LEARNING FACTORIES for VET

LABOUR CONTEXT OF THE ADVANCED MANUFACTURING SECTOR IN AUSTRIA.

WP2 PEDAGOGY OF THE LEARNING FACTORIES FOR VET

LF4VET partners:

CIFP MIGUEL ALTUNA LHII,

ECOLE NATIONALE SUPERIEURE D'ARTS ET METIERS;

FH JOANNEUM;

TEACHING FACTORY COMPETENCE CENTER

DOCUMENT SUMMARY

Document type:	
Title	Labour context of the advanced manufacturing sector in Austria
Author/s	Sabrina R. Sorko, Christine Lichem-Herzog, Bianca Steiner
Reviewer	
Date	March 2026
Document status	1.0
Document level	Confidential until its publication
Document description	Labour context of the advanced manufacturing sector Austria and its links with VET and Learning Factories
Cite this deliverable as:	Sorko, S. R., et al. (2026). Labour context of the advanced manufacturing sector in Austria. Retrieved from https://lf4vet.eu/)
Document level	Public

1. GLOSSARY AND/OR ACRONYMS

AR Augmented Reality
AGV - Automated Guided Vehicles
AR - Augmented Reality
ARI - Automation and Industrial Robotics
BI - Business Intelligence
CBL - Challenged-Based Learning
CLF - Collaborative Learning Factory
CNC - Computer Numerical Control
CoVE – Centres of Vocational Excellence
ERP - Enterprise resource planning
ESCO European Skills, Competences, Qualifications and Occupations
ENSAM - Ecole Nationale Superieure D'arts Et Metiers
EQF – European Qualification Framework
FHJ – FH Joanneum
HC-R-S - Human-centred, Resilience, and Sustainable
HVET High Vocational Education and Training
I4.0 - Industry 4.0
I5.0- Industry 5.0
IALF - International Association of Learning Factories
IoT - Internet of Things
IT - Information Technologies
LF - Learning Factory
SAT - Self Assessment Tool
SOP Standard Operating Procedures
SWOT – Strengths, Weaknesses, Opportunities, and Threats
TFCC – Teaching Factory Competence Center
VET - Vocational Education and Training
VR - Virtual Reality
WP - Work Package
WS - Workstation

CONTENT TABLE

EXECUTIVE SUMMARY

Austria's industrial economy is characterized by strong regional specialization, high export orientation, and an ongoing structural transformation toward more digitalized, service-oriented, and sustainable production systems. While traditional manufacturing employment is declining, industry remains central to value creation. At the same time, automation, rising global competition, and decarbonization are reshaping skill demands. This shift creates a growing need for highly qualified professionals with hybrid profiles that combine engineering, business, digital, and sustainability competences, alongside transversal skills such as problem solving, communication, and adaptability. Labour shortages persist particularly in technical and management roles, despite overall employment stagnation in manufacturing.

This report presents the case of FH JOANNEUM University of Applied Sciences, focusing on its Institute of Industrial Management and the Smart Production Lab in Kapfenberg. As a practice-oriented higher education institution, FH JOANNEUM integrates teaching, applied research, and industry collaboration, particularly within the Styrian manufacturing ecosystem. The Smart Production Lab functions as a learning factory, simulating a fully networked production environment where students and industry partners can test and develop Industry 4.0 and 5.0 applications. Equipped with advanced technologies such as collaborative robots, IoT infrastructure, digital shopfloor systems, and AI-based applications, the lab supports both education and innovation transfer to companies.

The Industrial Management study programmes—especially the part-time bachelor's programme—combine business, engineering, and IT/digitalization in an interdisciplinary and practice-oriented format tailored to working professionals. Through industrial research projects, real-world problem solving, and hands-on lab activities, students gain experience in areas such as production optimization, supply chain management, digital integration, and sustainability. The Smart Production Lab exemplifies how learning factories can bridge education and industry by fostering technical, digital, and managerial competences in realistic settings. It prepares graduates to address complex industrial challenges, including process inefficiencies, quality management, supply disruptions, and workforce transformation, thereby supporting Austria's transition toward a high-skill, innovation-driven industrial model.

