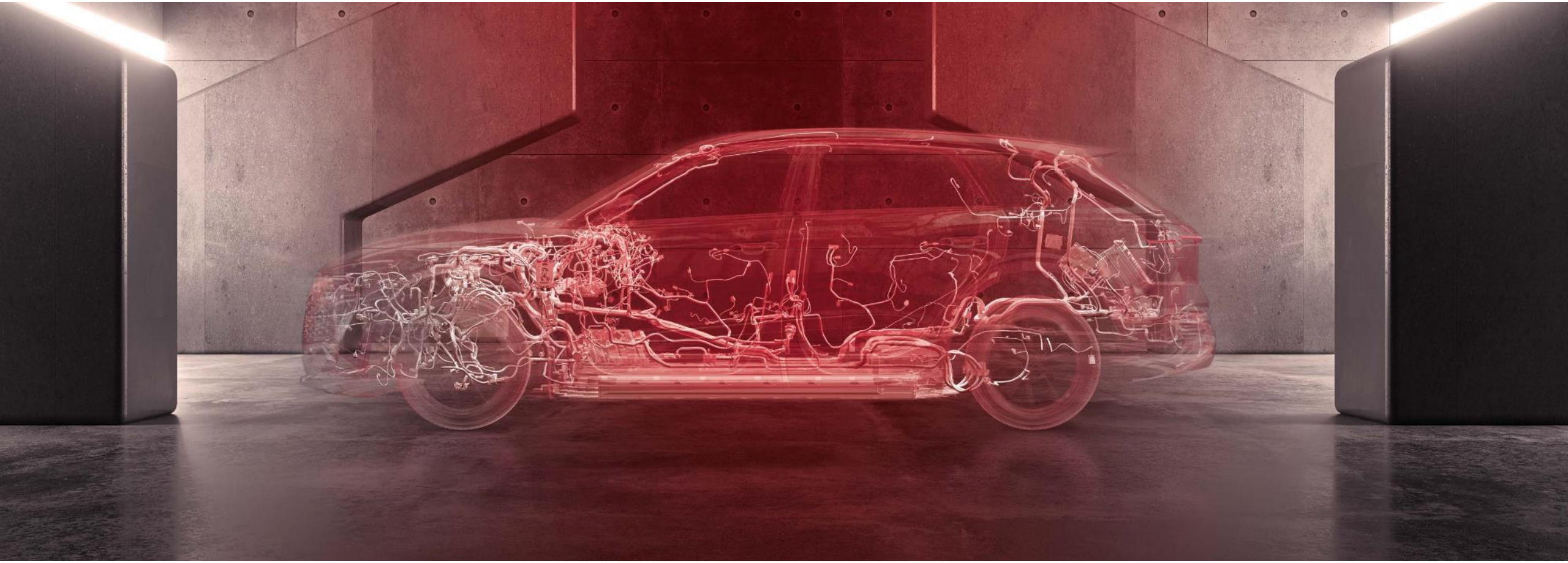
Transformation Hub Wiring Harness

TransformationsHub LEITUNGSSATZ

Info Session 1: Overview of the Robotics Challenge 2027

Microsoft Teams Meeting, November 6, 2026



ARENA2036

bayern innovativ

OHLF OPEN HYBRID LABFACTORY

Gefördert durch:
Bundesministerium für Wirtschaft und Energie
aufgrund eines Beschlusses des Deutschen Bundestages

Netiquette / Organizational Information



Switch to Mute
Please mute your microphone when you are not speaking.



Camera Usage
You are welcome to keep your camera on. We kindly ask you to turn it on when speaking.



Show of hands
During discussions, contributions or questions are indicated by the raise-hand function.



Chat Usage
Please use the Teams chat function to ask questions or share comments on the presentations.



Slides
The slides presented during the session will be available for download on our website.



Recording
The session will be recorded. **Please let us know if you do not consent to being recorded.**

Agenda – November 6, 2026: Online-Info-Session on the Robotics Challenge

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Transformation Hub Wiring Harness: Goals and Functions

Objective of the Transformation Hub Wiring Harness

The Transformation Hub Wiring Harness aims to link research and development efforts with the practical needs of the industry to develop relevant outcomes.

Functions of the Transformation Hub Wiring Harness

- **Hub Function:** Serves as the central contact point for the industry and academia for trends and future technologies.
- **Bridge Function:** Translates topics and trends from research for practical application, and vice versa.
- **Support Function:** Drives transformation by initiating projects in both industry and research.

Consortium

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Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

Project Duration: Oct 1, 2022 – Dec 31, 2026

Project Website: www.leitungssatz-hub.de

Consortium Lead: ARENA2036, Stuttgart

Activities of the Leitungssatz-Hub: Networking

The Wiring Harness Hub connects experts:

We provide access to the developers and innovators driving emerging trends and technologies.

Leitungssatz-Hub „Trend Outlook“

Presentation of technical approaches and technological trends that are relevant to wiring harnesses or could potentially be applied in this field.



Leitungssatz-Hub „Innovation Showcase“

Highlighting outstanding innovations from an industry perspective and communicating them in language relevant to the sector.



Leitungssatz-Hub „Website“

The website serves as the central point of contact and information hub, providing a newsletter with regular updates.



Topic-Specific In-Depth Events

Organizing info sessions and other event formats, such as the **Robotics Challenge**, to explore specific topics in greater detail.



Activities of the Leitungssatz-Hub: Information

The Wiring Harness Hub provides updates on new developments:

“Do good things and talk about them!”

Through our events and publications, we provide inspiration and create opportunities for implementing innovations.

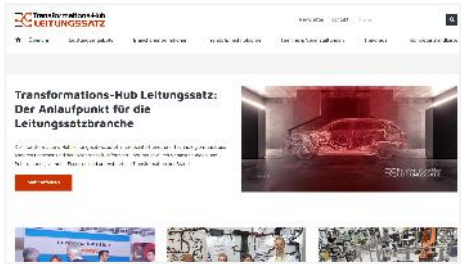
Wiring Harness Hub Events

- Annual main event: “Innovation Forum”
- Regular virtual information sessions
- In-person technical events



Website www.leitungssatz-hub.de

- Public knowledge base of the solution portfolio
- Presentation of the transfer modules



Trade Fairs and Conferences (Examples)

- Automotive Wiring Systems Cooperation Forum
- International Automotive Wiring Systems Congress, Ludwigsburg
- Productronica Trade Fair
- Hannover Messe

Articles in Trade Publications (Examples)

Robotics Challenge | Motivation from the Automotive Manufacturers' Perspective

Automotive manufacturers explicitly welcome initiatives to stimulate the development of automation solutions.

During the Robotics Challenge 2026, Norbert Zundl, Head of Wiring Harness & Technology Development at Mercedes-Benz, outlined the OEM's motivation and expectations:

- 80% of wiring harness production time is spent on manual activities. Therefore, the **high demand for personnel** in wiring harness manufacturing represents a major challenge.
- To be prepared for the future, a paradigm shift towards **automated manufacturing** and **end-to-end digitalization** of the process chain is essential.
- **Automation** of wiring harness production offers significant benefits for OEMs in terms of production process monitoring, greater flexibility in selecting wiring harness manufacturing locations, and traceability of wiring harnesses and their components.

