What are the possibilities of extending the good practice more widely?	The CNC machines are ready to be implemented in SMEs for producing metal components for machinery.
FINAL REMARKS		
Conclusion	Conclude specifying / explaining the impact and usefulness of the good practice.	The CNC machines typically produces consistent and high-quality work and improves factory productivity. Automation and precision are the key benefits of implementing cnc machining in the production process.
Disclaimer / Acknowledgements	Address any legal loose ends or limitations for dissemination, certify the use of this information for dissemination, online and printed (Yes/No)	No

3 TEMPLATE FOR GOOD PRACTICE DOCUMENTATION

Element	Guiding questions	Answers
INTRODUCTION		
Company information	Data identification, logo, contact person, possible representative image(s).	<p>IT Industrial Technologies Etien Tenev – CTO Telephone: (+359 2) 9624221 E-mail: info@smd-assembly.com</p>  <p>http://www.smd-assembly.com/</p>
Name and brief description.	Name or acronym: what is the name that captures the essence of the good practice	IT Photovoltaic System - IT PS
	Provide a concise description of the good practice being addressed	Photovoltaic System installed on the roof and the parking lot of the factory providing electricity and lowering the company's expenses. The system is custom made from metal frames, photovoltaic panels, voltage invertors and switch, serving as both shelter and electricity provider.

Element	Guiding questions	Answers
GOOD PRACTICE DESCRIPTION		
Detailed description	How did the SME create good practice / new product?	The high electricity expenses of the factory, made it necessary to find an alternative solution for power supply using new technologies.
	What is the relationship to SFH approach: novel technology, production processes, HRM or cost efficiency, quality assurance, risk management?	The good practice is tied to the Smart factory hub's approach in relation to the cost efficiency of the production process.
	Describe what are the technical solutions and innovations: of the good practice	The innovation is that the construction of the system is used also as a parking shelter and at the same time is a power supply provider reducing the electricity cost for the production by 50%
	Highlights (or keywords) of the Best Practice	Photovoltaic, Solar, System, Electricity, Green, Cost Efficiency, Power Supply
	Good practice applied in : (NACE code)	C26.4 - Manufacture of consumer electronics
Benchmarking	How does your solution related to others provided by competitors	In Sofia region there is no other factory that is using solar electricity in the production process.
Additional information's / materials	Provide additional information if existing such as case studies, datasheets, whitepapers, awards and other relevant information. Electronic sources (websites, social media, pictures, videos) are encouraged to be included in this section. Training manuals, guidelines, technical fact sheets, posters, pictures, video animations, audio documents, 3D files, and/or other material about the Good practice implementation (if existing).	


Element	Guiding questions	Answers
		
OBJECTIVE AND TARGET AUDIENCE		
Geographical coverage and target audience	What is the geographical range where the good practice has been used / tested / validated: country, region, Danube Region if is relevant and possible Specify also the target audience/potential customers and stakeholders (stakeholders can affect or be affected)	The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company only Small, medium and large manufacturing companies
Targeted customers and scale of use	Select the target group of customers: 9. SMEs (<250 employees)	The system could be installed at: 1. SMEs (<250 employees)

Element	Guiding questions	Answers
	10. Large companies 11. Public institutions 12. End customer (Business to Customer) Other, please specify	2. Large companies 3. Public institutions
METHODOLOGICAL APPROACH		
Managerial aspects	Cost efficiency of the good practice, if applicable	The good practice is targeted cost efficiency of the production process.
	Quality assurance aspects, if applicable	N/A
	Risk management aspects, if applicable	N/A
Implementation guidelines	How can the Good practice be implemented?	The good practice is easy to be implemented. The company needs to identify the added value of using solar technologies in the production process
	What resources are necessary for implementation (personnel, finance, infrastructure and timespan)?	For implementing the good practice, the company needs to allocate financial resources for building a metal structure and installing photovoltaic panels at any open space near the company. The expenses depends on the size of the company.
VALIDATION PROCESS		
Validation	Provide a brief description of the good practice validation process.	The validation process was completed within the factory and comprised in the analysis and comparison of the power supply expenses before and after implementation of the system.
RESULTS / IMPACT		