1. REGIONAL SOCIOECONOMIC CONTEXT OF AUSTRIA

1.1. GEOGRAPHY AND REGIONS AND SOCIO-ECONOMIC PROFILE

Austria covers about 84,000 km² and is dominated by the Alps in the west and south, with more lowlands and basins in the east and northeast where most people and industries are located. Austria is a highly industrialized, export oriented economy in Central Europe whose geography, regional structure and labour market shape a specific context for industrial work and for graduates in industrial management and related fields. Industry remains central for value creation and exports. (Advantage Austria, 2024)

Regionally, industrial specialization is marked: Upper Austria is a core industrial region with iron and steel, chemicals and mechanical engineering and plays a central role in exports. Styria is strong in automotive, steel and advanced manufacturing along the Mur–Mürz axis, supported by dense supplier networks. Vorarlberg has niches in textiles, clothing and precision manufacturing, while Tyrol and Carinthia emphasize wood, pulp, glass and related sectors; Vienna is more service-dominated but hosts many headquarters and R&D units of industrial groups. (Advantage Austria, 2024)

1.2. SOCIO-ECONOMIC PROFILE

Socio-economically, Austria is a high-income country where industry and related services underpin employment and exports, but structural and cyclical pressures (energy prices, international competition, decarbonisation) are forcing firms to upgrade technology and skills. (Weichselbaumer, 2025; Austrian National Bank, 2025)

Recent data show a cyclical downturn with falling manufacturing employment and turnover, while demand for highly qualified technical and management profiles remains structurally strong and appears explicitly on shortage-occupation lists. (Weichselbaumer, 2025) Thus, structural change at firm and sector level takes place mainly from production to service orientation (Weichselbaumer, 2025):

- Employment has gradually shifted from goods production toward services and public services; a 2025 structural change report notes employment losses in industry and construction, while public services expanded.

- Many manufacturing firms increase their service content (maintenance, engineering, digital services), becoming "hybrid producers" that invest more in intangible assets and higher skilled labour but often employ fewer traditional production workers.

Austria's industrial base is also characterized by high automation: in automotive manufacturing, Austria ranks among the countries with the highest robot density worldwide, with about 1,412 robots per 10,000 factory workers in this segment, well above global averages. This high robot density supports productivity but shifts the skill mix toward engineering, automation and management of complex systems. (FH Wien der WKW, 2025)

2. LABOUR STRUCTURE AND QUANTITATIVE LABOUR MARKET INDICATORS

2.1. LABOUR STRUCTURE

The Austrian labour market has been relatively resilient overall, but manufacturing has experienced a notable contraction. According to Statistik Austria, in 2024 total employment was almost unchanged compared with 2023, yet the number of employees in manufacturing fell by 38,400 persons, with "production of goods" alone losing 33,400 employees. (Statistik Austria, 2025a; Austrian National Bank, 2025)

Despite the downturn, there is still substantial recruitment activity. On average in 2024, around 40,600 job vacancies were recorded in the manufacturing sector, while trade and services accounted for about 100,000 vacancies, corresponding to 57.5% of all advertised vacancies. (Statistik Austria, 2025b)

From a structural perspective, industrial labour in Austria is characterized by (FH Wien der WKW, 2025):

- A strong dual vocational education system: many workers are skilled bluecollar employees with apprenticeships in metal, mechatronics, electrical and process professions, complemented by high school- and university-trained technicians and engineers.
- Growing weight of higher qualified functions in planning, R&D, quality, supply chain, IT/OT integration and industrial engineering, as automation, digitalization and internationalization proceed.
- An internal differentiation between classic shopfloor jobs and knowledge intensive roles at the interface of technology, data and management. This leads to a combination of employment decline in manufacturing and persistent vacancies in high skill positions.