OEM Perspective on the Robotics Challenge



Norbert Zundl | Head of Wiring Harness & Technology Development at Mercedes-Benz & Advisory Board Member of the Transformations-Hub Leitungssatz

The video of Mr. Norbert Zundl's welcome address is available on the Leitungssatz-Hubs website: https://www.leitungssatz-hub.de/robotik-challenge/robotik-challenge-2026/

Bordnetz-Hub from 2027: Overview of Key Facts and Application Status

Key Facts of the Wiring Harness Hub:

- **Partners**: ARENA2036, Bayern Innovativ, Institute for Automation and Communication, TU Braunschweig, and TU Darmstadt
- **Budget**: Approx. €4.5 million
- **Project Duration**: 3 years, from 01/2027 to 12/2029

Funding:

- **Funding Call:** Regional Transformation Networks and Transformation Hubs
- **Funding Body:** Federal Ministry for Economic Affairs and Energy
- **Project Management Agency:** VDI/VDE Innovation + Technik

Application Status:

- **Application Submission:** July 14, 2026
- **Funding Approval:** Pending



The project is expected to start in early 2027.

Transformation Projects in the Bordnetz-Hub from 2027

Robotics Challenge: Assembly of wiring harness modules	Challenge	Automa-tion
Dismantling Challenge: Automated disassembly of wiring harness components	Challenge	Sustainability
Virtual Reference Factory: Highly automated wiring harness production	Event Series	Automa-tion
Catena-X in Wiring Harness Systems	Convoy event series	Digitalization
Platform **Grünes Bordnetz**	Think Tank	Sustainability
Digital Product Passport (DPP) for wiring harness components	Convoy event series	Digitalization
End-to-end digital **Product Carbon Footprint** Calculation for wiring harness systems	Proof of Concept	Sustainability
AI in Wiring Harness Development	Think Tank	AI
Greenfield "**Software Defined Vehicle**"	Design Thinking	SDV
Open Source for SDV	Transfer Hackathon	SDV
Sensor Fusion for SDV	Convoy event series	Sensors

Legende:

Transformation project topic	Implementa-tion format	focus area classification

The Hub's core activities are organized into **11 transformation projects**, in which companies and research institutions work together to address specific transformation needs of the wiring harness industry.

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Why Automation in Wiring Harness Manufacturing?

- Shortage of skilled workers and personnel
- Disproportionately rising labor costs – reshoring production to Germany/Europe

Since 2020, labor costs in Germany have increased by 22.3%.

(Source Claude)

Location	Wage (€/h)	Freight Surcharge
Germany	38,00 €	0,8%
Poland	15,00 €	1,2%
Czech Republic	17,00 €	1,2%
Romania	11,50 €	2,0%
Morocco	6,50 €	3,5%
Tunisia	5,80 €	3,2%
Mexico	7,50 €	4,0%

Labor costs based on an example calculation

- Geopolitical risks – automated production in Central Europe reduces dependence on geopolitical conflicts
- Technical complexity – can only be reliably managed through automation
- High quality requirements – reliably met and documented
- Economic scalability, e.g., when production volumes increase
- International competitive pressure – major international suppliers continue to grow, requiring fast and efficient implementation

Automated Wiring Harness Manufacturing – Not a New Topic

Major projects were already implemented in the 1990s, e.g., in the automotive and household appliance industries.

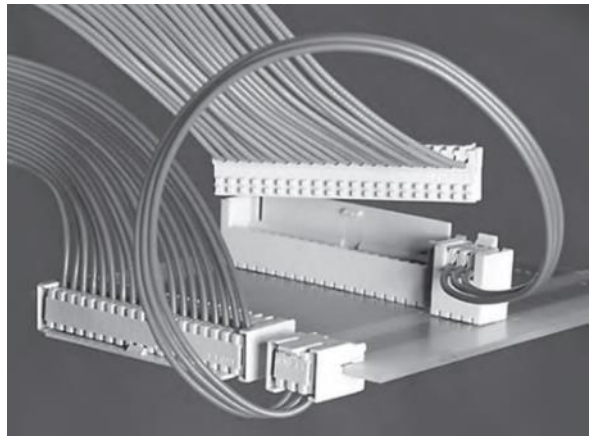
- Large wiring harness subassemblies (Citroën Rennes)
- Complex modules (VW instrument cluster, steering column switches)
- Audi using Insulation Displacement Connection technology (instrument cluster with IDC technology)
- Household appliance industry: Miele, AEG, etc., using RAST systems with IDC technology
- The main motivation was cost reduction in manufacturers' in-house production

What was the strategy?

- On the one hand, inflexible, high-performance dedicated machines
- On the other hand, automation-friendly components (RAST) for flexible automated processing

Insulation Displacement Technology in the Household Appliance Industry

- Future-proof components designed for automation
- Still used today in semi- and fully automated machines by wiring harness manufacturers



Dedicated Automated Machines in the Automotive Industry

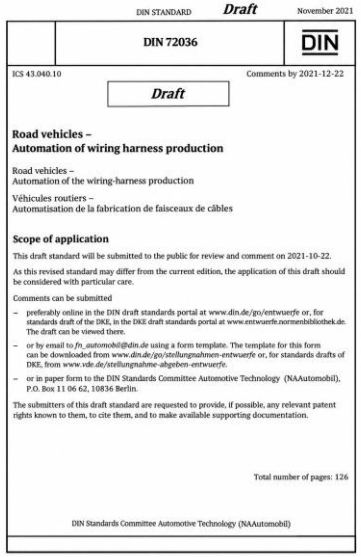
- Only used for the duration of the project (vehicle production lifecycle)
- With the opening of low-cost production locations in Eastern Europe and North Africa, as well as maquiladoras in Mexico, the pressure to automate disappeared
- Development was largely discontinued



We want to do things differently!

DIN 72036 was developed through intensive collaboration between OEMs, wiring harness manufacturers, component suppliers, and machine manufacturers. It defines more than 100 rules and recommendations covering:

- **Component requirements** – What is the optimal design of contacts and connector housings?
- **Wiring harness design** – Do we have a clear, well-structured design?
- **Processing specifications** – Are the technologies suitable for fast and reliable processes?
- **AI in automation** – Prerequisites for end-to-end digital description, simulation, planning, and documentation of the process
- The third edition and the English version are currently in preparation



DIN STANDARD *Draft* November 2021

DIN 72036

DIN

ICS 43.040.10 Comments by 2021-12-22

Draft

Road vehicles –
Automation of wiring harness production

Road vehicles –
Automation of the wiring-harness production

Véhicules routiers –
Automatisation de la fabrication de faisceaux de câbles

Scope of application

This draft standard will be submitted to the public for review and comment on 2021-10-22.

As this revised standard may differ from the current edition, the application of this draft should be considered with particular care.

Comments can be submitted

– preferably online in the DIN draft standards portal at www.din.de/go/entwuerfe or, for standards draft of the DKE, in the DKE draft standards portal at www.entwuerfe.normenbibliothek.de. The draft can be viewed there.
– or by email to *Pr_automobil@din.de* using a form template. The template for this form can be downloaded from *www.din.de/go/stellungnahmen-entwuerfe* or, for standards drafts of DKE, from *www.vde.de/stellungnahme-abgeben-entwuerfe*.
– or in paper form to the DIN Standards Committee Automotive Technology (NAAutomobil), P.O. Box 11 06 62, 10836 Berlin.

The submitters of this draft standard are requested to provide, if possible, any relevant patent rights known to them, to cite them, and to make available supporting documentation.

Total number of pages: 126

DIN Standards Committee Automotive Technology (NAAutomobil)

BMW GROUP · BOSCH Technik fürs Leben · Coroplast group · komax

KOSTAL · LEAR · Mercedes-Benz · Rosenberger

Schleuniger · schunk · SIEMENS · SEI Automotive Europe

TE · TELSONIC ULTRASONICS

- **Labor costs** are rising in low-cost countries.
- Current international **conflicts** are affecting supply chains and delivery capabilities.
- Rising **energy prices** are impacting freight costs.
- **CO_2 footprint** – affected by long transportation distances.
- Increasing **quality requirements** due to legal regulations, high-voltage applications, autonomous driving, electrification, etc.
- Increasing **complexity**, e.g., in high-frequency wiring harnesses, which can no longer be handled through manual production.
- International **competitors** are entering our markets.

