LEARNING FROM THE BEST:

EXCELLENCE IN LEAN & DIGITALISATION

AUTOMOTIVE LEAN PRODUCTION
AWARD & STUDY
AUTOMOBIL PRODUKTION
agamus CONSULT

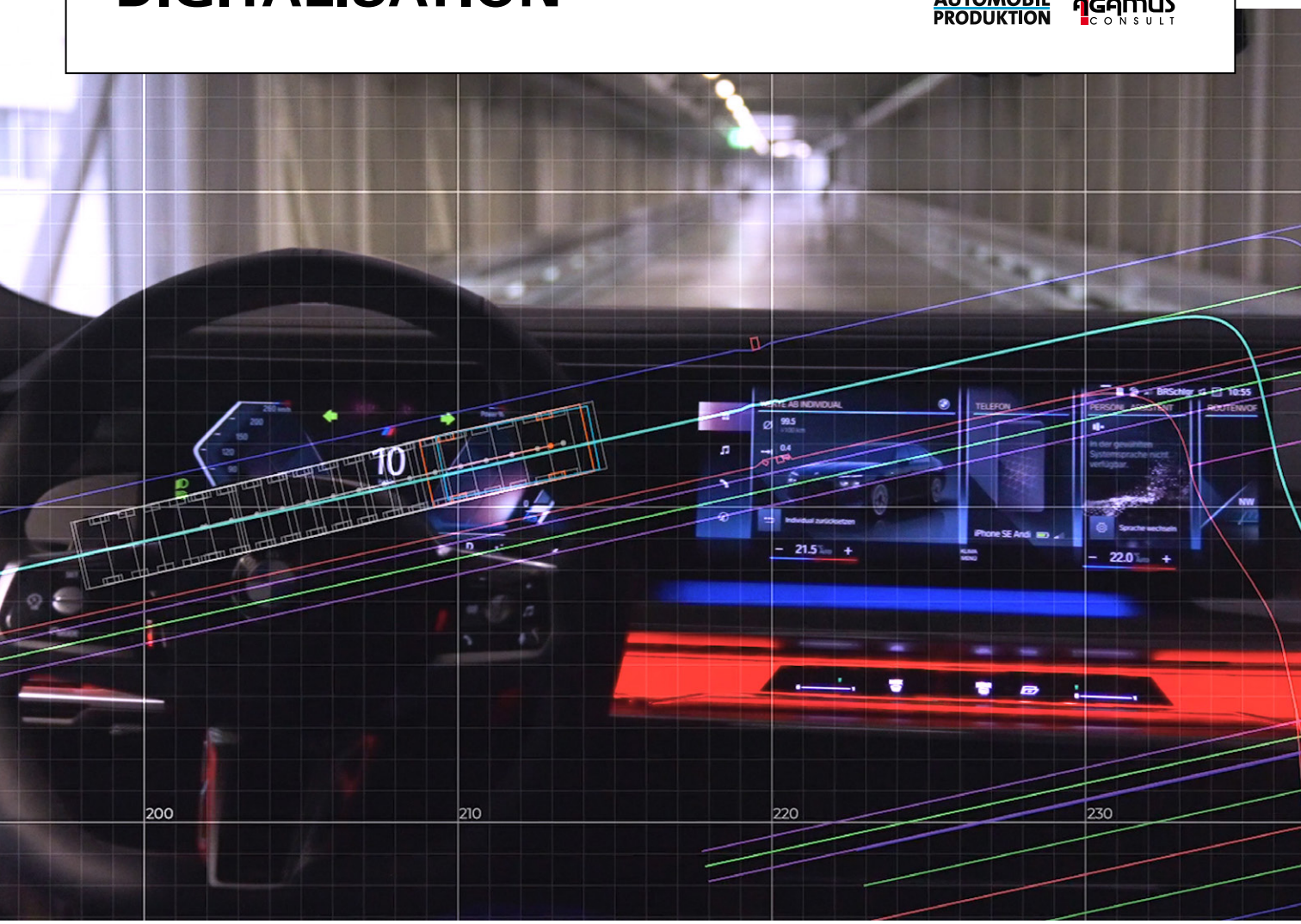

Photo: BMW Group

Automotive Lean Production – Award & Study Questionnaire 2023

// Application deadline: 14 May 2023

A cooperation between

AUTOMOBIL PRODUKTION
agamus CONSULT

automobil-produktion.de // agamus.com

Award & Study 2023: Application & Dates

Application deadline for the Automotive Lean Production Study is **14 May 2023.**

You can find the digital version of the questionnaire on our website **automotive-lean-production.de/en**

Please return the completed questionnaire via email to **lean.award@agamus.com**

Your questionnaire data will be stored electronically by Agamus for evaluation and will not be passed on to third parties.
The use of your data for statistical purposes is exclusively anonymised. Your personal data will only be used for queries within the scope of the study. Only the company names of the award winners will be published.