2.2. DEMAND FOR INDUSTRIAL MANAGEMENT GRADUATES AND SHORTAGE OCCUPATIONS

Interdisciplinary industrial engineering and industrial management programmes in Austria are described as having good career prospects, because graduates combine technical understanding with business, legal and international skills. Official shortage occupation lists confirm sustained demand for such profiles: Nationwide shortage occupation lists for 2026 include 64 occupations, up from 58 in 2025, with a strong presence of engineering and hightech roles. (Austrian Federal Government, 2025)
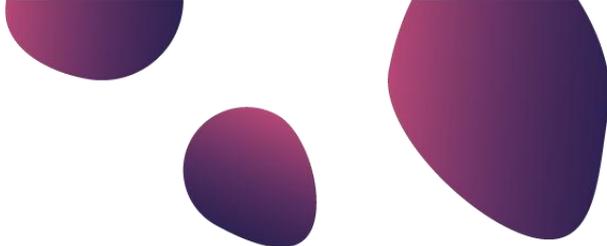
Because industrial production becomes more automated and data driven, industrial engineers and industrial management graduates who combine engineering knowledge with management, digital and green transition skills are in a favourable position despite stagnating or falling aggregate manufacturing employment. The coexistence of 38,400 lost manufacturing jobs in 2024 and 40,600 vacancies in manufacturing underlines the importance of skill level and profile: low skilled roles are being reduced, while firms struggle to recruit highly qualified staff. (Edstellar, 2025)

In this context, the skills expected from industrial management graduates in Austria can be grouped as follows (Edstellar, 2025; FH Wien der WKW, 2025; Klausner, 2025):

- Technical--economic skills
  o Solid grounding in industrial or mechanical engineering combined with business administration, finance and management, as reflected in Austrian master programmes in industrial engineering and business.
  o Knowledge of production systems, supply chains, quality management and industrial cost structures, including the ability to work in international, export-oriented settings.
- Digital and data competences
  o Familiarity with automation, robotics and AI in production, including understanding of how machine learning and data analytics support quality, planning and maintenance.
  o Data literacy (KPIs, dashboards, basic analytics) and awareness of cloud and digital platforms used in industrial environments.
- Green and regulatory competences
  o Knowledge of environmental management, energy efficiency and climate policy, as green technologies and environmental goods and services already contribute about twice as much to Austria's GDP and employment as in the EU-27 on average.
  o Ability to align operations with sustainability targets, ESG requirements and relevant EU and national regulations (e.g. energy, environment, AI related frameworks).
- Management and social skills
  o Leadership, team coordination and change management abilities to steer automation, restructuring and cross functional projects, including agile project management methods.
  o Strong communication across hierarchical levels and disciplines, negotiation skills and intercultural competence for work in export-oriented firms and international value chains.

3. LEARNING FACTORY 'SMART PRODUCTION LAB' AT JOANNEUM UNIVERSITY OF APPLIED SCIENCES

3.1. ORGANISATION CONTEXT AND BACKGROUND

FH JOANNEUM is one of Austria's largest universities of applied sciences, with a strong engineering and management focus and an over 30 years longstanding profile in industrial management at its Kapfenberg campus. The Institute of Industrial Management and the Smart Production Lab in Kapfenberg together form a regional hub for Industry 4.0 and Industry 5.0 teaching, applied research and cooperation with industrial networks, especially for Styrian manufacturing SMEs.

FH JOANNEUM University of Applied Sciences was founded in 1995 and has since grown into one of the largest UAS institutions in Austria, with around 5,000 students and approximately 750 employees across four Styrian campuses. The operating company FH JOANNEUM Gesellschaft mbH is majority owned by the Styrian government, and the university positions itself as a practice oriented, research active institution that "helps to shape the future" through applied projects and close cooperation with business and public partners.

The university offers a broad portfolio of bachelor's and master's programmes (full time, part time, dual) as well as certified vocational courses in the areas engineering, management, health, media and design, IT and social and ecologic studies.

The Institute Industrial Management at FH JOANNEUM in Kapfenberg is one of the university's oldest institutes and has been training industrial engineers (Wirtschaftsingenieur:innen) since 1995, combining business, engineering and IT/digitalization in an interdisciplinary curriculum. The institute emphasizes practice oriented learning, extensive knowhow and the use of modern technologies, offering high-quality teaching, top equipped laboratories and a "familial" atmosphere according to graduate testimonials.