- **Major german OEMs**
  - BMW
  - Mercedes
  - Volkswagen Group

  Together, they produce over 14 million vehicles worldwide, with the technology and wiring harness architecture defined in German development centers.

- **Tier 1 Wiring Harness Manufacturers** define production technologies for their global manufacturing sites in Germany and Central Europe.

- **System Suppliers** manufacture customized functional and assembly modules, e.g., for battery systems, charging infrastructure, headlights, climate control systems, etc.

- • **Innovative wiring harness architectures –** zonal electrical architectures – introduce new requirements for automation (module production) and unlock further potential.

- **Rollout** of locally developed standards to international production sites.

Summary – Opportunities for automation technology providers

- **Current Situation**
  - Intelligent partial solutions are in demand – this 4th Robotics Challenge addresses specific requirements of the wiring harness industry.

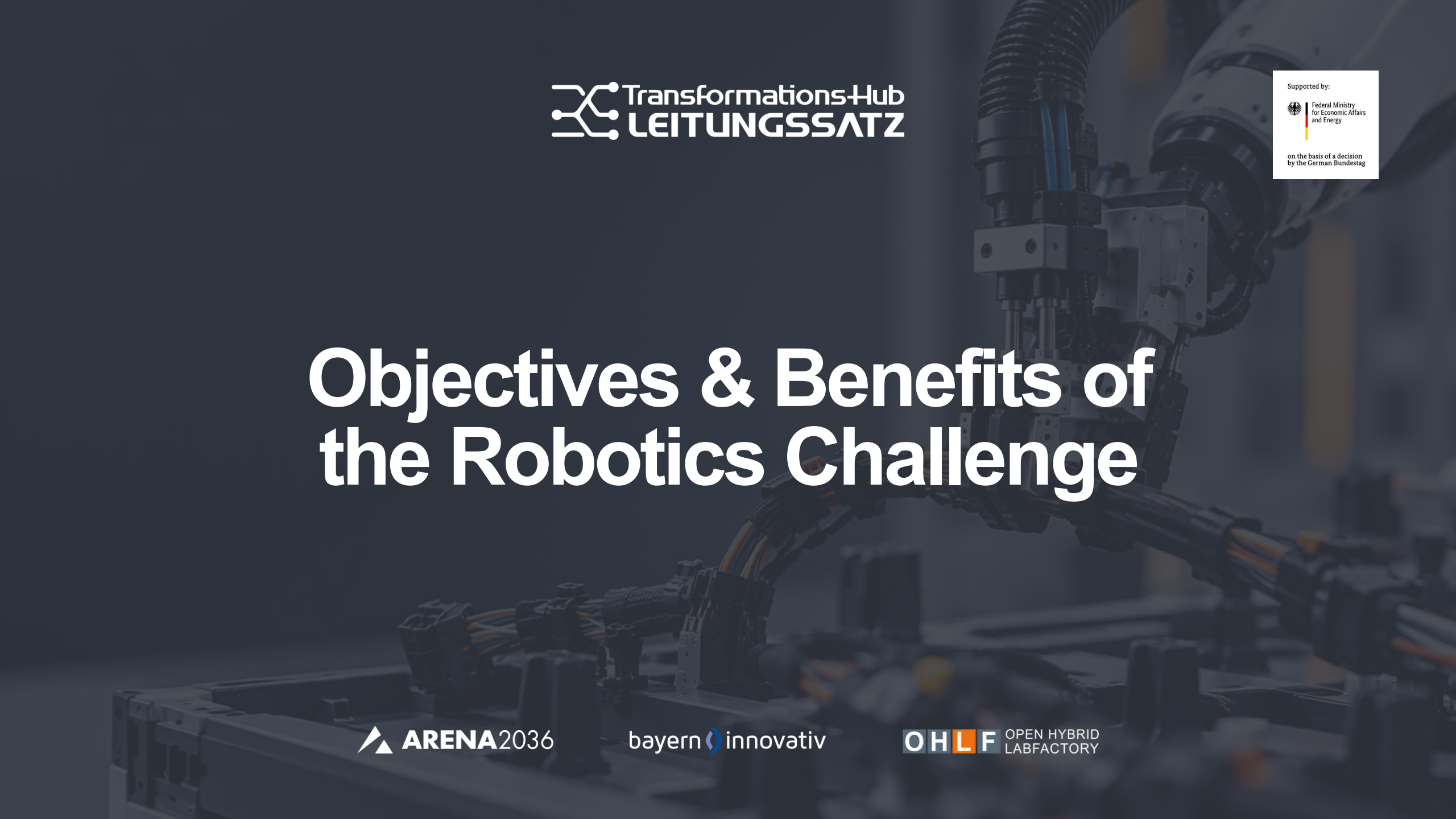
- **…. time is running out**
  - Chinese competitors (automotive manufacturers, suppliers, and machine manufacturers) are entering the market.

- **Successfully Solving This Challenge Offers Participants in the Highly Complex Field of Automotive Wiring Harnesses the Opportunity To:**
  - Present their solutions to key industry players and decision-makers with international influence, including:
    - OEMs
    - Wiring harness manufacturers
    - System suppliers

    Both directly and through the ARENA2036 platform.
  - Reach a broad professional audience through media coverage and publications.
  - Establish horizontal partnerships among participating companies.

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Objectives & Benefits of the Robotics Challenge

ARENA2036 bayern innovativ OHLF OPEN HYBRID LABFACTORY

Initial Situation – Need for Action

Overview RC 1 – RC 3

		Participants			Complexity					Result	
	Duration [months]	Number of Participants	University	Company	Assembly Components	Individual Wires	Coaxial Cables	UTP (Twisted pair)	Conncectors	Complete process cycle	Digitalization
RC1	4	8	2	6	4	3	-	-	1 /2	8	no
RC2	4	5	3	2	9	5	-	-	4	2	no
RC3	5	7	3	4	13	3	RG 174	2X0,35	6	3 *	yes

The challenge increased in complexity by 50% each year over the past three years. This had no impact on the number of participants; however, only a maximum of 40% of participants were able to demonstrate the required process chain. (*EKS Intec demonstrated a simulation of the process chain.) Nevertheless, some participants in RC3 presented creative new approaches (use of drones; AI-trained robotic grippers).

The objective of initiating projects to commercialize the Robotics Challenge results was achieved on several occasions (RC1: Celios; RC2: project discussions involving Dräxlmaier and Sumitomo with Agile Robots, LEONI and THWS; RC3: Dräxlmaier and FAPS).

→ The results of the new Challenge should be even more applicable to the practical needs of the wiring harness industry!