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Automotive Lean Production – Award & Study is a cooperation between the magazine Automobil Produktion and Agamus Consult GmbH. Agamus Consult has served automotive enterprises as an implementation consultant for more than 25 years.

Photo: BMW Group

17th Congress Automotive Lean Production

BMW Group Plant Dingolfing & BMW Welt Munich 14/15 November 2023

Photo: BMW Group

On 14/15 November 2023 the best performers of the study will receive the Automotive Lean Production awards at this year's congress at BMW Welt in Munich, Germany.

The BMW Group production invites the participants to an exclusive plant tour and provides inspiring insights into its production.

For further information about the congress, please visit: **automotive-lean-production.de/en**

Photo: Volkswagen Navarra

The award winners from the BMW Plant Dingolfing at the presentation of the Automotive Lean Production Awards 2022; f.l.t.r.: Marc Kräutle (Agamus), Gunther Böhner (BMW Group), Christoph Schröder (BMW Group), Dr. Werner Geiger (Agamus)

Automotive Lean Production – Award & Study

Objective of the initiative

Agamus Consult and Automobil Produktion are carrying out the Automotive Lean Production study for the 17th time. The Europe-wide initiative focuses on the following questions:

- What are the success factors of Lean Production?
- Which lean modules are used and to what extent?
- What results are achieved in terms of quality, costs and delivery performance?
- How does the digitalisation of manufacturing affect the further development of production systems?
- What successful digitalisation projects are existing in the automotive industry?

The best plants are honoured with the renowned Automotive Lean Production Awards (including OEM, Supplier, Digital Use Case). With the category ‚Digital Use Case' we are honouring individual projects. Every participant has the opportunity to apply for one of the coveted awards with a successful digitalisation project. Eligible are plants and operational units that employ more than 250 employees.

Application procedure

After evaluating the questionnaires received, an on-site evaluation is carried out at the plants that are nominated for the Automotive Lean Production Award. The winners will be announced at the Automotive Lean Production Congress on 14/15 November 2023 and will present their prize-winning projects and strategies.

Results

All participants receive – upon request – their individual analysis with benchmark comparison.

Participation is free.

Benefit for the participants

- **Benchmarking**
  Based on the individual evaluation, every participating plant can determine its own benchmark regarding application of lean methods and digitalisations modules as well as the achieved results.
- **Comprehensive self-reflexion**
  Beyond benchmarking, the questionnaire focuses on a variety of success factors (e.g. communication and change management, training, planning of resources, Lean Roadmap etc.), which were developed based on the experience of more than 17 years Automotive Lean Production – Award & Study by Agamus Consult. The critical analysis helps to identify blind spots at the approach in every stage of Lean implementation.
- **External feedback on request**
  For all participants, which do not belong to the group of finalists, Agamus Consult offers an evaluation visit on request, independently of the award. Incurred travel expenses have to be beared.
- **Public recognition**
  The winners can receive an editorial profile about their plant from the industry magazine Automobil Produktion, if they so desire. This profile can be used to communicate their Lean competence internally and externally.

Comments from former participants

”While engaging ourselves with the questions, we were able to reflect on our achievements once again as well as bringing into focus the challenges of the steps that lie ahead of us."

Peter Lion
Head of HoP1/BPS – Bosch Production System
Robert Bosch GmbH, Plant Homburg

”The participation in the Automotive Lean Production evaluation after an intensive lean-transformation process has given us an honest, unadorned and profound reflection of our current situation and progress. It was and is exciting to find out where we stand as a company compared to other global players and especially medium-sized companies. In the end, it is extremely motivating to see what we have achieved – winning an award, really tops it all."

Dr. Gregor Wasle
CEO at InTiCa Systems AG

”By LEAN/KAIZEN we understand the cultural change as the basis for improvements and economic success. The evaluation of our locations offers us both an internal and external benchmark, intensive professional discussions with Agamus and thus new impulses for our ambitious goals."