Teaching activities include bachelor's and master's programmes in Industrial Management full time and part time, with content such as operations management, tools for data analytics, leadership, or process technology. Within the bachelor's programme, students can choose a deep dive in sustainability, digitalisation or international affairs. On master's level there are three majors: Business Transformation, Supply Chain Engineering and Smart Production & Services. Students work on "Industrial Research Projects", where they lead project teams and solve real tasks for national or international companies, thereby strengthening links to industrial partners and networks.

In research and transfer, the institute focuses on digitalization, Industry 4.0 and smart production, closely linked to its Smart Production Lab and regional, national (f. e. Platform Industry 4.0) and international (f. e. prime network) networks. As a longstanding industrial
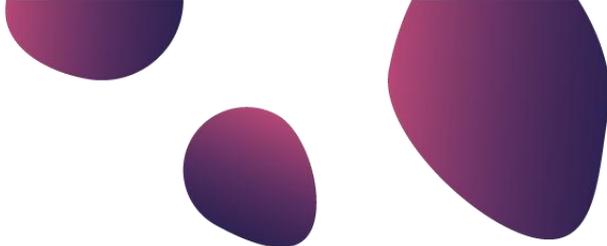
engineering faculty in Styria, it cooperates with manufacturing firms and technology providers in five main research areas: future of work, supply chain management, digital technologies, ERP & MES and Management & Controlling.

3.2. SMART PRODUCTION LAB KAPFENBERG: ROLE AND VISION

The Smart Production Lab in Kapfenberg is a 600 m² teaching and research factory dedicated to digitalization and Industry 4.0, conceived and implemented by the Institute Industrial Management. Its aim is to accelerate digital transformation processes in production, particularly supporting medium sized companies, by providing a realistic but controllable environment in which new manufacturing technologies and networking concepts can be tested and demonstrated. Lately the lab was further developed to an Industry 5.0 lab focussing on sustainable, human centric and resilient aspects of production.

The lab is designed as a "Learning Factory" in which tomorrow's specialists qualify for the requirements of digitalization using hands-on use cases. It acts as a regional demonstration and transfer centre for "smart production", i.e. the networking of machines, humans and services across the entire production chain, and explicitly positions FH JOANNEUM Kapfenberg as an expert hub for digital production in Styria.

Equipment and research fields in the Smart Production Lab

Within its 600 m², the Smart Production Lab houses a range of high-tech equipment representing a modern, networked factory environment, including industrial controllers, IIoT infrastructure, sensor technology, collaborative robots, immersive data glasses, AGVs, exoskeletons and digital shop-floor systems. The lab's research field "Digital Shopfloor" concentrates on networking machines and systems, optimization of vertical IT integration along the automation pyramid and the use of industrial IoT scenarios and AI methods for predictive and prescriptive applications in an industrial context.

These use cases are used both in teaching (e.g. student projects, labs in Smart Production & Services or Operations Management modules) and in cooperation projects with industrial partners, which can test and prototype digitalization steps before rolling them out in their own plants.

Industrial networks, teaching–research integration and regional role

The combination of the Institute Industrial Management and the Smart Production Lab positions FH JOANNEUM Kapfenberg as a key node in industrial and regional networks in Upper Styria, serving as a bridge between research, teaching and company practice. Through industrial research projects, theses, applied research in fields like digital shopfloor management and smart production, and lab based demonstrators, the institute contributes to the digital transformation and competitiveness of the regional manufacturing base.

For students, this integration offers a practice oriented- education in industrial management that combines classic industrial engineering- content with concrete Industry 4.0 technologies and Industry 5.0 use cases, preparing graduates for roles in production and operations management, smart factory projects, -supply chain- engineering and industrial consulting.

3.3. STUDY PROGRAMS SAMPLE

The aim of the project is to analyse and improve mainly the part time bachelor's degree in industrial management (EQF 6). In our understanding, part time means that the students are both, students and workers in industry. Thus they directly link the gained knowledge to their daily business and also bring in practical examples, and issues from their firms.