Element	Guiding questions	Answers
Solution impact	What has been the impact (positive or negative) of this good practice on the beneficiaries	The implementation of the system has positive impact on company production process related to decrease of production costs.
SUCCESS FACTORS AND CONSTRAINTS		
Limitations and Strong points	Describe limitations, both from the technical and implementation point of view	The technical and implementation limitations depends on the open area that the company has. Also the use of the good practice could be limited by national legal issues
	Selling points – list the real or perceived benefit of a good practice that differentiates it from the competing brands and gives its client a logical reason to prefer it over other brands	The system is customly made and the financial investment is lower than the systems offered by other brands.
Need assessment	What else would be needed in order to improve the impact of the Good practice	The system could be improved with installing an accumulator for storing the produced energy when the factory is not working.
LESSON LEARNED		
Lessons learned	What are the key messages and lessons learned to take away from the good practice experience	The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost.
SUSTAINABILITY		
Sustainability of Good Practice	Describe aspects related to sustainability of the Good Practice, if applicable	-
REPLICABILITY AND UP SCALING		
Replicability and further application	How can the solution / good practice be useful for other SMEs?	The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost.

Element	Guiding questions	Answers
	What are the possibilities of extending the good practice more widely?	The good practice could be implemented by every manufacturing company
FINAL REMARKS		
Conclusion	Conclude specifying / explaining the impact and usefulness of the good practice.	The good practice is an excellent example of using green energy in the manufacturing process and reducing production cost.
Disclaimer / Acknowledgements	Address any legal loose ends or limitations for dissemination, certify the use of this information for dissemination, online and printed (Yes/No)	NO


4 TEMPLATE FOR GOOD PRACTICE DOCUMENTATION

Element	Guiding questions	Answers
INTRODUCTION		
Company information	Data identification, logo, contact person, possible representative image(s).	<p>Mechanic Design and Construction Konstantin Kamberov - CEO www.mdc-bg.com ul. "Magnaurska shkola" 13, 1784 7-Mi Kilometerar, Sofia tel: +359 2 974 47 48 email: info@mdc-bg.com</p> 
Name and brief description.	Name or acronym: what is the name that captures the essence of the good practice	KOMANDIR.NET Product Lifecycle Management (PLM) System
	Provide a concise description of the good practice being addressed	<p>The good practice is a system for manufacturing management aiming to optimize and digitalize the manufacturing process in the factory through:</p> <ul style="list-style-type: none"> · Automate the preparation of accompanying technological documentation in accordance with ISO 9001: 2000 (order documents, complete maps, route cards, etc).;

Element	Guiding questions	Answers
		<ul style="list-style-type: none"> · Automated transmission of tasks from one workplace/machine to another via computer terminals; · Permanent monitoring of the condition of the parts and the nodes; · Timing reports for each product at every operation; · References for workers working on each operation for each detail according to ISO 9001: 2000; · Remote access to production data with the ability to change the priority for order execution; <p>Others.</p> <p>The system consists of network of computer terminals, cloud based server, and computers, smartphones, tablets etc.</p> <p>KOMANDIR.NET system operates using Google apps.</p>
GOOD PRACTICE DESCRIPTION		
Detailed description	How did the SME create good practice / new product?	The SME created the good practice through finding the need of optimizing the manufacturing process and prioritising the order execution.
	What is the relationship to SFH approach: novel technology, production processes, HRM or cost efficiency, quality assurance, risk management?	The good practice is strongly linked to the SFH approach by implementing a smart system for optimizing the ensuring production process and cost efficiency and quality assurance.
	Describe what are the technical solutions and innovations: of the good practice	The network of terminals ensures good digital control over the production process. Being cloud based allows the system to be accessed remotely by any type of digital device. Using google apps makes the implementation cost low and compatible with wide rage of devices.

Element	Guiding questions	Answers
	Highlights (or keywords) of the Best Practice	Product Lifecycle Management (PLM) System, Optimization, Management, Constant monitoring, Automated process, Remote access, Terminals, Cloud
	Good practice applied in : (NACE code)	C25 - Manufacture of fabricated metal products, except machinery and equipment
Benchmarking	How does your solution related to others provided by competitors	The system is custom made so it is not known whether there is a competitor using similar system in their work process.
Additional information's / materials	Provide additional information if existing such as case studies, datasheets, whitepapers, awards and other relevant information. Electronic sources (websites, social media, pictures, videos) are encouraged to be included in this section. Training manuals, guidelines, technical fact sheets, posters, pictures, video animations, audio documents, 3D files, and/or other material about the Good practice implementation (if existing).	 KOMANDIR.NET www.komandir.net




