WORLD PLUMBING COUNCIL (WPC) SCHOLARSHIP REPORT - 2024

Submitted By – Rinki Mahato

ABOUT WORLD PLUMBING COUNCIL

The World Plumbing Council (WPC) is a global organization that brings together professionals from the plumbing industry to promote the importance of plumbing and sanitation in improving public health and environmental sustainability. The WPC focuses on raising awareness about the crucial role that plumbing plays in both developed and developing nations, addressing global challenges such as water conservation, sanitation, and the sustainability of plumbing systems.

One of the WPC's key initiatives is the scholarship for WPC Education and Training Scholarship for applicants from developing or least developed countries, which supports professionals from emerging economies to gain exposure to international best practices in plumbing engineering. Through this scholarship program, WPC empowers individuals to enhance their expertise and contribute to the development of their local communities and industries.

About Myself

RINKI MAHATO

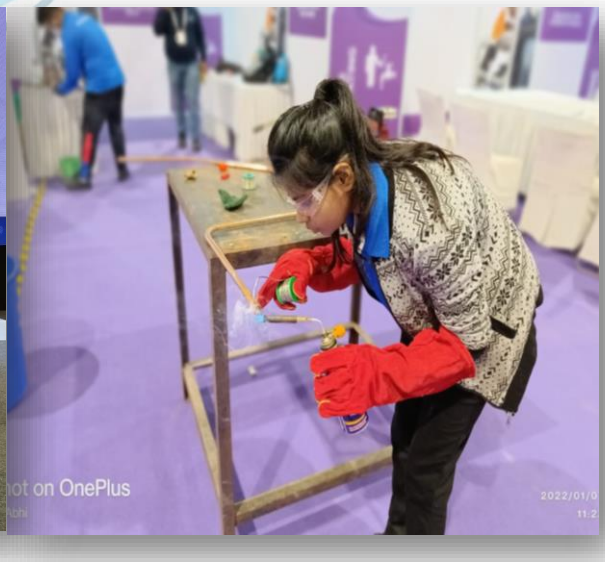
Assistant Manager (Trainings), Water Management & Plumbing Skill Council (WMPSC), India

Being an enthusiastic professional towards the water management and plumbing industry, I have engraved my skills in learning and executing the attributes in advanced technology of Plumbing.

I am honored to be the recipient of the World Plumbing Council (WPC) Scholarship 2024. As a dedicated professional with a B.Tech in Civil Engineering and a Master Trainer at the Water Management & Plumbing Skill Council (WMPSC), I have built my career on a foundation of

My core expertise lies in advanced plumbing systems, water management technologies, and sustainable infrastructure solutions. I have hands-on experience with cutting-edge products and installation techniques from leading global manufacturers such as Viega, Geberit, Grohe, and Hindware, which has enabled me to deliver high-performance, resource-efficient plumbing systems.

My technical journey began with my participation in India Skills 2021, where I became the **first female competitor in Plumbing & Heating in India**, securing a Gold Medal at the Regional Level and a Medallion for Excellence at the National Level. One of my proudest moments was mentoring India's first female winner in this trade, who went on to represent our country at the 47th World Skills Competition in Lyon, France.



As a **trainer for World Skills Competitor 2024** and a **jury member for India Skills 2024**, I have developed and implemented **rigorous training modules, technical assessments, and real-world project simulations** that prepare candidates for international standards.

I am particularly passionate about **integrating digital technology and sustainability** into plumbing solutions—leveraging smart water management, leak detection sensors, and eco-friendly materials to create long-lasting, future-ready systems for buildings and communities. My work in projects like **"Mai Bhi Jal Rakshak"** demonstrates my commitment to **resource conservation, community awareness, and the adoption of global best practices**.

My achievements, such as the **Vision of Women Award by Lubrizol and IAPMO** and recognition in **The Times of India**, reflect my drive for innovation and leadership in technical trades. I am eager to collaborate with forward-thinking companies to drive excellence, implement next-gen plumbing solutions, and set new benchmarks for quality and sustainability in the industry.