Dr. Ronald Märtins
former Managing Director bei MöllerTech International GmbH

	A. Contact data		
1	**Name and job title of respondent:**		
2	**Company and address:**		
3	**Phone number:**		
4	**E-mail:**		
5	**What is the exact designation of your unit** (company, plant, ...) **you are participating with in the study? Hereafter always designated as plant:**		
6	**State your plant's two most important products:**		
		YES	NO
7	**Do you wish to apply for one of the awards for your plant?** (upon request you will receive the results of the study even if you do not apply for the award)		

	B. Structural data	
8	**How many employees work at your plant?**	
9	**What is the ratio of direct employees in relation to the entire workforce?** (direct employees = spend at least 80% of their attendance on value adding activities)	%
10	**How high is the proportion of women from the management level of team leader to top management?**	%
11	**What is the turnover rate of direct employees?** (direct employees = spend at least 80% of their time on value-adding activities)	%
12	**What is the turnover rate of indirect employees?** (Indirect employees = spend less than 80% of attendance on value-adding activities)	%
13	**How high is the absenteeism rate among direct employees?** (direct employees = spend at least 80% of their presence on value-adding activities)	%
14	**What is the absence rate for indirect employees?** (Indirect employees = spend less than 80% of attendance on value-adding activities)	%
15	**What were the sales of your plant in the last fiscal year?**	Mio. €
16	**What percentage of your turnover do you generate directly with companies from the automotive industry?**	%
17	**How do you supply your customers?** (please differentiate according to the following types in percent by value of goods)	
	Batch (lot sizes)	%
	Just in Time (JIT)	%
	Just in Sequence (JIS)	%
18	**What are the main production technologies at your plant?** (please rate the distribution of your direct production employees)	
	Assembly	%
	Robot welding (e.g. body shop)	%
	Casting (metal)	%
	Pressing, punching, forging ... (metal)	%
	Machining (shape cutting)	%
	Painting, powder coating, heat treatment, electroplating...	%
	Plastics processing (e.g. injection moulding, thermoforming, RIM process)	%
	Manufacturing of electronic parts (e.g. SMD assembly)	%
	Other (please specify): _____	%

	C. Production system – structure and implementation level					
	To what extent have you sustainably implemented the following Lean production practices at your plant?	NOT IMPLEMENTED	PILOT	HALFWAY	EXTENSIVELY	COMPLETELY
19	**5S** Sort, set in order, shine, standardise, sustain					
20	**FMC – Flexible Manpower Cell** A working environment in which people and machines can quickly adapt to changing customer demands					
21	**Flexible working hours** e.g. flex time accounts					
22	**Flow production** Layout of the workstations corresponds to the material flow; synchronous and interlinked processes					
23	**Group / team work models** Multiple qualifications, partly autonomous teams					
24	**Kaizen- / CIP-Workshops** Continuous improvement workshops with the employees who take part in the process					
25	**Supplier development** Proactively develop the supplier to extensively integrate material and information flows					
26	**Cyclic material supplier in production** Milkrun, waterspider, etc.					
27	**Levelling of production** Smoothing of customer call-offs with the aim of producing constant quantities at defined intervals for a defined period					
28	**Poka Yoke** Avoidance of defects by a special design of the material or the manufacturing process; fail-safe processes, test equipment, and facilities					
29	**Q-Tools** QFD, FMEA, 6-Sigma, 8D-Reports, A3-problem-solving process, etc.					
30	**Fast response systems** Standardised event- and time-driven escalation routines that provide the necessary resources in the event of problems; e.g.rip cord					
31	**Fast setup** Fast tooling to flexibly respond to customer requirements; goal: reducing stock and increasing flexibility					
32	**Standardised workflows** Clearly visualise workflows, defined operator cycles dependent on the customer tact time; Goal: process reliability and efficient employee deployment					
33	**Standardised KPIs** Key figures, that represent the necessary efficiency ratios (OEE, workforce productivity, complaint files) at production group level and are aggregated to area codes					
34	**TPM – Total Productive Maintenance** Maintenance strategy, autonomous maintenance, management of external services, spare part management, workload planning and scheduling in maintenance					
35	**Pull production control** Pull principle driven by demand, self-regulated control loops					
36	**Visual Management** Visual marking of standards in the flow of materials and information, so that deviations become obvious and countermeasures can be taken immediately					