Element	Guiding questions	Answers
		
OBJECTIVE AND TARGET AUDIENCE		
Geographical coverage and target audience	What is the geographical range where the good practice has been used / tested / validated: country, region, Danube Region if is relevant and possible	The solution described above was used in Sofia, Bulgaria, on the territory and for the benefit of the company only
	Specify also the target audience/potential customers and stakeholders (stakeholders can affect or be affected)	Small, medium and large manufacturing companies; Another systems that need visualisation, monitoring, control and prioritization of different kind of tasks/processes.
Targeted customers and scale of use	Select the target group of customers: 13. SMEs (<250 employees) 14. Large companies 15. Public institutions 16. End customer (Business to Customer) Other, please specify	The system could be installed at: 1. SMEs (<250 employees) 2. Large companies 3. Public institutions
METHODOLOGICAL APPROACH		
Managerial aspects	Cost efficiency of the good practice, if applicable	N/A
	Quality assurance aspects, if applicable	The good practice is targeted quality assurance of the production process

Element	Guiding questions	Answers
	Risk management aspects, if applicable	N/A
Implementation guidelines	How can the Good practice be implemented?	Because of the remote use of free software on wide range of devices the system is easily implemented for the need of production lifecycle process management.
	What resources are necessary for implementation (personnel, finance, infrastructure and timespan)?	For implementing the good practice, the company needs to allocate financial resources for installing terminals on every step of the manufacturing process.
VALIDATION PROCESS		
Validation	Provide a brief description of the good practice validation process.	The validation process was completed in 6 months within the factory with help of some IT experts nearby, and comprised in the analysis and comparison of the work process and the before and after implementation of the system.
RESULTS / IMPACT		
Solution impact	What has been the impact (positive or negative) of this good practice on the beneficiaries	The implementation of the system has positive impact on company production process related to time optimization and order prioritizing.
SUCCESS FACTORS AND CONSTRAINTS		
Limitations and Strong points	Describe limitations, both from the technical and implementation point of view	Because of low volume of data and performance needed from the system their limitations will be reached when the terminals (and relevant workplaces/machines) are more than 100, and/or the server DB/Internet connection to the cloud reach their limits, but this is subject of additional researches and tests.

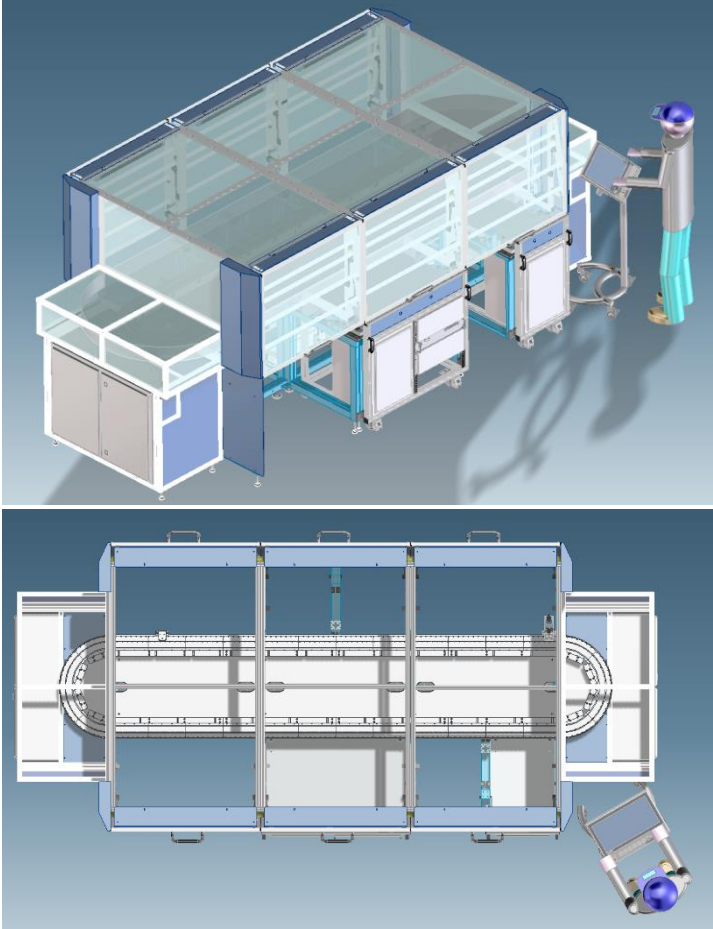
Element	Guiding questions	Answers
	Selling points – list the real or perceived benefit of a good practice that differentiates it from the competing brands and gives its client a logical reason to prefer it over other brands	The system is custom made and it could give an easy way for remote monitoring and reporting of the manufacturing process from the beginning (taking the order) to the finish (completing the order). The use of open source hardware and software reduces the cost of the system significantly.
Need assessment	What else would be needed in order to improve the impact of the Good practice	The system could be improved with installing an audio and video connectivity on every terminal for faster and better management of the work process.
LESSON LEARNED		
Lessons learned	What are the key messages and lessons learned to take away from the good practice experience	The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the products and the positive feedback from the clients
SUSTAINABILITY		
Sustainability of Good Practice	Describe aspects related to sustainability of the Good Practice, if applicable	The system is sustainable because of their low cost not only for the establishing, but also for it's support and improvement, being in the same time high efficient and reliable.
REPLICABILITY AND UP SCALING		
Replicability and further application	How can the solution / good practice be useful for other SMEs?	The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the product and the positive feedback from the clients
	What are the possibilities of extending the good practice more widely?	The good practice could be implemented in every company where there is a need of monitoring a