Women reshaping industry by foraying into male-dominated trades

Priyadarshini.Gupta
@timesgroup.com

The recently concluded IndiaSkills Competition 2024 witnessed an increased participation of women in trades that were previously dominated by men. More than 170 women participated in trades like logistics and freight forwarding, web technologies, visual merchandising, industrial design technology, renewable energy. New-age skills, including autonomous mobile robotics, automobile repairing, cloud computing, and mechatronics garnered a lot of popularity in this edition.

Atul Kumar Tiwari, secretary, Ministry of Skill Development and Entrepreneurship, says, "Empowering women in traditionally male-dominated trades is not just about breaking barriers; it is about reshaping industries. The competition, this year, saw a remarkable surge in female participation across male-dominated sectors. This surge also reflects the collaborative efforts of MSDE in fostering gender inclusivity." Representation from Tamil Nadu, Odisha, Sikkim and Maharashtra confirmed that women from across India are not just competing, they are paving the way for a more diverse and dynamic workforce. "Their journey from underrepresentation to over 170 this time, underscores the transformative power of skill development. Among them, 20 women gold winners in skills like robot system integration, logistics and freight forwarding, plumbing, and heating, and shoemaking, stand as shining examples of excellence. Beyond the competition, the participants hold the keys to a future marked by employment opportunities, advanced training, and recognition," he says.

Evolution is promising

Urging women to break free from societal constraints, Rinki Mahato, a national-level winner in the plumbing section in 2022, says, "Women not only competed but also excelled in fields such as plumbing and heating, shoemaking, robot system integration, and logistics and freight forwarding. This year's competition marked a significant shift, showcasing women's capabilities and determination to succeed in these areas."

Seeing more women enter and succeed in this male-dominated trade is inspiring. —Rinki Mahato

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Women making inroads into male-dominated skill trades

170 women excel in skills, including electrical installations, freight forwarding, mobile robotics at IndiaSkills competition

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The recently concluded IndiaSkills Competition 2024 witnessed an increased participation of women in trades that were previously dominated by men. More than 170 women participated in trades like logistics and freight forwarding, web technologies, visual merchandising, fashion technology, graphic design technology, painting and decorating, electrical installations, industrial design technology, and renewable energy.

New-age skills including autonomous mobile robotics, automobile repairing, cloud computing, and mechatronics garnered a lot of popularity in this edition. In previous years, the competition had witnessed the participation of a female candidate in the plumbing and heating sector, while landscape gardening had two all-woman teams. While, visual merchandising was dominated by women, mobile robotics too saw a team of two girls.

Atul Kumar Tiwari, secretary, Ministry of Skill Development and Entrepreneurship (MSDE), says, "Empowering women in traditionally male-dominated trades is not just about breaking barriers; it is about reshaping industries. The competition, this year, saw a remarkable surge in female participation across male-dominated sectors. This surge also reflects the collaborative efforts of MSDE in fostering gender inclusivity."

Dynamic workforce

Representation from Tamil Nadu, Odisha, Sikkim and Maharashtra confirmed that women from across India are not just competing; they are paving the way for a more diverse and dynamic workforce. "Their journey from underrepresentation to over 170 this time, underscores the transformative power of skill development. Among them, 20 women gold winners in skills like robot system integration, logistics and freight forwarding, plumbing, and heating, and shoemaking, stand as shining examples of excellence. Beyond the competition, the participants hold the keys to a future marked by employment opportunities, advanced training, entrepreneurship, and recognition," he says.

Amit Singh Khokhar, assistant professor, Delhi Skill and Entrepreneurship University, says, "There has been a marginal rise in women participation that may be accredited to a combination of factors. Increased awareness about opportunities such as the IndiaSkills competition, skill development programmes focused on women, and a general push to break gender stereotypes are the likely contributors."

While Puja Swain, Kamini Ram, and Rina Bagha, all from Odisha, won in the welding section, Simon Grover from Maharashtra, and Nishtha Chauhan from Rajasthan, won in the logistics and freight forwarding section.