37	**Value stream methodology** Graphical visualisation of the material and information flow as a map and as a design, determination of the total lead time and the included non-value adding activities					
38	**Shop floor management** Leading on the spot; standardised work and control loops for employees and managers					

	D. Introduction of Lean	YES	NO
39	**Since when** (year) **have you been introducing Lean principles and tools to an appreciable extent?**	2022	
40	**Do you have a Lean roadmap?**		
	If yes: does your roadmap include digitalisation projects?		
	If yes: What planning horizon (years) does the roadmap show?	years	
41	**Do you perform maturity assessments on the status of your production system?**		
	If yes: Which maturity level shows your plant? (rate positive 0-100%; if you use a stage model, please refer to the highest stage)	%	
42	**How many exempt lean experts (FTEs) who do not perform a line function do you have per 100 employees?**		

	What were the relative improvements in percent that you achieved as a result of your lean activities in the last two years? What will be the relative improvements you plan to achieve in the next two years? Regarding:	IMPROVEMENT OVER THE LAST 2 YEARS	IMPROVEMENT IN THE NEXT 2 YEARS
43	Productivity	%	%
	Cost reduction	%	%
	Internal PPM	%	%
	Supplier's PPM	%	%
	PPM to customers	%	%
	Lead time	%	%
	Inventory	%	%
	OEE	%	%
	Reaction speed	%	%
	Flexibility	%	%
	Ergonomics	%	%
	Other (please specify): _____	%	%
44	**How many suggestions for improvement are submitted per employee per year?**		

	E. Digitalisation – structure and status of implementation					
	To what extent have you sustainably implemented the following digitalisation modules at your plant?	NOT IMPLEMENTED	PILOT	HALFWAY	EXTENSIVELY	COMPLETELY
45	**Culture of change** Employees have room for invention and further development: In addition to innovation workshops, employee ideas are used to generate projects that contribute to the further development of the company (Digital Factory Lab)					
46	**No-code apps & tools development** Employees can develop their own apps and workflows without programming skills, which are made available to the organisation via a library					

47	**Virtual reality for workplace design and worker training** The workplace is virtually tested after planning and freed from weaknesses. For effective training or a shortened start-up, the workers are then trained at the virtual workplace					
48	**Use of assist systems for workers** Workers use assist systems based on the networked infrastructure for various tasks in manufacturing/assembly					
49	**Use of mobile assist systems for the lower management level in production** The lower management level in production uses mobile assist systems based on the networked infrastructure for management and control tasks					
50	**Usability** Operation of complex equipment by normal operators based on a user-centred software environment and user-friendly human-machine-interfaces (semiotics).					
51	**Human-robot-collaboration** Operators share their workspace with robots without separative protection devices (maintaining same safety level). Work steps between humans and robots can be combined individually					
52	**Intuitive methods of robot-programming** Robots are no longer plain-text programmed, but are now installed by teach-by-demonstration (human demonstrates assembly operations), by app or speech-based solution					
53	**Inline component manufacturing using additive processes** Use of additive processes to manufacture components in order to meet increasing individualisation of customer requirements (batch size 1, reduction of lead times, reduction of logistics costs)					
54	**Integrated quality assurance system** In the event of quality issues, the system intervenes in the control loops in real time and initiates processes to solve the problem					
55	**Predictive maintenance** By determining optimal maintenance times based on real time monitoring, errors can be prevented by maintenance or early repairs					
56	**Augmented reality** Maintenance and repairs can be supported with the help of displayed virtual objects (for better explanation)					
57	**Flexible manufacturing concepts** Thanks to a modular structure, production units/lines can easily be modified or expanded. A flexible change of production technologies can proceed with a minimum effort via plug & play solutions					
58	**Digital shop floor management** Relevant shop floor data are available at multi-sites in real time (enhancing know-ledge management) and being reviewed on a virtual board by all stakeholders					
59	**Digital integration of value chain partners** All partners worldwide (suppliers, customers, service providers, etc.) are using the same up-to-date data pool					
60	**'Digital twin' of the real production** All equipment, products, plants as well as their conditions are clearly monitored, mapped and interconnected into a virtual representation (digital world)					
61	**Digital platform controls the real production** A manufacturing-process-platform based on the 'digital twin' controls the production and logistics in real time by autonomously adjusting the work organisation when changes of the 'twin' occur. (Integration of industrial engineering, planning, production control and management of production and logistic into one platform)					