Bild: ARENA2036

RC 1: Cellios/IPA



Bild: ARENA2036

RC 2: Agile Robots SE

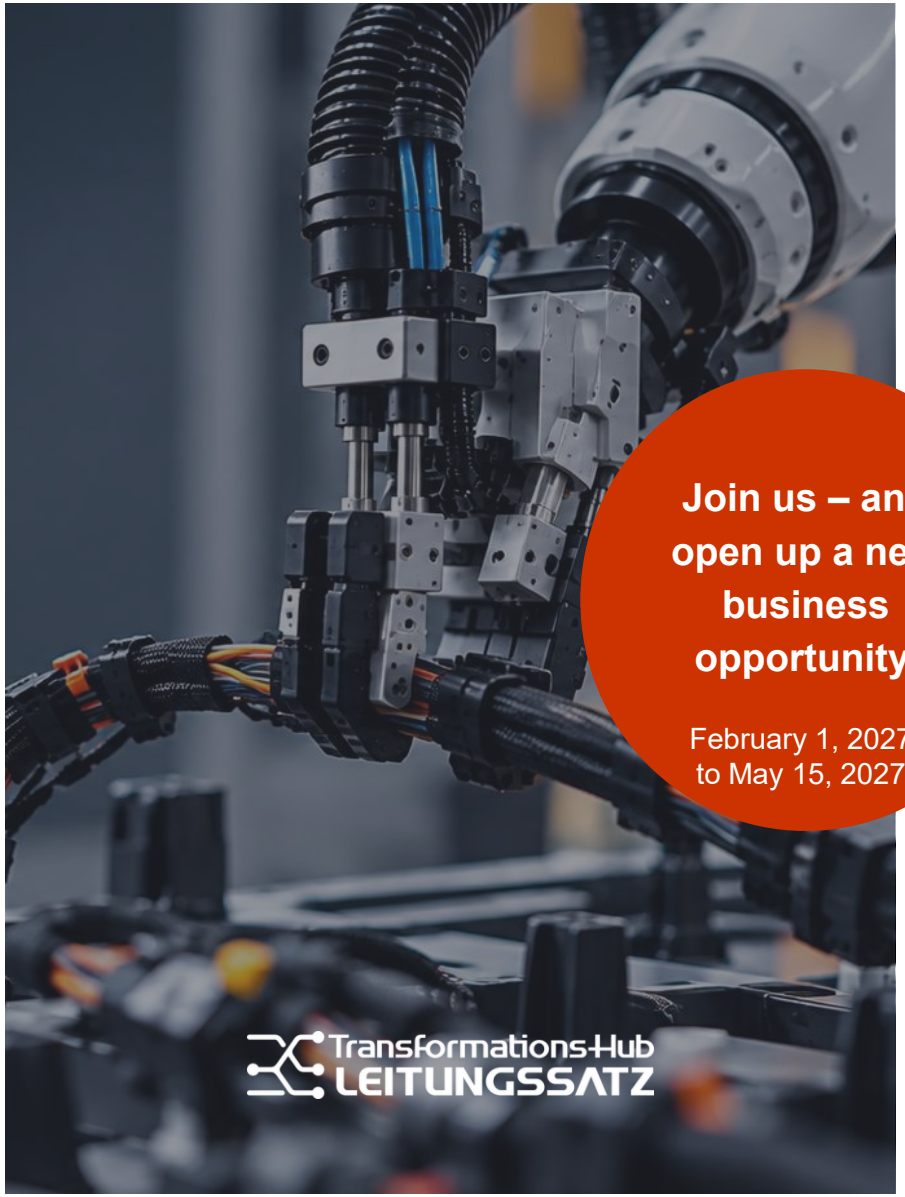

Bild: ARENA2036

RC 3: TUM; LS iwb


Bild: ChatGPT

RC 4: ?

Robotics Challenge 2027: Automated Production of a Door Wiring Harness



Robotics Challenge 2027: Focus & Objectives

Wiring harness production is undergoing technological change. Through **Robotics Challenge 2027**, the Wiring Harness Hub brings research and industry together to automate previously manual steps. The focus is on **short cycle times**, **reliable processes** and **flexible systems** that operate efficiently and comply with applicable standards.

Target groups

Teams wishing to test their technologies in practice and demonstrate how manual processes can be intelligently automated using **robotic systems**:

- Research institutes and universities
- Companies in mechanical engineering, robotics, software, automation and AI

Development phase:
Feb 1, 2027 to May 15, 2027

Presentation of results:
June 2027 · ARENA2036, Stuttgart

Automation of Wiring Harness Production Is Economically Viable

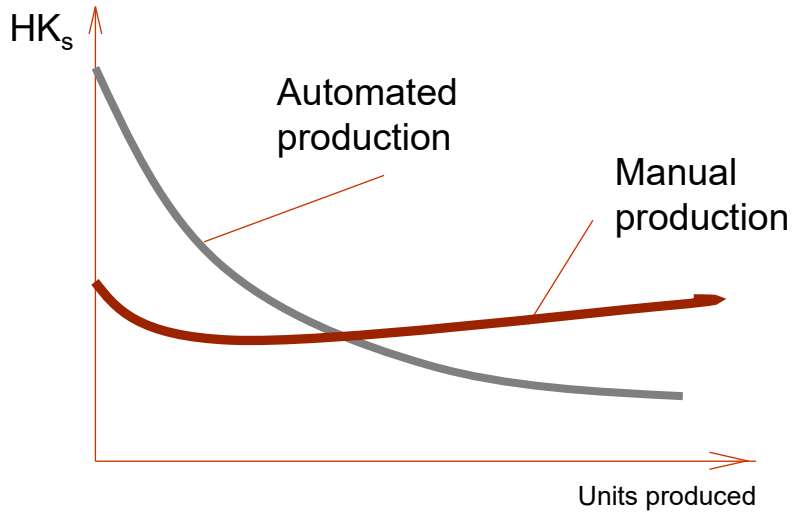
A simplified manufacturing cost analysis (EUR/unit) is sufficient to estimate the economic viability of automated wiring harness production.

HK_s = material costs + Machine costs f(A) + Labor costs + Operating costs + Overhead costs

Machine costs = **Investment / depreciation years** + maintenance + wear parts + service
Labor costs = **Process time** × (wages + non-wage labor costs)
Operating costs = Energy + consumables
Overhead costs = Quality assurance + **rework (in %)** + logistics

Comparison: Manual vs. Automated Production

	Manual production	Automated production	Comment
Investment	low	high	expensive equipment
Machine costs	low	high /low	Depends on depreciation
Labor costs	high	low	Depends on complexity
Overhead costs	high	low	Human errors, rework



Qualitative manufacturing cost trend by production volume

Automation is economical when:

- the automated process time is shorter than the manual process time;
- the investment (depending on volume) is calculated using realistic depreciation; and
- the system's precision remains constant, unlike fluctuations in manual production.

Economic viability is the decisive evaluation criterion for Robotics Challenge 2027



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Challenge Tasks

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Robotics Challenge 2027 – New Focus