Urging women to break free from societal constraints, Rinki Mahato, a national-level winner in the plumbing section in 2022, says, "The evolution is gradual but promising. More women are winning gold and silver medals at IndiaSkills. Women not only competed but also excelled in fields such as plumbing and heating, shoemaking, robot system integration, and logistics and freight forwarding. Traditionally, trades such as construction, plumbing, carpentry and jewellery making, welding, and tile work have been considered male bastions. However, this year's competition marked a significant shift, showcasing women's determination to succeed in these areas."

Faced scepticism

Rinki who represented India at the world level last year, says, "I faced scepticism from the male competitors who questioned my choice of skill - plumbing. Winning gold at the state level fuelled my determination to continue and inspire other women to break stereotypes. Seeing more women enter and succeed in this male-dominated trade is inspiring," says Rinki. She says, "My college, CV Raman Global University, was the first to introduce me to the skills competition. Coming from a civil engineering background, I was particularly drawn to plumbing. I had no idea I would be the first woman to represent India in this trade." Transitioning from a competitor to a trainer for boot camps and jury member in competitions has been an incredible journey for Rinki. To inspire more women to participate in this trade, she is presently training Kirteeparna Sadangi, the first female gold medallist in plumbing and heating at the national level this time.

LOGISTICS & FREIGHT FORWARDING

Participants at the competition in Delhi. New-age skills garnered a lot of popularity in this edition

The evolution is gradual but promising. More women are winning medals at IndiaSkills, who will represent the country on a global stage. —Rinki Mahato, a national-level winner in the plumbing section in 2022

Kirteeparna Sadangi

ABBREVATIONS

BIM – Building Information Modelling
CO_2 – Carbon Dioxide
CTS – Craftsman Training Scheme (India)
DIY – Do It Yourself
EHS – Environment, Health, and Safety
EMENA – Europe, Middle East & North Africa
FMIH – Master School for Plumbers & Heating Engineers (Germany)
FMOL – Master School for Stove and Air Heating Engineers
FTHLK – Technical College for Heating, Ventilation and Air Conditioning Technology
HMI – Human–Machine Interface
HVAC – Heating, Ventilation and Air Conditioning
IAPMO – International Association of Plumbing and Mechanical Officials
ICT – Information and Communication Technology
IO-Link – Industrial Communication Protocol for Sensors/Actuators
IR – Infrared
ITI – Industrial Training Institute (India)
MB Active Trap – Microbiological/Mechanical Odor Trap used in URIMAT
NCVT – National Council for Vocational Training (India)
NPCC – National Plumbing Code of Canada
PA – Process Automation
PLC – Programmable Logic Controller
PVC – Polyvinyl Chloride (Pipe Material)
SHK – Sanitär Heizung Klima (Sanitary, Heating & Climate/Germany)
SOP – Standard Operating Procedure
TÜV – Technischer Überwachungsverein (German Technical Inspection Association)
UPC – Uniform Plumbing Code
URIMAT – Brand name (Eco-friendly waterless urinal manufacturer)
VUNA – Valorization of Urine Nutrients in Africa (Urine recycling project)
WC – Water Closet / Toilet
WS – WorldSkills
WSS – Water Supply System

INDEX

LIST OF IMAGES

INDEX

List of Table

ACKNOWLEDGEMENT

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Finally, I extend heartfelt thanks to all trainers, coordinators, and team members across organizations who contributed to making this training program a valuable learning experience.

VISIT TO GERMANY & SWITZERLAND *(Oct 05th 2025 to 31st Oct 2025)*

A. VISIT TO GROHE, Lahr- Germany: GROHE Production Site and Training Centre, Lahr, Germany
Visit Duration: *3 Days (06th Oct 2025 to 08th Oct 2025)*

1. Introduction to GROHE

The GROHE name is one of the most well-known brands in the world when it comes to comprehensive bathroom solutions and kitchen fittings. Since 2014, GROHE has been a member of the robust brand portfolio of LIXIL, a company that produces pioneering water and housing solutions. Every single product that is offered under the "Pure Freude a Wasser" brand is created with the company's core principles of quality, technology, design, and sustainability in mind.