62	**Digital integration of manufacturing and logistics** Changes in the manufacturing process (e.g. product is manufactured at a different working station) update automatically related logistics processes and the simulation- and production-planning tool of the digital world					
63	**Process mining** Business processes are automatically mapped and analysed (e.g. divergences from standards) based on process log data from IT systems					
64	**Deep learning / machine learning** Digital systems enable to process large data volumes of different formats and identify recurring patterns and cause-effect correlations. In this way, trends and anomalies can be detected – in real time and within the running system					

	F. Lean and Industry 4.0 – prerequisites, culture change, future trends						
65	**How many of your digitalisation projects are evaluated with ROI?**						%
66	**To what extent do you agree with the following statements regarding the interaction of Lean and Industry 4.0?** (please rate with *0: don't agree* to *3: fully agree*)						**0 - 3**
	Lean is the prerequisite for a successful implementation of Industry 4.0						0
	Industry 4.0 will replace our previous Lean activities						0
67	**To what extent do the following statements apply to the digitalisation projects in your plant?** (please mark each with *0: strongly disagree* to *3: strongly agree*)						**0 - 3**
	Our digitalisation projects are handled using agile project management methods						0
	Our digitalisation projects are implemented by a central department						0
	The product owner is always the person responsible for the process from the operations area						0
	Product ownership is usually double staffed from IT and production/logistics						0
	We work according to the MVP principle (minimum viable product) and successively expand functionalities						0
68	**To what level are goals for the following topics broken down in policy deployment (hoshin kanri)?** (please tick the appropriate box)	**Top management**	**Middle management**	**Foreman/ group leader**	**Team leader**	**Operator**	**n.a.**
	Lean						
	Digitalisation						
	Sustainability						
69	**To what extent do you agree with the following statements about changes in cooperation as a result of the digitalisation at your plant?** (please rate with *0: don't agree* to *3: fully agree*)						**0 - 3**
	Management decisions have become more transparent for employees						0
	Decisions are now made quicker and more targeted						0
	Leaders are delegating more often their tasks						0
	Decisions are now made more often within a team						0
	The quality of regular meetings improved						0
	Working is less hierarchical						0
	The spirit of innovation is now higher						0
	'Pockets of knowledge' are decreasing						0
	Experienced employees respect the input from younger colleagues more (digital natives)						0
	Junior colleagues are taking management responsibilities more quickly						0

70	**What benefits do you already receive today or expect to receive in the next 2 years from the following smart applications / developments?** (please give your assessment as follows: *0: no use*; *1: low benefit*; *2: average benefit*; *3: high benefit*; *9: no statement possible*)	TODAY	FUTURE
	Sensitive collaborative lightweight robots	0	0
	Additive manufacturing for the production of spare parts (machines, tools) and helping devices (e.g. poka yoke or assembly devices)	0	0
	Usage of smart glasses (e.g. picking/logistics or remote instructions)	0	0
	Industrial Internet of Things (IIoT) platform (to link all IIoT-systems)	0	0
	In-Memory Data Analytics Software for process and equipment data exploration	0	0
	Indoor tracking (part tracking) in the production (e.g. RFID, UWB, etc.)	0	0
	Software for simulating virtual commissioning	0	0
	Software for modelling and simulating the manufacturing process as-is	0	0
	Condition monitoring systems for equipments	0	0
	Predictive maintenance software	0	0
	Digital assembly instructions at the work station (via mobile devices)	0	0
	Cloud platform with suppliers to control (critical) components	0	0
	Automated in-house logistics (combining AGVs with control software)	0	0
	Pick-by-x (pick-by-light, -voice, -vision, etc.)	0	0
	Exoskeleton as ergonomic support for factory workers	0	0
	MES (Manufacturing Execution System)	0	0
	Online (white) boards for cooperating in real time across different locations (digital visual management)	0	0
	Software for holistic energy management	0	0