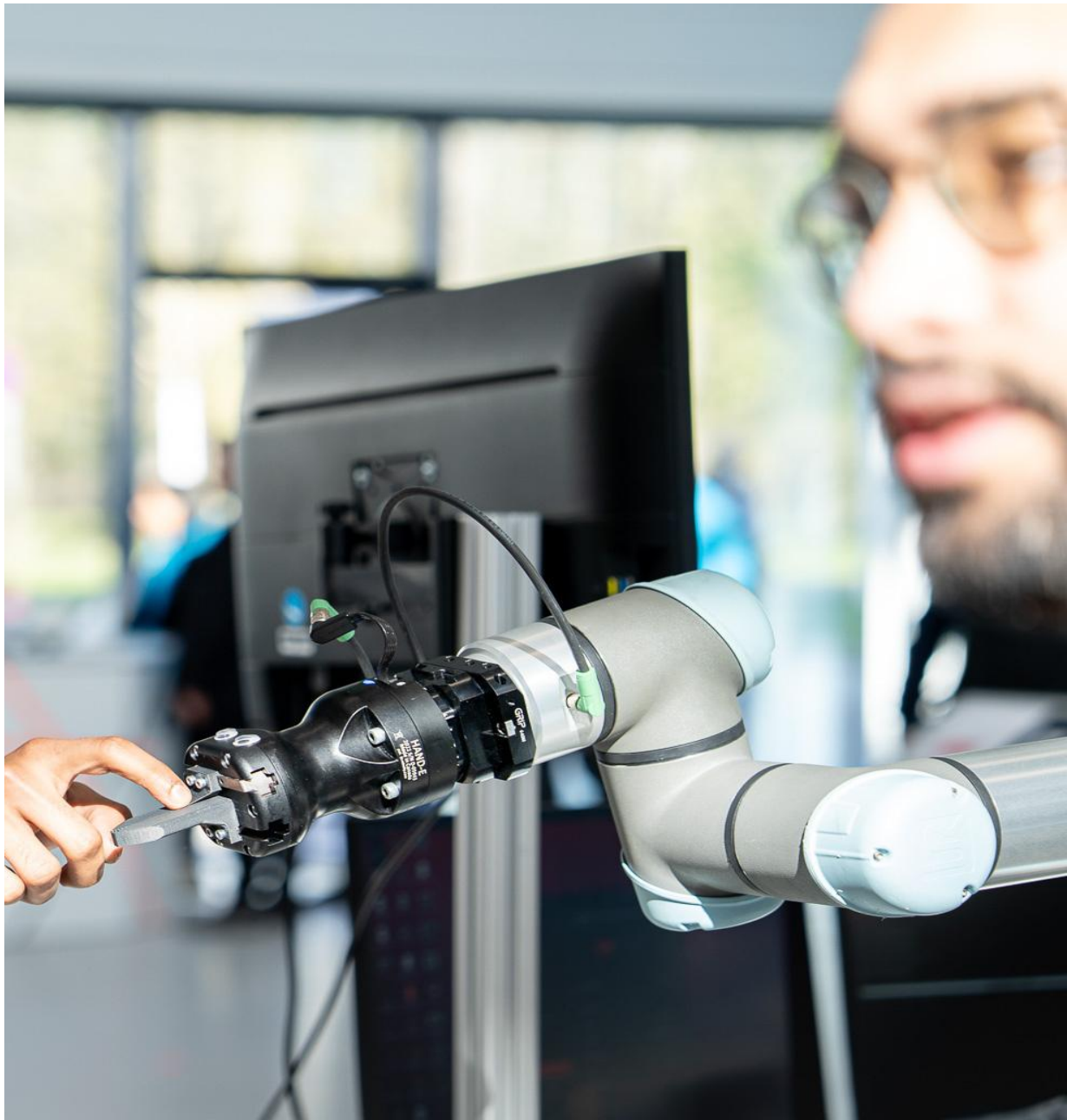
Building on experience from previous years, the focus in 2027 is on **automated handling in wiring harness production.**

The focus is a selected section of the process chain for a door wiring harness. The aim is to replace manual activities with automated solutions and demonstrate their practical feasibility under realistic conditions.

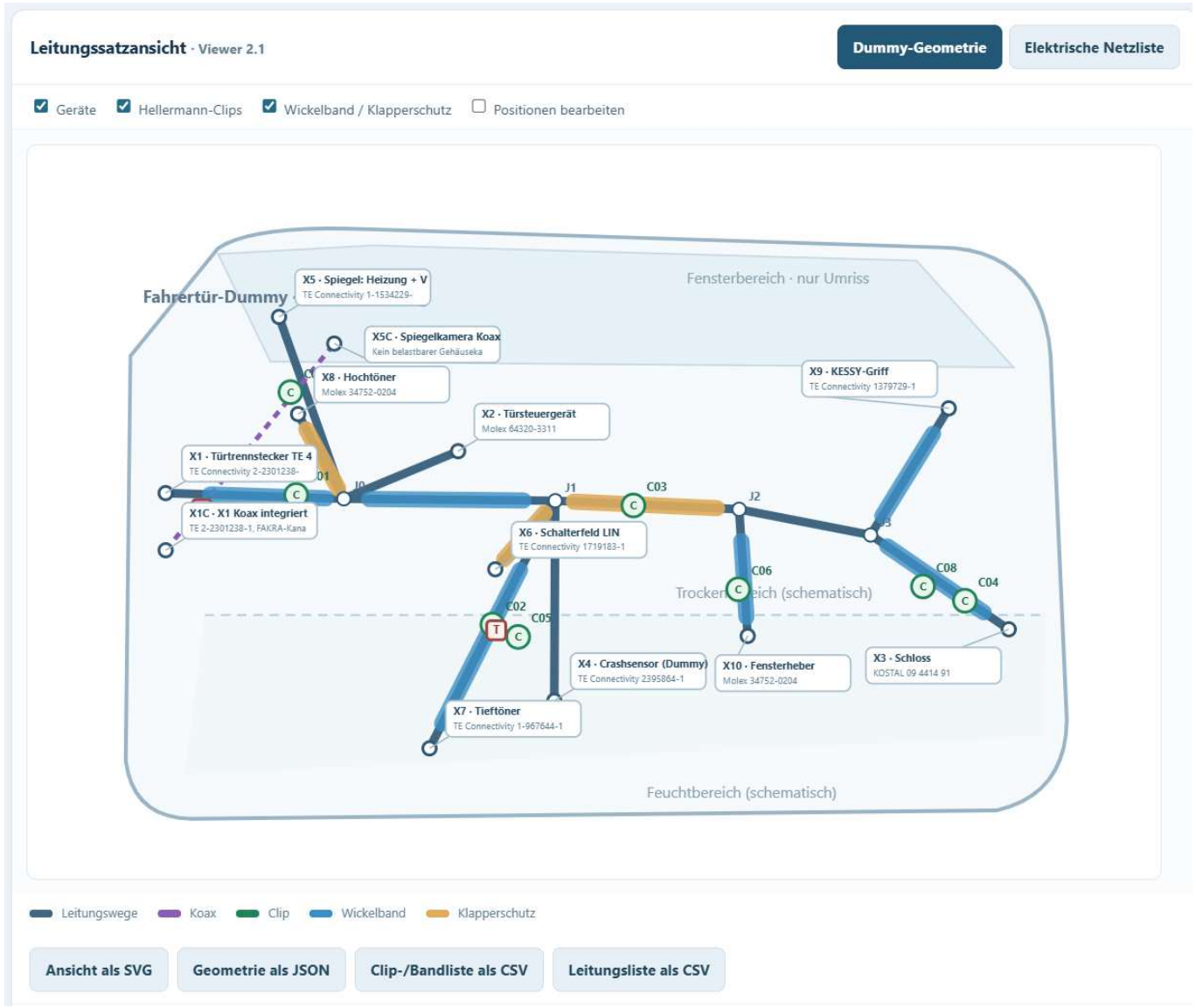
Previous Challenges

Since 2024, teams from industry and research have developed robotic solutions for wiring harness production, including Bosch Rexroth, Agile Robots, iwb at the Technical University of Munich, and FAPS.

- Robotics Challenge 2024: Steckerbestückung
- Robotik Challenge 2025: Herstellung Teilleitungssatz
- Robotik Challenge 2026: hybride Leitungssatzfertigung



The Product Focus of Robotics Challenge 2027 Is a Door Wiring Harness



The door wiring harness provides signal and power connections between electrical components in a vehicle door.

It is characterized by its connection to the vehicle electrical system and its routing between dry and wet areas.

The different components and processes require specific skills that participants can address.

Automatic Production of a Driver's Door Wiring Harness

Process Steps and Challenges

1. Understanding the Door Module



- Door Connector
- Window Regulator
- Door Control Unit
- Door Lock
- Speaker
- ...