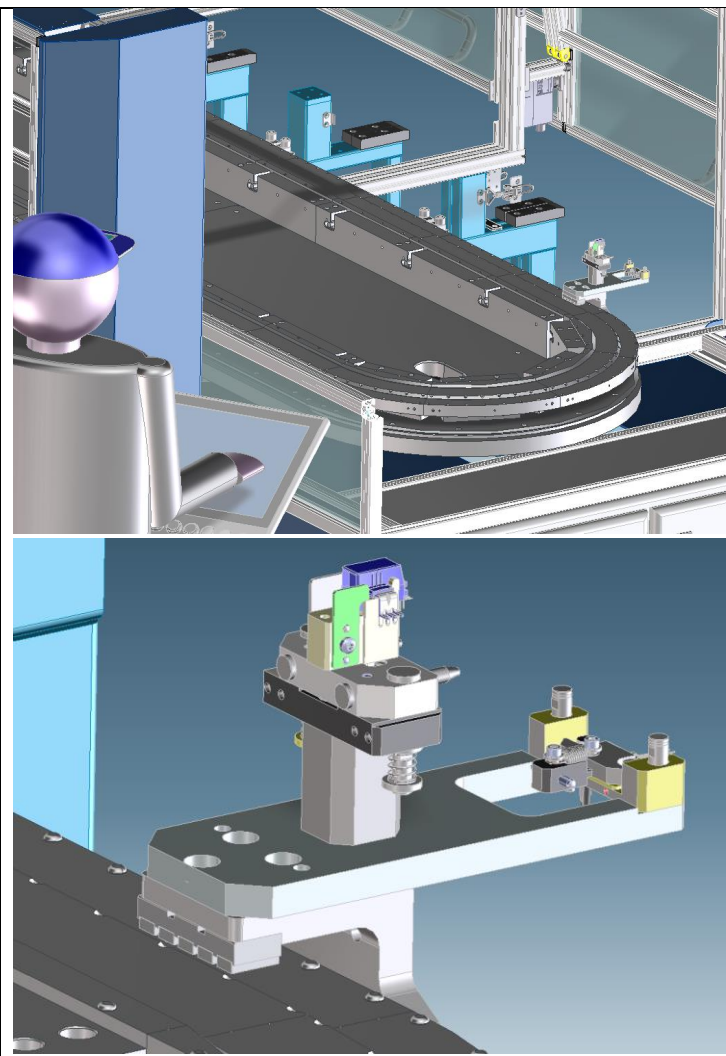
Element	Guiding questions	Answers
		numerous process at once and optimizing the time for completing certain tasks
FINAL REMARKS		
Conclusion	Conclude specifying / explaining the impact and usefulness of the good practice.	The good practice is an example for smart remote organization of the work process in the factory that will increase the manufacturing capabilities, quality of the product and the positive feedback from the clients
Disclaimer Acknowledgements	/ Address any legal loose ends or limitations for dissemination, certify the use of this information for dissemination, online and printed (Yes/No)	NO