G. Sustainability

71	**How high is the share of renewable energy in total consumption?**		%
72	**How high is the share of self-generated energy in total consumption?**		%
73	**What was the relative improvement in percentage terms that you achieved through your sustainability activities in the last two years? What relative improvements do you plan to achieve in the next two years?** Regarding:	IMPROVEMENTS OVER THE PAST 2 YEARS	IMPROVEMENTS IN THE NEXT 2 YEARS
	THG emissions	%	%
	Amount of waste	%	%
	Water consumption	%	%
	Energy consumption	%	%
	Share of recycled materials	%	%
	Media consumption (compressed air, coolant, ...)	%	%
	Others (please state): _____	%	%

		YES	NO
74	**Have you defined annual target values for the sustainability indicators from question 73?**		
75	**Have you defined a target year for the plant's CO2 neutrality?**		
	If yes: By when would you like to achieve this goal?		years
76	**What approach do you take to ensure improvements in sustainability at your plant?**	YES	NO
	Quantifiable target values (e.g. CO2 emission)		
	Environmental certification (ISO14000 ff)		
	Energy management system certification (ISO 16000ff / ISO 50000ff)		
	Corporate Social Responsibility indicator		
	Internal audit system		
	Checklist for self-assessment		
	Third party audit system (please state): _____		

	H. Value Stream Performance	
77	**What is the proportion of material cost in relation to the total turnover?** (raw materials and purchased parts)	%
78	**In what kind of delivery are these materials been supplied?** (please specify each as a percentage by value of goods)	
	Batch (lot sizes)	%
	Just-In-Time (JIT)	%
	Just-In-Sequence (JIS)	%
79	**How many days supply** (own + consigned) **of finished goods do you maintain on average?**	
80	**How many days supply** (own + consigned) **of raw materials do you maintain on average?**	
81	**What is the frequency of production of A-products?** (one answer only, please)	
	Several times a day	
	Every day	
	Every third day	
	Every week	
	At intervals longer than weekly or irregularly	
	Unknown / not analysed	
82	**What is your plant's service level** (on time in full deliveries) **from your customers' perspective?** (order placement date, delivery date)	%
83	**What is your suppliers' customer service level from your plant's perspective?** (order placement date, delivery date)	%
84	**What is the average overall equipment effectiveness** (OEE) **as a percentage of total production time at bottleneck processes/machines?**	%
85	**What is your direct customer complains rate?** (product and logistics defects only)	PPM
86	**Number of days without reportable accidents**	days
87	**Number of near-accidents per thousand hours of attendance**	

	I. Best Practice Example "Digital Use Case" (Optional)
88	**In the category "Digital Use Case", we are also awarding prizes for individual projects and not just entire works. Each participant has the opportunity to apply for one of the coveted awards with a successful digitalisation project that improved the KPIs of the value stream. Please present your project in a separate documentation, in a form of your choice. In particular, please address the following aspects of the project.**
	Name / designation
	Start and end date
	Target
	Essential contents/milestones
	Improvements attained (qualitative, key figures)
	Innovations/what distinguishes the project in particular?
	Experiences/lessons learned
	Rollout/further implementations planned

Send

To fill in the questionnaire, it is necessary to use Adobe® Reader®.
Please do not fill in this document via web application.
You can download Adobe® Reader® free of charge here:
www.adobe.com/acrobat/pdf-reader.html

The Winners of the Automotive Lean Production Awards 2022

OEM
BMW Group Plant Dingolfing, Germany

Component Supplier
IVECO Group – FPT Powertrain Technologies, Plant Bourbon-Lancy, France

Part Supplier
Eissmann Automotive, Plant Nyíregyháza, Hungary

Special Award: Lean Turnaround
REHAU Automotive, Plant Viechtach, Germany

Special Award: Digital Use Case
Volkswagen Autoeuropa, Portugal

Photo: Volkswagen Navarra

The winners from the benchmark study Automotive Lean Production – Award & Study 2022 from Automobil Produktion and Agamus Consult

f.l.t.r.: Dr. Werner Geiger (Agamus), Marc Kräutle (Agamus), Alexander Ziehr (REHAU Automotive), Gunther Böhner (BMW Group), Attila Böszörményi (Eissmann Automotive), Dr. Eva Rother (FPT Powertrain Technologies), Thomas Hegel Gunther (Volkswagen Autoeuropa), Pascal Nagel (Automobil Produktion), Dirk Reusch (Automobil Produktion)

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Highly flexible, efficient, responsible and fully digital:
With the BMW iFACTORY, the company redefines
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towards electric mobility and preconditions
for the integration of the NEUE KLASSE.

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outstanding production competence in our
entire network.

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