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Hannover Messe

Technology for increased efficiency in production

The focus of this year's Hannover Messe (April 17–21) will be on technologies to promote climate-neutral and networked industry. The digitization of production processes generates efficiency gains in many areas, and with efficiency being the key to greater sustainability, Fraunhofer IPA will be exhibiting technologies that save both energy and resources.

Climate change, energy shortages, interrupted supply chains, a shortage of skilled workers: The challenges facing industry are immense. Under the core topic of "Industrial Transformation – Making the Difference", Hannover Messe will be showcasing technologies to promote networked and climate-neutral industry between April 17 and 21. In hall 16 at stand A12, across an area of more than 900 square meters, Fraunhofer-Gesellschaft will be presenting a series of technologies that contribute to sustainable value creation.

The Fraunhofer Institute for Manufacturing Engineering and Automation IPA will not only be exhibiting at the Fraunhofer-Gesellschaft joint stand, but will also be present at the Allianz Industrie 4.0 stand (hall 15, stand A06) and at the stand for the FabOS research project (hall 15, stand H07). In the following, we provide an overview of what visitors can expect to see:

Everything as a service: Manufacturers as service providers

You do not necessarily have to buy machines outright to use them. They could just as easily remain the property of the manufacturer and the user either pays a flat monthly fee for their use or a fee per unit of production. Companies would no longer have to invest vast sums in production equipment, but could start manufacturing immediately, while machine builders would have a keen interest in keeping their machines operational for as long as possible.

Such innovative business models are based on the continuous exchange of data across company boundaries. In this way, manufacturers not only become service providers, but every factory floor process can be understood as an individual service:

At a glance

What? Fraunhofer IPA at Hannover Messe

When? April 17–21, 2023

Where? Fraunhofer-Gesellschaft joint stand:
hall 16, stand A12

Allianz Industrie 4.0 stand:
hall 15, stand A06

FabOS stand:
hall 15, stand H07

Free tickets: <https://bit.ly/3RRvIEF>

Press communication

Jörg-Dieter Walz | Phone +49 711 970-1667 | presse@ipa.fraunhofer.de

Fraunhofer Institute for Manufacturing Engineering and Automation IPA | Nobelstrasse 12 | 70569 Stuttgart | www.ipa.fraunhofer.de

Everything as a Service (XaaS). The conditions that must be met for these data-based business models to be economically viable and technically feasible are being clarified by Fraunhofer IPA experts in conjunction with industry as part of the large-scale X-Forge research project. At Hannover Messe, representatives of the consortium partners will introduce the four X-Forge projects in detail and present the current research and project results.

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Visit XaaS at the Allianz Industrie 4.0 exhibition stand: hall 15, stand A06.

The »PAIRS« research project: Identifying crises early and increasing resilience

If companies only react to a crisis when its effects are already being felt, it is too late. It would be better to initiate the appropriate countermeasures before an urgently needed raw material is delivered after it is required, if at all. This is exactly what scientists from the Department of Factory Planning and Production Management at Fraunhofer IPA would like to make possible. In the research project "Privacy-Aware, Intelligent and Resilient Crisis Management" (PAIRS), they are developing a platform for crisis management that identifies disruptions as they arise and provides data-based recommendations for action.

For this purpose, an artificial intelligence (AI) evaluates publicly available data: On which roads is traffic currently gridlocked? Which ports are blocked? Where are storms threatening? Where have earthquakes, volcanic eruptions or other natural disasters occurred? How are the prices of certain commodities developing on the market? Furthermore, the AI also utilizes KPIs, such as the on-time delivery performance of a particular supplier. As soon as the AI concludes that disruptions in the supply chain are to be expected, the algorithms can suggest suitable countermeasures, such as changing the supplier or ordering another comparable raw material. The result is an increase in the company's resilience.

Using individual modules of the PAIRS platform, the research team is providing an insight into its work to date at Hannover Messe. The demonstrator can be seen at the Fraunhofer-Gesellschaft's joint stand: Hall 16, stand A12.

Marktspiegel Business Software

In February, the "Aachener Marktspiegel Business Software – Supply Chain Management 2023" was published in its third, completely revised edition. It compares over 140 supply chain management software solutions available on the market. One of the authors is Hans-Hermann Wiendahl, head of the Fraunhofer IPA Production Planning and Control Group. His team is displaying copies of the market review at the Hannover Messe.