Door wiring harness as a standalone module; electrical connection to the vehicle via the door connector.

2. Material Receiving & Feeding



Bulk Wire



Terminals



Connector Housings



Mounting Points



Grommets

Automatically identify, inspect, sort, and provide materials in the correct configuration.

3. Pre-Sorting for Wire Harness Assembly





Defined connector housing positions enable fast automated loading and wire harness assembly.

4. Wire Processing



- Cutting
- Crimping
- Terminal Insertion

Automated wire processing with reproducible quality and high availability.

5. Handling After Wire Harness Assembly



- Organized Transfer
- Gentle Gripping
- No Tangling

Reliably grip, remove, align, and transfer flexible wiring harnesses in an organized manner.

6. Feeding and Assembly of Additional Components



Components



Clips/Mounting Points



Grommets



Clips, grommets, protective sleeves, and door connectors are often attached to the door module using a mirror or door handle during final door assembly.

7. Testing, Inspection & Documentation



Electrical Testing



Visual Inspection

Seamlessly document test results, production batch, components used, and serial numbers.

8. Packaging, Shipping & Cost-Effectiveness



Removal



Pakaging

Sample assumption: 400,000 units/year, 10-year equipment lifetime; evaluate cost-effectiveness compared to low-cost production locations.

Key Challenges

- Automated Supply of All Components
- Robust Handling of Flexible Wires
- Fast and Easy Grommet Installation
- High Speed and Process Reliability
- Complete Traceability
- Cost-Effective Implementation

Tasks of Robotics Challenge 2027

Transformations-Hub LEITUNGSSATZ

Automatic Production of a Driver's Door Wiring Harness

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Digitalization of the Process Chain

Task 1

Task 2

Task 3

Task 4

Key Challenges

- Automated Supply of All Components
- Robust Handling of Flexible Wires
- Fast and Easy Grommet Installation
- High Speed and Process Reliability
- Complete Traceability
- Cost-Effective Implementation

Robotics Challenge 2027 – Task Description

Participants in the Robotics Challenge can choose from the following four tasks:

Task 1



Image: Komax

Task: Load the carrier pallet with connector housings – more than 10 different types.

Challenge: Bulk parts from boxes or containers (standard packaging) – eliminate the feeder.

Solution: Efficient camera/picker combination.

Task 2

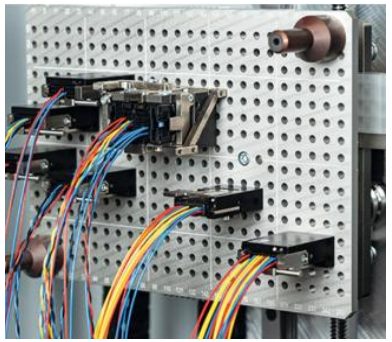


Image: Komax

Task: Safely remove the wiring harness and continue handling it without damage.

Challenge: Without fixing the connectors, wires easily become entangled and are difficult to separate cleanly.

Solution: The process should be performed quickly using simple tools.

Task 3



Image: Sketch from ChatGPT

Task: Finish partially assembled wiring harnesses.

Challenge: Individual wires have different lengths and special mechanical properties.

Solution: Fix the wiring harness on an innovative, highly adaptable fixture.

Task 4

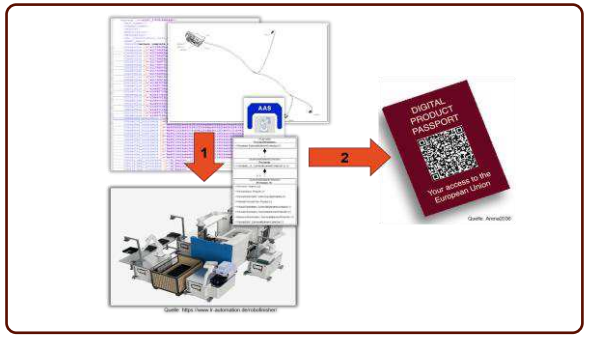


Image: ARENA2036

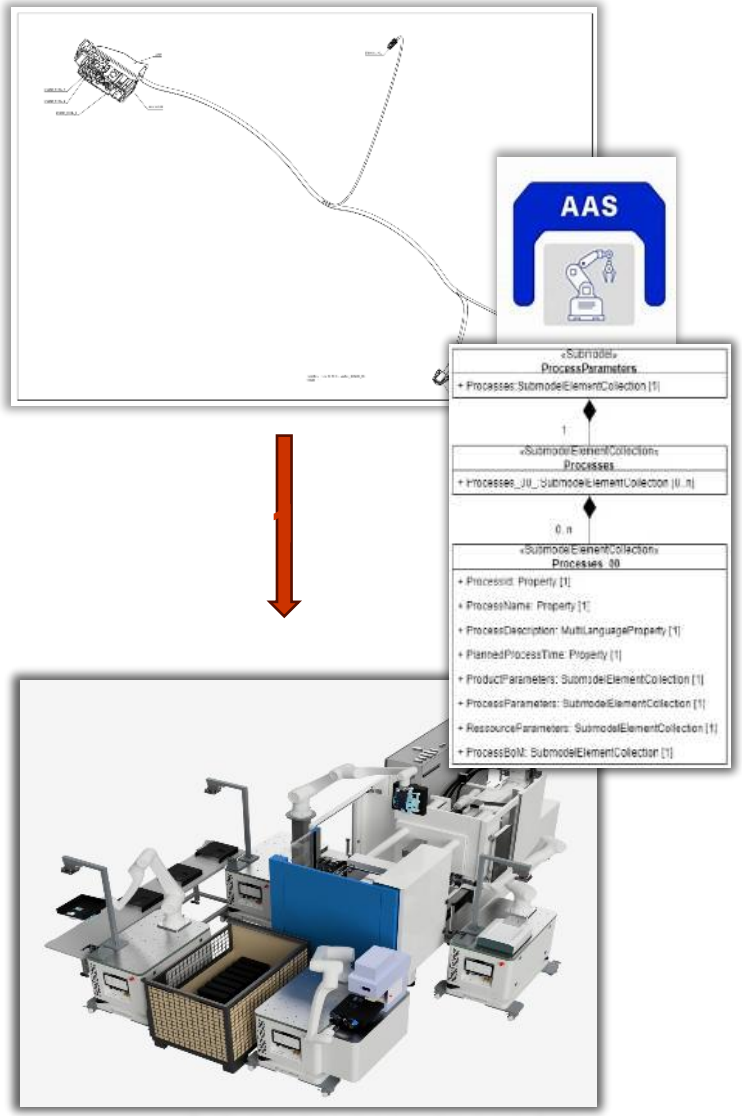
Task: Digitalization across the process chain

Challenge:

1) How can production be controlled as fully automatically as possible?
2) How can the Digital Product Passport (DPP) be generated fully automatically during wiring harness production?
3) Digital networking between engineering model, production order, production and DPP

Solution: Describe process steps systematically in machine-readable form. Log process steps and integrate them into the toolchain/data space/ecosystem.