In addition, GROHE-LIXIL is active in the World Skill Competitions; the most recent Special Edition for plumbing and heating was held in Lahr, Germany, and Grohe was the event's organizer.
In addition to serving as a manufacturing plant for the product, they also function as a training center.

Image 1: - Training at GROHE with Mr. Manfred Kuhn

2. Day 1: An Introduction to the Facility, the GIVE Program, and Fixture Diversity

The Lahr complex, which serves as GROHE's primary production location and international training center, has numerous functional zones that are devoted to manufacturing, quality assurance, and professional education. The facility was the venue of the Special Edition of WorldSkills 2022, which welcomed twenty international competitors and more than one thousand guests. Permanent training infrastructure was erected after the tournament.

GROHE GIVE Programme Overview:

Image: 2 - GROHE Training Academy

The GROHE Installer Vocational Training & Education (GIVE) program is designed to establish global uniformity in the skills of installers by providing the following services:

- Provision of contemporary equipment to plumbing schools
- Development of a curriculum that is uniform and in accordance with international standards
- Examinations that are both written and practical in nature, which set industry standards
- Mentorship programs that link up established experts with up-and-coming talent

Observations

The GIVE program establishes a common framework in over 150 countries where GROHE operates.

- Training materials stress water-saving solutions and energy-efficient technologies.
- Paths to obtaining professional certifications are in line with the requirements that are used for the WorldSkills competition.

Image: 3 - Training on different types of WC

Training encompassed the complete GROHE ecosystem of fixtures and fittings across bathroom and kitchen applications:

Bathroom Fixtures Range

a) Basin Mixers: Single-lever designs with integrated temperature and flow control
b) Bath/Shower Mixers: Thermostatic and mechanical mixing cartridges with manual or electronic operation
c) Bidet Mixers: Specialized fixtures for sanitary applications
d) Flushing Systems: Electronic and mechanical WC flush mechanisms, urinal flush valves, and cistern components.
e) Towel Bars, Hooks, and Accessories: Functional bathroom hardware Kitchen Fixtures
f) Sink Mixers: Pull-out sprays, retractable mousers, varied spout geometries (C-spout, L-spout, U-spout)
g) Water Filtration Integration: Foundation for advanced systems like GROHE Blue
h) Swivel Ranges: Adaptable to single or dual-sink configurations

Image: 4 -Different types of faucets

3. **Day 2: Hands-On Training – GROHE Blue, Sensor-Based Faucets & Single-Lever Mixers (***GROHE Blue System: Physical Training and Demonstration)*

GROHE Blue represents an advanced water purification, chilling, and carbonation system integrating seamlessly with GROHE kitchen faucets. The system offers three water options: still, medium sparkle, or fully carbonated, delivered through a single smart faucet. [web:52]

Physical Training Components:

Architecture of the System

a) Faucet Unit: Smart single-lever design with built-in display for choosing and using
b) Cooler Module: Chilled water tank with insulation and CO_2 cartridge mechanism for carbonation
c) filtering Cartridges: Progressive filtering stages (particle, activated carbon, ion exchange)
d) Remote Control/App Integration: You can control it without touching it using a smartphone or a special remote for advanced settings.
e) Installation Footprint: The compact design works for both home and business kitchens. Hands-on instruction on: Trainees built up GROHE Blue Home Starter Kits with their own hands, which included:
   - Using multi-stage compression fittings to seal water supply connections
   - Putting the cooler module under the counter with power and water connections

- Mounting the faucet assembly to the counter with the right alignment and watertight seal]
- Setting carbonation levels and water temperature through a remote or mobile app
- How to change the filter cartridge (every six months, depending on how often you use it)
- Fixing typical problems including low pressure, inadequate carbonation, and changes in temperature