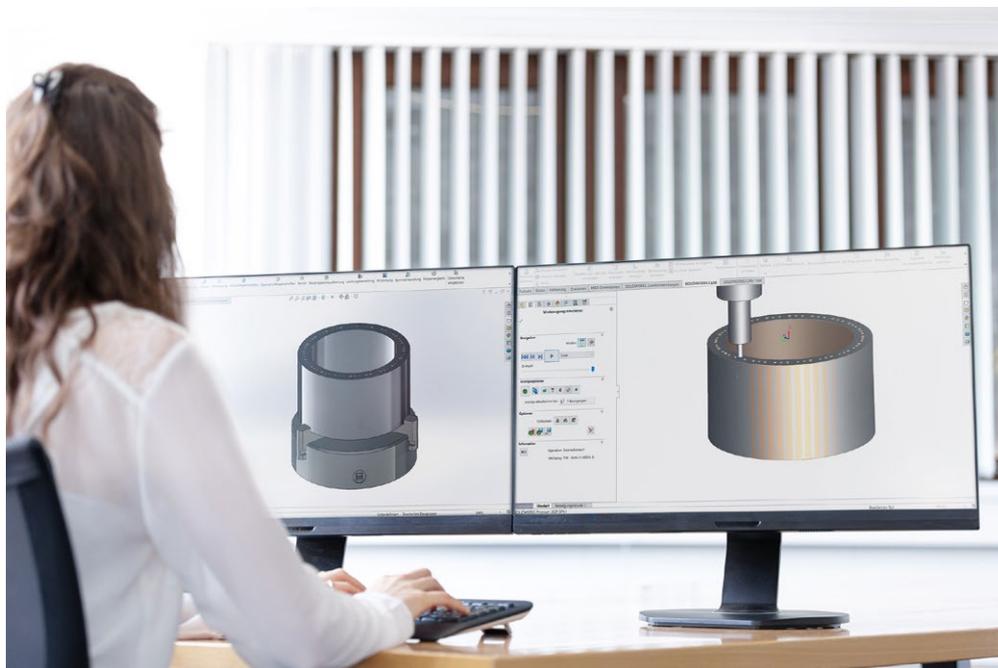
Hall 16, stand A12

DesignChain: Digitization and automation of order processing

Industry must produce personalized products cost-effectively and in increasingly short times. DesignChain can provide the answer to companies seeking to hold their own against fierce global competition under these conditions. In essence, this offers end-to-end digitization and automation of technical order processing – from the original order to the finished product.

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DesignChain is end-to-end digitization and automation of technical order processing – from the original order to the finished product.

Source: Fraunhofer IPA/

Photograph: Rainer Bez

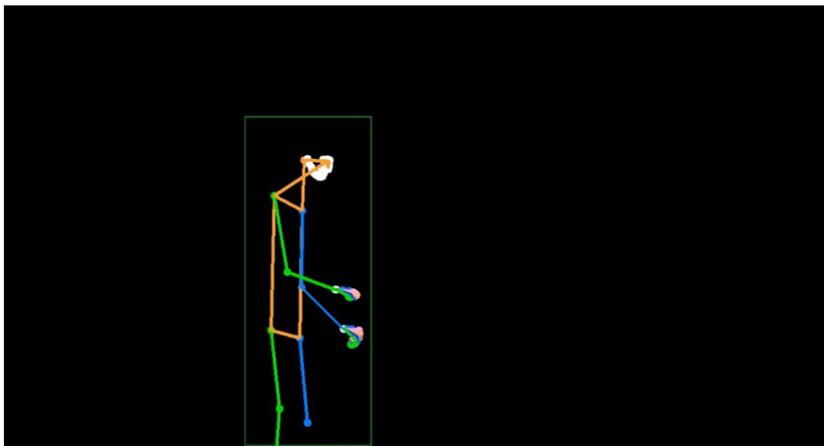
A research team led by Timo Denner from the Factory Planning and Production Management department at Fraunhofer IPA will demonstrate exactly how this works. Visitors to the trade fair can configure an individual product at the stand, which is then generated as a CAD model and simulated ready for production, before being manufactured via a 3D printing process.

Drop by the Fraunhofer-Gesellschaft joint stand at hall 16, stand A12 to see for yourself how DesignChain works.

The “SLEM” research project: a machine that adapts to the user independently**PRESS RELEASE**

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In the Self-Learning and Self-Explanatory Machine (SLEM) research project, a team from the Machine Vision and Signal Processing department at Fraunhofer IPA is developing an intelligent and adaptive assistance system. It recognizes the experience and knowledge level of the machine operator and adapts accordingly. To do this, built-in sensors are used to record both the status data of the machine and the operator's interaction data, which are then evaluated by AI. In this way, the self-learning and self-explanatory machine can observe the trained operator and learn from them how it should be operated. Conversely, for inexperienced users, it could provide instructional material and step-by-step instructions.

**Anonymized posture data of a machine operator.**

Source: Fraunhofer IPA

Operator interaction data can be captured, for example, by input from the operator on a touch display, or from the operator's hand movements, or by AI recognizing which activities the operator is currently performing. At Hannover Messe, the researchers will be demonstrating how well the algorithms can already do this. A camera at the stand records the posture and movements of a trade fair visitor. In real time, a screen displays the visitor's data in the form of colorful dots and lines and visualizes the actions – standing, walking or waving, for example – that the algorithms can detect.

Visit SLEM at the Fraunhofer-Gesellschaft joint stand: Hall 16, stand A12.