Digitalization: From the Engineering Model to the Digital Product Passport (DPP)



Quelle: https://www.lr-automation.de/robofinisher/



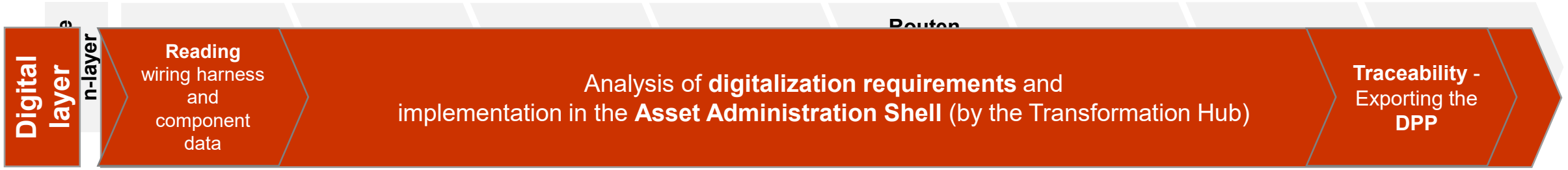
Source: Arena2036

Relevant topics:

- Product models and offerings (wiring harness components and harnesses) in the digital data space (e.g. Catena-X)
- Making VEC and KBL compatible with data spaces
- Digitally controlled manufacturing automation via AAS
- The Digital Product Passport (DPP) → Material and energy consumption, carbon footprint
- Use of **IMDS**

1. How must the digital product model be designed to enable manufacturing to be controlled as fully automatically as possible?
2. How can the Digital Product Passport (DPP) be generated fully automatically during wiring harness production using the engineering and process model?

Digital Layer: Digitalization Aspects of the Robotics Challenge



1	**Digital models of components**	Challenge participants receive **human-readable descriptions** and **machine-readable digital models** of the sample wiring harness and its components **in the relevant file formats** (KBL, VEC, DXF, STP, IGS, etc.) to design their respective manufacturing automation solutions.
2	**Data require-ments of RC participants**	The Challenge participants develop their respective solutions for **data-driven manu-facturing automation**, including the creation of a **machine-readable production** order. Gap analyses are conducted to identify **which data** is missing for the RC participants to develop their automation concepts. These **gaps** are then reported back to the data providers.
3	**Traceability in the Asset Administration Shell**	**Digital logging** of the manufacturing process to enrich a so-called Digital Product Passport (DPP). **Accompanying analysis** and/or **support** provided by **service providers commissioned by the Transformation Hub**, taking into account the data interfaces and tools used by the RC participants.



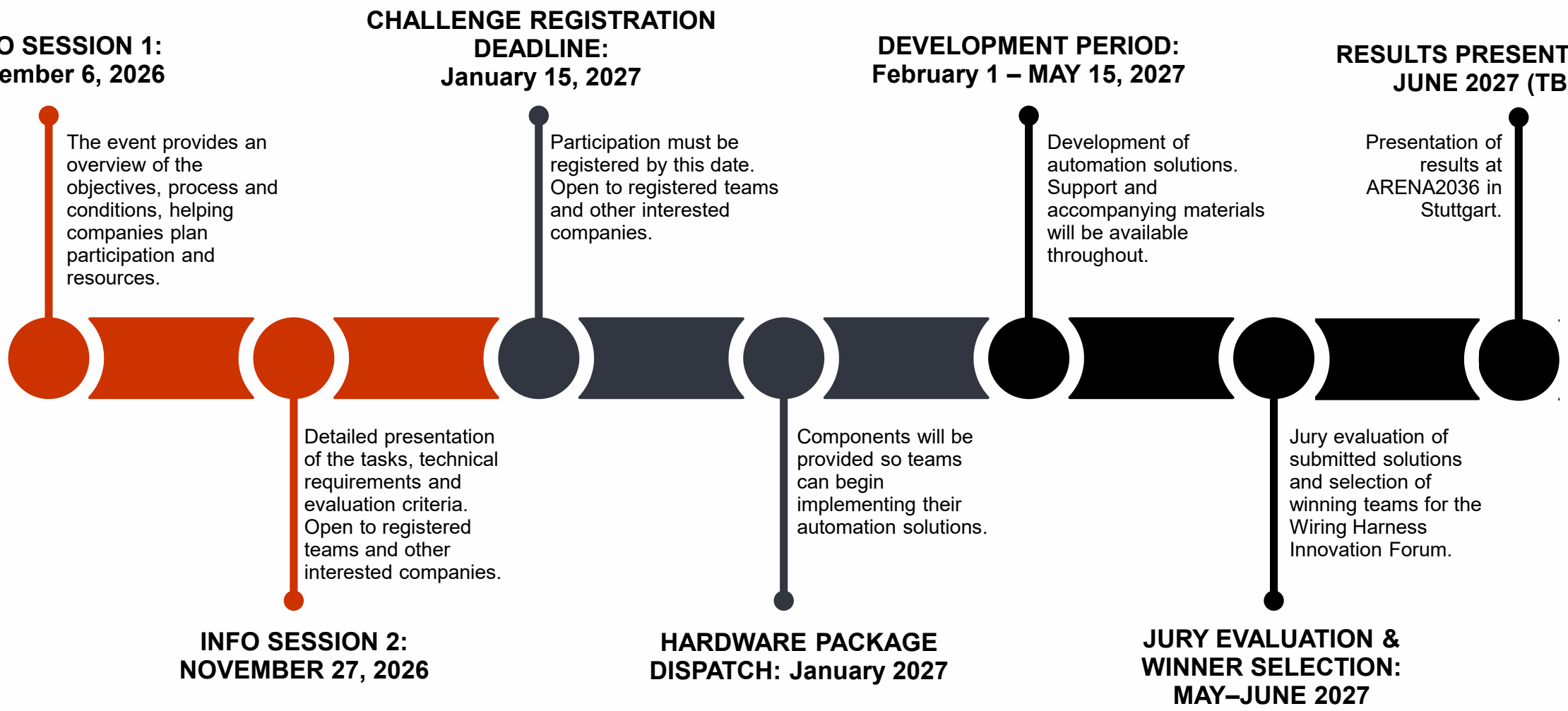
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Results & Utilization

ARENA2036 bayern innovativ OHLF OPEN HYBRID LABFACTORY

Next Steps and Timeline for Robotics Challenge 2027



Robotics Challenge | Support and Milestones

Ongoing support | from February 2027

- ARENA2036 will be available as a contact for teams throughout the Challenge.

Interim presentation | mid-March 2027

- Bilateral online meetings with ARENA2036.
- Presentation of current development status and opportunity for technical feedback.

Evaluation presentation | end of May 2027:

- Virtual presentation and demonstration of the developed solutions to the expert jury.
- During the digital presentation, **two camera streams** must be transmitted.
  - The first camera must be positioned so that the jury can see the **entire workstation**, including all computer systems and robot controllers.
  - The second camera must focus **on the robot's working area**, minimizing obstruction by the manipulator(s).
- **Short video (max. 5 minutes):** Presentation of the system, challenges and possible further developments. Submit before the competition run.
- Exception: For particularly large installations, the jury may arrange an on-site evaluation with the team.

Final presentation and results | end of June 2027

- Public presentation of Challenge results at the Wiring Harness Innovation Forum.

Expert Jury Robotics Challenge 2027

The Robotics Challenge expert jury consists of representatives from the automotive and supplier industries. Their expertise and practical industrial experience have already contributed to the development of the tasks. The expert jury also evaluates the solutions developed by participating teams in terms of their practical applicability in wiring harness production.