Basic Information About Infrared Sensor Technology

How Sensors Work: GROHE sensor faucets use infrared (IR) sensing to turn on the water flow without touching it, which improves cleanliness and cuts down on water waste. The infrared emitter senses when a hand is nearby and turns on a solenoid valve to let water flow. **Theoretical Parts:**

a) IR Emitter/Detector Pair: Infrared light pulses can find reflecting surfaces (like skin and hands) within a range of 10 to 15 cm.
b) Control Circuit: A microprocessor looks at IR signals, gets rid of false positives, and opens the valve in accordance to the signal strength.
c) Solenoid Valve: An electromagnetic actuator that controls the flow rate and duration of water.
d) Temperature Regulation: An integrated mixing valve that keeps the temperature at a given level even when the pressure changes.
e) Electricity Supply: Versions that run on batteries (last 6–7 years) or mains electricity.
f) User Interface: Remote control or smartphone app for sensitivity adjustment, flow time, and temperature settings.

Installation and Configuration Training:

Sequence of Physical Setup:

a) Before Installing:
- Check the water supply pressure (ideal: 1.5–6 bar)
- Check the electrical grounding for models that run on mains power
- Check the shape of the sink/basin to make sure the sensor is in the right spot.

b) Mounting and Sealing:
- Place the sensor unit in the middle of the sink, 10–15 cm above the water surface.
- Use the included gaskets and fasteners to hold it in place against the basin.
- Attach the water inlet line (for hot and cold water) to the solenoid valve.
- Use compression fittings to hold the outlet spout to the faucet body.

c) Configuration via Remote/App:
- Adjust IR sensor sensitivity to prevent false triggering from paper towels or reflective surfaces
- Set water flow shut-off time (typically 2-5 seconds after hand removal)
- Program water temperature (manual override via side lever)
- Calibrate flow rate for specific sink size and usage pattern

d) **Testing and Validation:**
   - Hand proximity test at various distances and angles
   - Verify consistent on/off transitions without chattering
   - Confirm temperature stability under flow condition variations
   - Test battery status and low-power warning indicators

Water and Energy Conservation:

- Touchless operation decreases water usage by 35-45% relative to manual faucets
- Automatic shut-off upon hand removal prevents unnecessary wastage
- Lower pressure requirements reduce thermal energy expenses in hot water systems

Internal Mechanisms:

a) Cartridge Design: Ceramic disc cartridge with an angled offset for mixing in proportion
b) Temperature Stability: The TurboSta cartridge keeps the exit temperature stable even when there are pressure differences.
c) Flow Control: An included restrictor limits the maximum flow to predefined settings, such as 5.7 l/min for the kitchen and 8 l/min for the bath.
d) Safety Features: CoolTouch technology keeps the outside surfaces cool even when hot water is flowing.

Image: 5 - Testing of Senson based faucet after setting distance and sensitivity distance

Single-Lever Mixer Installation: Comprehensive Practical Training

a) Single-lever mixers represent GROHE's core offering for basin, bath, and shower applications. These intuitive fixtures combine hot/cold water control and flow regulation through a single ergonomic handle.

b) Cartridge Design: Ceramic disc cartridge with angular offset for proportional mixing
c) Temperature Stability: Turbo Stat cartridge responds to pressure imbalances, maintaining constant outlet temperature.
d) Flow Control: Integral restrictor limiting maximum flow to preset levels (e.g., 5.7 l/min for kitchen, 8 l/min for bath)
e) Safety Features: Cool Touch technology keeps external surfaces cool despite hot water flow.