The part-time Bachelor's programme in Industrial Management at FH JOANNEUM is a 6 semesters program with, 180 ECTS that targets working professionals and balances business management (50%), engineering/technology (25%) and IT/digitalization (25%), with a strong emphasis on practical application, soft skills and interdisciplinary projects. Classes are scheduled on Friday afternoons, Saturdays and occasional block weeks or online evenings to fit professional schedules, allowing immediate transfer of learned content to the workplace.

In addition, at FHJ we provide knowledge transfer to other EQF levels in a non systematic way. We provide workshops and trainings for companies within our lab – combining theoretical background with practical exercises. Also we provide workshops for schools to get more involved with industry, research and digital technologies. There are also some regional events organized such as "lange nacht der Forschung" to get together public and science. Furthermore, we have a FABlab installed in our lab which means, that every second week public can come to the lab, use the machinery and work with that under support of researchers.

Core skills acquired

Graduates develop a versatile industrial engineering profile with the following key competences:

- Management and economic skills: Strategic and operational management, accounting (financial and management/controlling), corporate governance, production and process management, logistics/supply chain (including procurement, transport, inventory), marketing, project management.
- Technical and engineering skills: Production engineering (machine elements, energy systems), automation (fundamentals and advanced), electrical engineering, materials science/technology.
- IT and digital skills: ERP systems, applied IT (AI, basics/advanced, business solutions, programming/physical computing), business intelligence, digitalization in production (e.g., IoT retrofits, process optimization).
- Soft and intercultural skills: Communication, team training, cross-cultural communication, scientific working methods, business English (four levels), leadership/personal development.

3.3.1. LEARNING CONTENT BY FOCUS AREA

The curriculum is structured across 6 semesters (30 ECTS each), with integrated courses (IL) combining theory, exercises and practice. Key modules include:

Business/Management (e.g., semesters 1–6):

- Accounting I/II (7 ECTS total), Management Accounting/Controlling I/II (8 ECTS), Corporate Management I–III (13 ECTS), Business Administration I/II (10 ECTS), Logistics & Supply Chain Management (4 ECTS), Marketing I/II (7 ECTS), Process Management I/II (6 ECTS).

Engineering/Technology:

- Production Engineering I–IV (17 ECTS), Machine Elements I/II (6 ECTS), Energy Engineering (2 ECTS), Automation I/II (9 ECTS), Electrical Engineering I/II (7 ECTS), Science Tech I/II (6 ECTS).

IT/Digitalization:

- Mathematics Basics I/II & Advanced (13 ECTS), IT (ERP) I/II (7 ECTS), Applied IT Basics I/II & Advanced (11 ECTS).

Projects, Thesis and Transversal:

- Industrial Project (10 ECTS), Bachelor's Thesis 1/2 (17 ECTS), Communication I/II (4 ECTS), English 1–4 (8 ECTS), Tools for Scientific Work (2 ECTS).

Practical elements like industrial research projects (e.g., real company tasks in small groups) ensure hands-on experience in digital production, ERP implementation and process optimization.

3.4. REPRESENTATIVE WORKPLACE SITUATIONS

3.4.1. WORKPLACE SITUATION 1: PROCESS OPTIMIZATION IN A STYRIAN METALWORKING SME

In a medium-sized steel processing company (~200 employees) in the Mur–Mürz region of Styria, Austria, production follows a lean, shift-based organization with small, cross-functional teams (5–8 members) responsible for defined production cells along the value chain from material intake to final inspection.

Profession: Industrial Mechatronics Technician with additional process coordinator training, acting as shift team leader on the shopfloor or technical oriented industrial management student.

Goals:

- Achieve a 15% reduction in setup times (from 20 to 17 minutes average) for batch changes on CNC machining centers to increase overall equipment effectiveness (OEE) from 78% to 82%.
- Minimize defects in welded assemblies (<1% scrap rate) through improved first-piece inspection and operator feedback loops.
- Implement a digital retrofit for one legacy machine to enable real-time data capture for predictive maintenance.