DryClean-CAPE®: The mobile dry cleanroom

In times of personalized products, reduced batch sizes, increasing variant diversity and at the same time the need for ever-faster processing and production environments, stationary cleanrooms are often not the most efficient solution in terms of investment, operating costs and set-up times when there is a need to maintain humidity-controlled cleanroom conditions. In response to this, a research team led by Udo Gommel, head of the Ultraclean Technology and Micromanufacturing department at Fraunhofer IPA, has developed CAPE® (Clean And Protective Environment): This is a mobile cleanroom system that generates air cleanliness of ISO classes 1 to 9. Just like a tent at a campsite, CAPE® can be set up and put into operation in about half an hour.

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The DryClean-CAPE® tent not only creates a clean production environment, but also one with very low humidity levels.

Source: Fraunhofer IPA

In recent years, the scientists have expanded CAPE® into a complete product family. The latest member is DryClean-CAPE®, which not only creates a clean production environment, but also one with very low humidity, for example, with a dew point of -50°C. This factor plays a critical role in product quality, in particular for battery cell and automotive production as well as in the aerospace industry.

DryClean-CAPE® will be on show at the Fraunhofer-Gesellschaft joint stand: Hall 16, stand A12.

FabOS: The operating system for the factory

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In many cases, the IT landscape in production is made up of systems from completely different providers and, as such, can be difficult to manage. This could be remedied by an operating system for production that scientists from Fraunhofer IPA are currently developing in conjunction with partners from 23 other research institutes, universities and companies. It is called FabOS and like operating systems for computers or smartphones, it will be a platform for machines, infrastructure and AI services.



FabOS is an open, distributed, real-time-capable and secure operating system for the factory.

Source: Institute of Industrial Manufacturing and Management (IFF) at the University of Stuttgart/Fraunhofer IPA/Photograph: Rainer Bez, Heike Quosdorf

The project partners will be presenting eleven exhibits at Hannover Messe, showcasing different aspects of the open, distributed, real-time-capable and secure FabOS operating system. For example, Felix Spenrath from the Robot and Assistive Systems department at Fraunhofer IPA will be showcasing a robot that detects sheet metal parts and picks them out of a bin. The AI processes used for this are trained in simulation and consequently do not require manual configuration by an expert. In addition, the exhibit will also feature a technology from project partner Compaile that compares the unsorted parts with stored blueprints when a new crate is added and therefore identifies them. With this, the system does not need to be specifically trained for each new part. A robot ultimately grips the parts and places them in the correct position.

Visit the dedicated FabOS exhibition stand: Hall 15, stand H07.

FRAUNHOFER INSTITUTE FOR MANUFACTURING ENGINEERING AND AUTOMATION IPA**Technological Business Excellence: Detailed planning is half the battle****PRESS RELEASE**

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Irrespective of whether it is a new business model, an operating system for production or end-to-end digitization and automation of technical order processing – in fact, whatever new technology a company is planning to introduce – the transformation will only be successful if it has been strategically planned in advance and is followed by a well-structured implementation process. The research team led by Oliver Schöllhammer from the Corporate Strategy and Development department at Fraunhofer IPA is happy to assist the search for the right strategy and the most efficient organizational form.

At Hannover Messe, the team will be providing visitors with information on its business model development and innovation projects: Hall 16, stand A12.



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Source: Fraunhofer IPA/Photograph: Rainer Bez

Expert contacts

Timo Denner | Phone +49 711 970-1082 | timo.denner@ipa.fraunhofer.de

Dr.-Ing. Udo Gommel | Phone +49 711 970-1633 | udo.gommel@ipa.fraunhofer.de

Christian Jauch | Phone +49 711 970-1816 | christian.jauch@ipa.fraunhofer.de

Matthias Schneider | Phone +49 711 970-1658 | matthias.schneider@ipa.fraunhofer.de

Oliver Schöllhammer | Phone +49 711 970-1947 | oliver.schoellhammer@ipa.fraunhofer.de

Dr.-Ing. Hans-Hermann Wiendahl | Phone +49 711 970-1243 | hans-hermann.wiendahl@ipa.fraunhofer.de

Fraunhofer Institute for Manufacturing Engineering and Automation IPA | www.ipa.fraunhofer.de

Press officer

Hannes Weik | Phone +49 711 970-1664 | hannes.weik@ipa.fraunhofer.de

With nearly 1200 employees, the **Fraunhofer Institute for Manufacturing Engineering and Automation**, Fraunhofer IPA, is one of the largest institutes in the Fraunhofer-Gesellschaft. The total budget amounts to € 82 million. The institute's research focus is on organizational and technological aspects of production. We develop, test and implement not only components, devices and methods, but also entire machines and manufacturing plants. Our 19 departments are coordinated via six business units, which together conduct interdisciplinary work with the following industries: automotive, machinery and equipment industry, electronics and microsystems, energy, medical engineering and biotechnology as well as process industry. The research activities of Fraunhofer IPA aim at the economic production of sustainable and personalized products.