Common Installation Challenges and Solutions

Challenge	Cause	Solution
Water leaking from mixer base	Improper seal positioning	Reposition seal, ensure full contact with basin surface
Uneven mixer positioning	Incorrect escutcheon spacing	Remeasure and re-adjust S-union connectors to 150 mm centres
Stiff lever operation	Cartridge misalignment or debris	Flush system, verify cartridge seating, check for mineral deposits
Temperature fluctuation	Pressure imbalance	Verify equal hot/cold supply pressures, check for kinks in inlet hoses
Connector leaks	Insufficient PTFE wrapping	Reapply PTFE tape, ensuring multiple layers in clockwise direction

Table: 1- Common Installation Challenges and Installations

Image: 6 - Installation of Single Level

Maintenance of Cartridge:

We cannot repair the cartridge, when we open the cartridge, we lose control about the precise parts. Most lever have the screw in front or from the back side old versions under decoration element. We have to replace the whole cartridge, here is important to use the right one

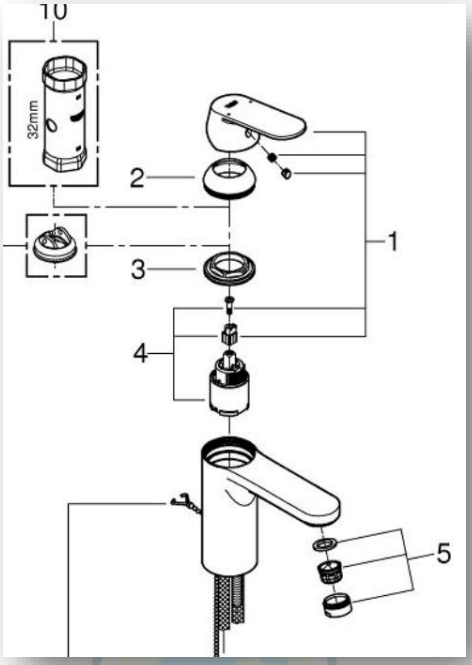

Image: 7 - Maintenance of Cartridge

4. Day 3: WorldSkills Competition Facility & Rapid Dry Wall System Installation

Lahr facility hosted WorldSkills 2022 Special Edition (November 2-4, 2022), a pivotal event establishing global standards for plumbing and heating excellence. GROHE's commitment to youth skill development as a Global Partner of WorldSkills International led to permanent infrastructure installation post-competition.

Facility Highlights:

- 20 International Competitors: Plumbing and heating professionals from diverse countries competing on standardized workstations
- 1,000+ Visitors: Industry observers, educators, and aspiring plumbers witnessing world-class competition
- Permanent Training Stations: Post-competition installation of competition workstations for ongoing training purposes.

Image: 8 - Rapid Dry wall system

WorldSkills plumbing competition evaluates:

a) Pre-Wall Installation Systems: Accurate positioning and fastening of concealed installation frames for wall-hung WCs and basins

b) Faucet Installation: Correct assembly and sealing of single-lever and thermostatic mixers

c) Drainage Systems: Proper drainage installation with slope verification and trap functionality

d) Pressure Testing: Hydrostatic testing protocols ensuring system integrity

e) Time Management: Realistic project scheduling reflecting commercial installation scenarios

f) Technical Documentation: Drawing interpretation and adherence to installation standards

Practical Observations:

The permanent competition infrastructure provides ongoing training scenarios combining:

- Realistic bathroom layouts (3-fixture configurations: WC, basin, shower)
- Pre-wall installation frameworks (Grohe and comparable systems)
- Modern faucet assemblies mirroring commercial specifications
- Professional-grade tools and equipment (pressure testing apparatus, pipe benders, torque wrenches)

Rapid Dry Wall System Installation: Theory and Practical Training:

Rapid dry wall construction represents a modern pre-fabricated building approach offering significant advantages over traditional masonry and plasterboard construction. Systems such as Rapid wall provide industrialized, moisture-resistant wall assembly with integrated service cavities for plumbing and electrical installations.