The Robotics Challenge 2027 expert jury consists of the following experts:

Ralf Milke

Automotive Consultant and Ambassador of the Wiring Harness Transformation Hub

Former Head of Wiring Harness Systems Development, Volkswagen AG

Steffen Pöhlmann

Predevelopment Electric, DRÄXLMAIER Group

Jürgen Reinert

Technical Advisor and Ambassador of the Wiring Harness Transformation Hub

Thomas Zander

Team Leader, New Manufacturing Technologies, Sumitomo Electric Bordnetze SE

Examples: Results and Evaluation of Robotics Challenge 2026



















Presentation of the results

- Process Video length ≤ 10 min.
- documentation
- Equipment on site; not mandatory if relocation would involve excessive effort

A Jury of 7 experts presents awards for:

- Innovation and technology
- Reliability and process stability
- Economic viability and transformation potential Creativity / Mindhack

Robotics Challenge 2025 - YouTube

Benefits for Participating Teams

- Access to a **strategically relevant, highly practical challenge.**
- Development of **automation solutions** with real **market potential**.
- **Building expertise** in **digitalization**.
- **Direct exchange** with OEMs, suppliers, researchers and potential customers.
- **Visibility and positioning** within the **wiring harness industry ecosystem** – including OEMs, harness manufacturers, component suppliers and machine builders.



Robotics Challenge results will be shared with the industry through various channels:

- **Presentation of results** at the **Wiring Harness Innovation Forum** to around 250 participants from OEMs, Tier 1 suppliers, component manufacturers and service providers
- **Specialist articles in industry media**
- **Detailed presentation of results** on the Wiring Harness Hub website
- **Publications on LinkedIn** and in the **Wiring Harness Transformation Hub newsletter**
- **Dissemination through the network** of the Transformation Hub **advisory board and ambassadors**

Visibility as a robotics expert for wiring harness production and the handling of flexible, deformable components.



Automation mit intelligenten Robotern

von Robert Süß-Wolf und Wolf Rumpelt

Bisher blieb das Potenzial, das eine Automatisierung der Leitungssatzbranche bringen könnte, aufgrund der Komplexität, Variantenvielzahl und kaum kalkulierbarer Effekte auf die Prozessketten weitgehend ungenutzt. Der ‚Transformations-Hub Leitungssatz' will dies ändern.

Der Fahrzeugbau tendiert seit einiger Zeit vermehrt dazu, hochkomplexe Leitungssätze zonenbasiert aufzuteilen, wodurch sich kleinere Leitungssatzmodule mit weniger Adern und Stecksystemen ergeben. Erste Fahrzeuge mit neuen zonalen Konzepten sind für dieses Jahr angekündigt. Diese Zonalisierung erlaubt potenziell eine Automatisierung der Leitungssatzproduktion. Der ‚Transformations-Hub Leitungssatz' – gefördert vom ‚Zukunftsfonds Automobilindustrie' mit seinen Partnern Arena2036, Bayern Innovativ und OHLF – adressiert die Ausgestaltung von robotergestützten Montagekonzepten zur Leitungssatzproduktion durch Initiierung der Robotik Challenge. Ziel ist es, Wissenschaft und Industrie zu vernetzen und praxisnahe Erkenntnisse moderner KI-gesteuerter Robotik für die Leitungssatzproduktion bereitzustellen.

Die erste Robotik Challenge

Die erste Robotik Challenge fand 2023/2024 statt und umfasste acht Teilnehmer, die am 11. April 2024 ihre Konzepte präsentierten. Ziel war es, drei verschiedene Crimp-Kontakte automatisiert mit Knickarmrobotern in vorgesehene Steckerkammern einzusetzen. Eine Fachjury bewertete die Ergebnisse nach Innovation, Robustheit, Technologie und Wirtschaftlichkeit. Die hohe Vernetzung der Teilnehmer während der Bearbeitung der Robotik Challenge führte zu einer



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Registration

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REGISTRATION ROBOTICS CHALLENGE 2027

READY FOR THE CHALLENGE? | ONLINE-INFO-SESSIONS:

Two online information sessions provide insight into the Challenge and an opportunity to clarify questions about participation and tasks.

- 06.11.2026 – OVERVIEW & PARTICIPATION
- 27.11.2026 – TASKS & EVALUATION CRITERIA

REGISTRATION

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REGISTER NOW FOR FREE!

Further information is available at www.leitungssatz-hub.de/robotik-challenge

Your contact for all questions about the Robotics Challenge:

Robert Süß-Wolf,
robert.suesswolf@arena2036.de

Agenda – November 6, 2026: Online-Info-Session on the Robotics Challenge

1	13:00	**Opening of the Session** • Welcome and introduction to the Transformation Hub for Wiring Harnesses • Introduction to the Robotics Challenge format	***Wolf Rumpelt*** *(ARENA2036)* *Research Coordination*
2	13:15	**Automation of Wiring Harness Production** • The need for automation in wiring harness production • Potential for the automotive industry • Opportunities for automation technology providers	***Jürgen Reinert –Technical Advisor*** *(Wiring Harness Ambassador)*
3	13:25	**Information on the Robotics Challenge** • Objectives and benefits of RC2027 • High-level technical overview of the Challenge (process steps, typical challenges, digitalization tasks) • Timeline • Benefits for participants • Registration	***Robert Süß-Wolf*** ***Markus Rentschler*** *(ARENA2036)* *Research Coordination*
4	13:45	**Question & Answers** • Answering participants' questions about the Robotics Challenge	*all speakers*
5	14:00	**Closing of the Session**	



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Questions & Answers

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Questions & Answers

Machines capable of automatically producing wiring harness modules already exist. Why was this process selected as a Challenge task?

Looking ahead, we are considering the entire assembly process for main wiring harnesses with thousands of wires, hundreds of connectors and securing tapes. The same operations are repeated, and our approach is to implement these core processes and then scale them up to produce complex wiring harnesses.

What descriptions will be provided for the wiring harness module?

We provide part specifications in the task description (guidelines), including illustrations and isometric views of connectors, part data, component names and dimensions. Connector design data will be provided digitally in a suitable exchange format (e.g. STP, DXF, IGS). Industry-specific wiring harness formats KBL and VEC will also be provided.

Are there any hardware restrictions for the robotics systems used?

There are no specific hardware restrictions. However, an economical system is an advantage.

Is the number of companies / participants per team limited?

The number of participants per team is not limited. Cooperation with other companies (e.g. gripper manufacturers) is also permitted.

What does my company gain from participating in the Robotics Challenge?

Since large parts of wiring harness production are not yet automated, robotics companies can distinguish themselves with a good solution. The Challenge offers visibility throughout the industry, especially among potential customers such as harness manufacturers, but also OEMs, component manufacturers and others. This is achieved through demonstrator presentations at the 2027 Innovation Forum (around 200 participants from all levels of the value chain) and through showcasing the solutions on our website, newsletter and LinkedIn channel.

Contacts for Robotics Challenge 2027

ARENA2036 serves as the central contact for participating teams throughout Robotics Challenge 2027. The following contacts will be happy to assist with questions about the Challenge, schedule or organization.



Main contact for the Robotics Challenge

Robert Süß-Wolf
Research Coordinator
Wiring Harnesses

robert.suesswolf@arena2036.de



Contact for digitalization projects:

Markus Rentschler
Research Coordinator
Digital Interoperability

markus.rentschler@arena2036.de

General Contact: info@leitungssatz-hub.de

Contact to Transformation Hub Wiring Harness

Transformation Hub Wiring Harness

Your go-to partner for innovation and transformation in the cable harness industry!

Please get in touch if you …

- would like to stay informed about all **events and activities** organised by the Wiring Harness Hub.
- wish to keep up to date with the latest findings and **developments**.
- would like to **showcase your technology** in the context of wiring harness production.
- would like to share the **results of your research project** with the wiring harness community.
- can contribute **transferable solutions** from other industries.

Follow us and join the Wiring Harness Hub community!

Visit our **Website**
www.leitungssatz-hub.de
or follow us on **LinkedIn.**
E-Mail: info@leitungssatz-hub.de

Webseite

LinkedIn