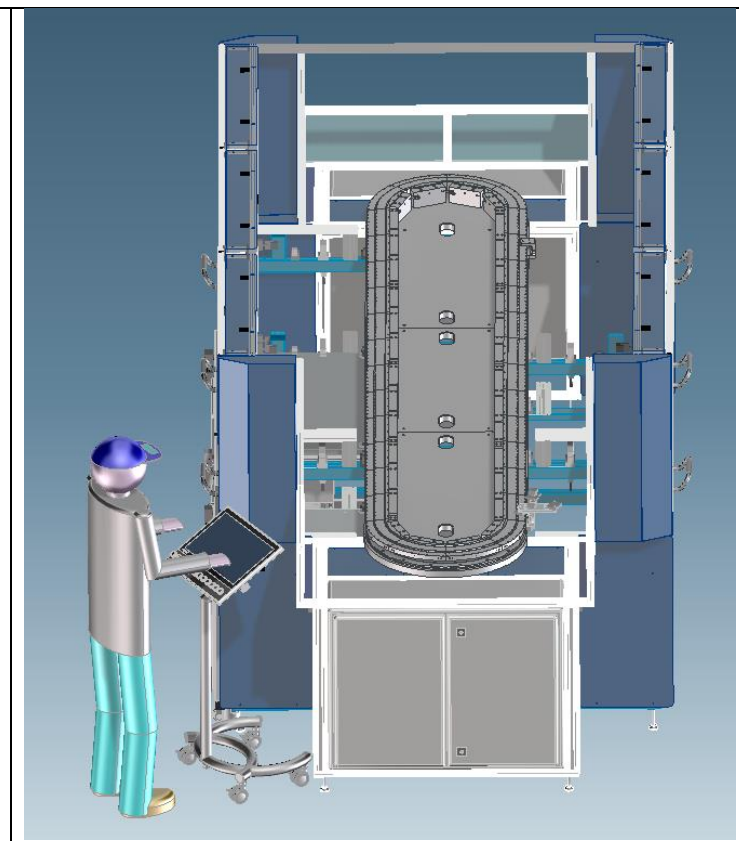
5 TEMPLATE FOR GOOD PRACTICE DOCUMENTATION

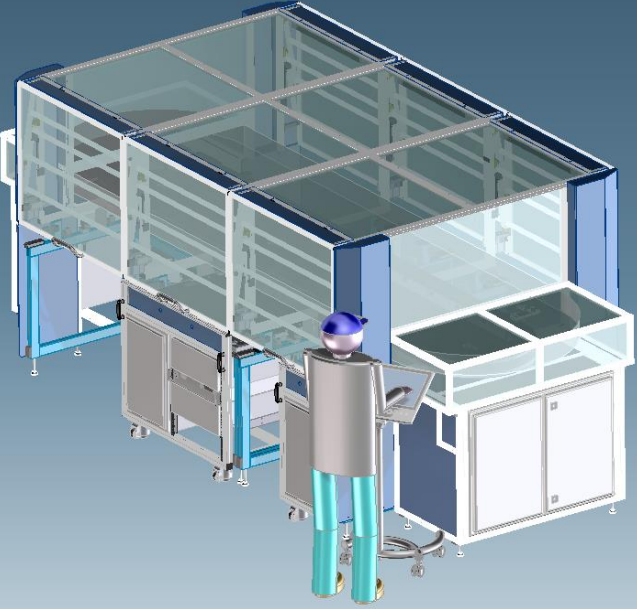
Element	Guiding questions	Answers
INTRODUCTION		
Company information	Data identification, logo, contact person, possible representative image(s).	 <p>LEM Bulgaria Address: ul. "Iliyansko Shose", 1220 NPZ Voenna rampa, Sofia, Bulgaria Tel: +359 2 424 6333 web: www.lem.com</p>
Name and brief description.	Name or acronym: what is the name that captures the essence of the good practice	Sigma – modular system
	Provide a concise description of the good practice being addressed	The system Sigma is a modular printing system which consists of flexible conveyor belt and collaborative robots (co-bots)
GOOD PRACTICE DESCRIPTION		
Detailed description	How did the SME create good practice / new product?	The Sigma system was developed in evolutionary way with the need of the company to increase the productivity.
	What is the relationship to SFH approach: novel technology, production processes, HRM or cost efficiency, quality assurance, risk management?	The developing of a system like Sigma and integrating robots in the work process increase the production process, assure quality as well as cost efficiency.
	Describe what are the technical solutions and innovations: of the good practice	Collaborative robots (co-bots) integrated in the production increases speed and the precision of manufacturing which is critical in microelectronics components