Equipment used:

- 5-axis CNC milling centers (e.g., DMG Mori with Siemens Sinumerik 840D controls).
- welding robots (ABB IRB 2600 with IRC5 controllers) integrated into a manual-robot hybrid cell.
- Collaborative robot (Universal Robots UR10e) for automated part handling and quality checks (vision system + force-torque sensor).
- B&R X20 PLCs and industrial PCs for IIoT edge computing, connected via OPC UA to a central MES (Manufacturing Execution System).
- Mobile tablets for Andon visualization, digital work instructions and real-time dashboards (e.g., OEE, cycle times, defect rates).

- Standard shopfloor tools: digital calipers, torque wrenches, first-piece inspection gauges and safety equipment.

Problem to solve:

During recent batch changes for a new customer order (precision steel components for automotive suppliers), setup times have exceeded targets by 25% due to manual data entry errors, missing digital work instructions and non-standardized tool presetting. This causes delays in the downstream welding cell (backlog of 2 hours) and increases scrap risk from incorrect first-piece setups (current scrap rate 1.8% vs. target <1%).

3.4.2. WORKPLACE SITUATION 2: ASSEMBLY WORKER IN A STYRIAN METALWORKING COMPANY

Context: In a large-sized steel processing company (<1.000 employees) in Styria's Mur–Mürz region, a new customer order for precision automotive components requires assembling 500 welded steel sub-assemblies per shift in a manual-robot hybrid cell. Production follows lean principles with small teams (6–8 members) rotating across tasks in a U-shaped cell layout to balance workload and enable quick changeovers.

Organisation type: large company with shift-based production (2 shifts, 38.5h/week), organized in autonomous cells combining manual assembly, robot support and quality checks, supervised by a mechatronics technician/process coordinator.

Profession: assembly worker with 2 years experience, trained on-site in manual assembly, basic machine operation and quality control (no formal apprenticeship required, but forklift certification and welding safety training).

Goals:

- Assemble 125 sub-assemblies per shift (target cycle time 4.8 min/unit) while maintaining <1% defect rate.
- Support setup changeover for new batch (reduce from 23 to 18 min using standardized checklists).
- Perform first-piece inspection and report deviations via tablet to prevent scrap (current scrap 1.8%).

Equipment used:

- Manual assembly station with pneumatic tools (cordless nutrunners, torque wrenches for M8–M12 bolts).
- Collaborative robot (UR10e) for repetitive pick-and-place of heavy steel brackets (15–20kg) into welding position.
- Welding robot cell (ABB IRB 2600) for automated seams; worker loads/unloads parts and monitors via safety light curtain.
- Digital inspection gauges (calipers, thread gauges, surface testers) and barcode scanner for traceability.
- Mobile rugged tablet for work instructions, digital checklists, photo documentation of first-piece and Andon call button.
- Forklift truck (for material transport) and overhead crane for heavier assemblies.
- Standard PPE: welding helmet, gloves, safety shoes, hearing protection.

Problem to solve: During the batch changeover, inconsistent fixturing of steel brackets leads to misalignment in the welding robot cell, causing 12% rework (weld defects from 2–3mm offsets).

3.4.3. WORKPLACE SITUATION 3: MIDDLE MANAGEMENT – PRODUCTION SHIFT SUPERVISOR IN A STYRIAN AUTOMOTIVE SUPPLIER (PLASTIC INJECTION MOLDING)

Context: In a medium-sized automotive parts supplier (~150 employees) near Graz, Styria, production of dashboard components faces delays for a major OEM order (2,500 units/week). Two injection molding lines run 3 shifts, but cycle time variations and frequent mold changeovers cause 15% output shortfall and rising reject rates from cooling inconsistencies.

Organisation type: SME with lean production cells; middle management oversees 2 shifts (12 operators/line), reports to plant manager, coordinates with maintenance, quality and tool shop.

Profession: Production Shift Supervisor, trained engineer with technician certification, 12 years experience, responsible for shift output, quality, safety and team leadership on injection molding line 1+2.

Goals:

- Increase output from 85% to 89% capacity (220 parts/shift/line) by optimizing changeover and cycle times.
- Reduce reject rate from 3.2% to <2,0% through process stabilization.
- Coordinate unscheduled mold repair (downtime 4h yesterday) to prevent repeat failures.