Element	Guiding questions	Answers
	Highlights (or keywords) of the Best Practice	Microelectronics, Co-bots, Modular, Automation
	Good practice applied in : (NACE code)	C26.4 - Manufacture of consumer electronics
Benchmarking	How does your solution related to others provided by competitors	The modular character of the system allows easier modification and customization of the system, which makes faster development and production of new products

Element	Guiding questions	Answers
<p>Additional information's / materials</p>	<p>Provide additional information if existing such as case studies, datasheets, whitepapers, awards and other relevant information. Electronic sources (websites, social media, pictures, videos) are encouraged to be included in this section. Training manuals, guidelines, technical fact sheets, posters, pictures, video animations, audio documents, 3D files, and/or other material about the Good practice implementation (if existing).</p>	





Element	Guiding questions	Answers
		
OBJECTIVE AND TARGET AUDIENCE		
Geographical coverage and target audience	<p>What is the geographical range where the good practice has been used / tested / validated: country, region, Danube Region if is relevant and possible</p> <p>Specify also the target audience/potential customers and stakeholders (stakeholders can affect or be affected)</p>	<p>For now the system is developed and used for the benefits of the company in Sofia, Bulgaria.</p> <p>The good practice could be useful for companies that need quality precise manufacturing.</p>
Targeted customers and scale of use	<p>Select the target group of customers:</p> <ul style="list-style-type: none"> 17. SMEs (<250 employees) 18. Large companies 19. Public institutions 	<ul style="list-style-type: none"> 1. SMEs (<250 employees) 2. Large companies

Element	Guiding questions	Answers
	20. End customer (Business to Customer) Other, please specify	
METHODOLOGICAL APPROACH		
Managerial aspects	Cost efficiency of the good practice, if applicable	The cost efficiency of the system shows in the lowering the personnel needed for production as well as the expenses for maintaining the co-bots is lower than a minimum wage.
	Quality assurance aspects, if applicable	The precision of the robots is far better than the human production which assures better quality especially in the sector electronic components.
	Risk management aspects, if applicable	N/A
Implementation guidelines	How can the Good practice be implemented?	Because of the modular character of the system the good practice could be easily implemented, and customize for the needs of the company
	What resources are necessary for implementation (personnel, finance, infrastructure and timespan)?	The main resources used for developing the good practice are financial as well as timespan of 3 years for creating testing and validation
VALIDATION PROCESS		
Validation	Provide a brief description of the good practice validation process.	The evolutionary way of developing Sigma system started the validation process from the beginning. The Validation methods used are lean manufacturing as well as value stream mapping.
RESULTS / IMPACT		
Solution impact	What has been the impact (positive or negative) of this good practice on the beneficiaries	The impact on the company has been positive. Reducing the needed personnel for the same task from 9 to 2 and at the same time increasing the production.

Element	Guiding questions	Answers
SUCCESS FACTORS AND CONSTRAINTS		
Limitations and Strong points	Describe limitations, both from the technical and implementation point of view	There are no technical or implementation limitation known at this moment.
	Selling points – list the real or perceived benefit of a good practice that differentiates it from the competing brands and gives its client a logical reason to prefer it over other brands	The modular characteristic of the good practice is the biggest advantage which allows the quick modification of the system and quick development of new products
Need assessment	What else would be needed in order to improve the impact of the Good practice	The Sigma system could be improved with sensors for quality control and tracking the production process
LESSON LEARNED		
Lessons learned	What are the key messages and lessons learned to take away from the good practice experience	Sigma is a great examples how automation and implementing co-bots in production allows more precise production without slowing the production process.
SUSTAINABILITY		
Sustainability of Good Practice	Describe aspects related to sustainability of the Good Practice, if applicable	Being modular system Sigma is flexible and easily customizable in order to be able for quick new product development and manufacturing. Every module of the system could be
REPLICABILITY AND UP SCALING		
Replicability and further application	How can the solution / good practice be useful for other SMEs?	The system could be customize for the need of the SME and by Implementing co-bots in production allows more precise production without slowing the production process
	What are the possibilities of extending the good practice more widely?	Sigma system could be implemented in every SME or Large manufacturer that need precise fast production.
FINAL REMARKS		

Element	Guiding questions	Answers
Conclusion	Conclude specifying / explaining the impact and usefulness of the good practice.	Sigma is a great examples how automation and implementing co-bots in production allows more precise production without slowing the production process.
Disclaimer / Acknowledgements	Address any legal loose ends or limitations for dissemination, certify the use of this information for dissemination, online and printed (Yes/No)	NO