Equipment used (for monitoring/supervision):

- Injection molding machines (Arburg Allrounder 570H, 4-cavity molds for PP/ABS parts).
- MES/ERP terminal (e.g., MPDV HYDRA) for real-time cycle times, reject rates, OEE tracking.
- Thermal imaging camera and pyrometer for barrel/mold temperature verification.
- Tablet with digital SOPs, defect photo documentation, Andon system.
- Robot arms (Epson SCARA) for part demolding/handling, supervised via HMI panels.
- Shopfloor printer for labels, wireless headset for team communication.

Problem to solve: Mold #3 shows 25% longer cycle times (38s vs. target 30s) due to inconsistent cooling channel performance after 4h downtime, causing sink marks (2.8% reject rate). Furthermore, there is a lack of skilled workers and there is a huge range from people that are not willing to include themselves in terms of responsibility to people that want to collaborate in decision making processes.

3.4.4. WORKPLACE SITUATION 4: PURCHASING CLERK IN A STYRIAN AUTOMOTIVE SUPPLIER (PLASTIC INJECTION MOLDING)

Context: In a medium-sized automotive parts supplier (~150 employees) near Graz producing dashboard components, production urgently needs 8 tons of ABS masterbatch within 48 hours due to supplier delays threatening €25k/day downtime on two injection molding lines. The purchasing team processes 15 urgent RFQs daily amid +18% global PP resin price spikes.

Organisation type: SME with centralized purchasing department (4 FTE); purchasing clerk supports purchasing manager, handles operational procurement (€2-5k POs), coordinates with production planners and logistics.

Profession: Purchasing Clerk, completed commercial apprenticeship or business informatics or industrial management, 5 years experience, responsible for operational procurement of raw materials and indirects (€3M annual value), PO processing and supplier coordination.

Goals:

- Process 3 emergency RFQs for ABS masterbatch and secure 8-ton delivery within 48 hours.
- Update 25 open POs with revised pricing/delivery dates from supplier portal.
- Maintain 98% on-time delivery rate to production while documenting price variances.

Equipment used (office-based operational tools):

- ERP terminal (SAP MM) for PO creation, goods receipt booking, stock level checks, consumption reports.
- MS Excel for supplier price comparisons, delivery tracking, freight cost calculations.
- Email/Teams for supplier coordination, production status updates, internal approvals.
- Procurement portal login (supplier extranet) for order confirmations, delivery notes, certificates.
- Dual-monitor workstation with article master data, Incoterms reference, logistics tracking.
- Office phone/scanner for PO printing, invoice matching, urgent calls.

Problem to solve: Primary supplier delays 8-ton ABS masterbatch (ETA now +3 days), risking complete line stoppage.

3.4.5. WORKPLACE SITUATION 5: HR MANAGER AT A LARGE CAR MANUFACTURER IN AUSTRIA

Context: The company is a large car manufacturer in Austria (largest vehicle contract manufacturer worldwide, ~10,000 employees), Industry 4.0/5.0 transformation (flexible EV/ICE lines, cobots, digital twins) collides with acute skilled labor shortages (mechatronics techs, automation engineers on AMS shortage list) and generational tensions: Gen Z demands purpose-driven roles/sustainability, while aging workforce (avg. 47y) resists reskilling. Turnover hit 14% in 2025; 120 skilled vacancies open across 3 shifts.

Organisation type: Large multinational with corporate HR (25 FTE), regional/global coordination; HR reports to VP HR EMEA, partners with works council, global talent center; manages recruiting, up-/reskilling for 37 vehicle models (G-Class, Supra, XPeng EVs).

Profession: HR Manager, Master Industrial Management or HR specific Master, 10 years manufacturing HR, responsible for plant talent strategy (2,500 indirects), Industry 4.0 academy, retention analytics, AMS Red-White-Red+ approvals.

Goals:

Fill 35 skilled vacancies (mechatronics, automation) within 60 days (92% fill rate target).

- Roll out "companies Digital Worker" program: upskill 800 operators on cobots/MES/AI (95% completion).
- Cut voluntary turnover 14%→9% via Gen Z retention (hybrid flex, mental health, EV project rotations).

Equipment used (corporate HR tools):

- SAP SuccessFactors for global ATS, skills ontology, succession planning, turnover prediction AI.

- Power BI dashboards: vacancy heatmaps, training ROI, demographic churn models.
- Workday LMS for 50+ Industry 4.0 modules (cobots, digital twin, human-AI collab).
- AMS Jobbörse/LinkedIn Recruiter for shortage occupation postings (€3k signing bonuses).
- SurveyMonkey/Qualtrics for NPS, pulse checks (monthly Gen Z focus groups).

Problem to solve: 120 skilled vacancies persist despite 2,500 applications (qualified rate 8%) as Gen Z rejects 3-shift models (prefer "smart shift" with flex/AI training) and skilled migrants need fast-track Red-White-Red+ visas. Aging workforce resists cobot reskilling (35% >50y).

4. CONCLUSION AND OUTLOOKS

Austria's industrial sector demonstrates a strong foundation for maintaining competitiveness while navigating structural change driven by digitalization, automation, and sustainability requirements. The close alignment between industry needs and practice-oriented higher education, as illustrated by FH JOANNEUM and its Smart Production Lab, highlights an effective model for integrating technical, managerial, and digital skills development. The combination of interdisciplinary study programmes, applied research, and real-world industrial collaboration enables students to acquire competencies that directly reflect the complexity of modern manufacturing environments and the transition toward Industry 4.0 and 5.0.

Looking ahead, several key outlooks emerge:

- **Evolving Skills Requirements:** Ongoing technological, digital, and green transitions will further increase demand for hybrid skill profiles that combine engineering expertise with data, automation, and sustainability competences. Industrial management education will need to continuously adapt curricula to reflect these changing requirements.
- **Practice-Oriented and Flexible Learning Models:** The importance of part-time and work-integrated study formats will grow, enabling learners to directly connect academic knowledge with industrial practice. Learning factories such as the Smart Production Lab will play a central role in delivering hands-on, application-driven education.
- **Strengthened Industry Collaboration:** Closer cooperation between universities, SMEs, and industrial networks will remain essential to ensure alignment with labour market needs, accelerate innovation transfer, and support digital transformation, particularly in regional manufacturing ecosystems.
- **Digitalization and Data-Driven Production:** As industrial systems become increasingly data-driven, competencies in AI, IoT, and digital shopfloor management will be critical. Educational institutions must expand capabilities in these areas to prepare graduates for managing complex, interconnected production systems.
- **Sustainability and Human-Centric Transformation:** The transition toward Industry 5.0 will require stronger integration of environmental sustainability, resilience, and human-centric approaches in both production systems and education. This includes addressing workforce challenges such as ageing, skills shortages, and changing employee expectations.

These perspectives position institutions like FH JOANNEUM and its Smart Production Lab as important contributors to developing a future-ready workforce, supporting Austria's shift toward a high-skill, innovation-driven, and sustainable industrial economy.

5. REFERENCES

Advantage Austria. (2024). *Key sectors*. Advantage Austria.

Austrian Federal Government. (2025, December 31). *Austria-wide shortage occupations 2026*. Austrian Migration Portal.

Austrian National Bank. (2025). *Austrian economy to stabilize in 2025* (Economic outlook report 2025/5). Oesterreichische Nationalbank.

Edstellar. (2025, December 22). *10 most in-demand skills in Austria for 2026*. Edstellar.

FH Wien der WKW. (2025, October 15). *Austria's industry in transition: Production work between crisis and new beginnings*. FH Wien der WKW.

Klausner, G. (2025, April 13). *How to find a job in Austria: Top skills & market trends 2025* [Article]. LinkedIn.

Statistik Austria. (2025a, March 14). *Economic recession and labour market in 2024: 38,400 fewer employees in manufacturing* (Press release). Statistik Austria.

Statistik Austria. (2025b, February 6). *Fewer job vacancies again in 2024* (Press release). Statistik Austria.

Weichselbaumer, M. (2025). *Structural change of firms and of the workforce* [Report]. Austrian Productivity Board.

6. INDEX OF TABLES

LEARNING FACTORIES
for VET

Where pedagogy meets technology

Shaping technical skills with human values