System Components:

- Precast Concrete Panels: Factory-manufactured wall elements with precise dimensions and factory-finished surfaces
- Service Cavities: Built-in voids accommodating water pipes, electrical conduits, and HVAC routing
- Damp-Proof Courses: Integrated waterproofing membranes preventing moisture ingress
- Jointing and Finishes: Composite materials for sealing panel interfaces and creating finished interior/exterior surfaces

Installation Sequence and Plumbing Integration

Foundation and Preparation:

a) Concrete foundation with damp-proof course applied (minimum 125 mm width, extending 150 mm above finished floor)
b) Starter bars inserted and secured for panel positioning
c) Waterproof membrane applied to foundation surface

Panel Erection:

a) Precast panels lifted by crane onto prepared foundation
b) Panels installed from highest rebate point, positioned over starter bars
c) Reinforcement bars and damp-proof courses verified between panels
d) Panel alignment and plumb verified using survey points and laser theodolites

Plumbing Service Installation:

a) Pre-Installation Planning: Coordinate with structural and electrical trades on service routing
b) Cavity Access: Utilize pre-formed service cavities in panel design for pipe routing
c) Pipe Installation: Install water supply and drainage pipes within cavities prior to internal finishes
d) Pressure Testing: Hydrostatically test plumbing system before wall closure and finishing
e) Penetration Sealing: Install fire/moisture-rated sleeves around pipe penetrations through panel interfaces

Advantages Over Traditional Construction

Aspect	Rapid Dry Wall	Traditional Masonry
Construction Speed	Reduced by 40-50%	Baseline
Weather Dependency	Minimal (pre-fabricated)	High (weather delays common)
Quality Consistency	Factory-controlled	Variable site conditions
Moisture Control	Integrated damp-proofing	Post-construction remediation needed
Service Integration	Pre-planned cavities	Often requires retrofitting
Dimensional Accuracy	±5 mm	±15-20 mm typical
Labor Efficiency	Fewer on-site trades	Multiple trades, longer scheduling

Table: 2 - Advantages Over Traditional Construction

Image: 9 - Installation of Thermostatic shower Diverter

B. VISIT TO URIMAT *(Switzerland on 13th October 2025)*

1. Introduction to URIMAT

The company URIMAT has gained a global reputation for manufacturing eco-friendly urinals that do not require water for use in public and semi-public restrooms. Over the course of more than twenty years, URIMAT has cultivated a reputation for its products as being of high quality, innovative, and sustainable; this has been accomplished via the company's dedication to the objective of significantly reducing the amount of water that is used and the environmental impact that results from its use. The company's urinals are created from advanced, high-tech polycarbonate and 100% recyclable ceramic bowls. They are manufactured in a way that prioritizes effective waste reduction and CO2-neutral production.

Image: 10 – visit to URIMAT

Every single URIMAT waterless urinal is equipped with a proprietary odor trap device, such as the MB Active Trap or membrane trap technology. The odors are effectively sealed in, and the formation of undesirable scents is prevented by the direct transfer of urine into the sewage system. The urinals are completely touch-free, simple to maintain, and feature simplified cleaning techniques that utilize microbiological agents in order to further increase hygiene when compared to conventional flush types. One URIMAT urinal is able to save a minimum of 100,000 liters of drinking water every year by greatly reducing the cost of water and the

amount of carbon dioxide emissions associated with the production of water and the treatment of wastewater.

The products made by URIMAT are well-known for being certified according to stringent requirements and for adhering to standards that are recognized worldwide. For example, in line with the National Plumbing Code of Canada as well as the Uniform Plumbing Code (UPC),

Image: 11 – MB Active Trap

the mechanical traps in their urinals are certified by IAPMO. Additional product aspects are evaluated and certified by reputable organizations, such as TUV, which demonstrates a commitment to quality and safety throughout the entire process.

Environmental responsibility is an essential element of the ideology that is held by URIMAT. The organization makes a persistent effort to reduce waste at the point of origin, finds new uses for materials such as packaging, and substitutes things that are intended for single-use, such as one-way pallets, with alternatives that can be reused. In terms of sustainability, URIMAT ranks in the top 5% of all firms worldwide, and it has been granted the Eco Vadis Gold sustainability grade (2025). Additionally, it is a member of the Solar Impulse Foundation's "1000 Solutions" list, which features ecologically beneficial and clean ideas that are also profitable.

To summarize, the waterless urinals that are offered by URIMAT exceed expectations in terms of sustainability and efficiency in sanitary products, as they are created by combining the most cutting-edge technology, complete recyclability, and third-party certification to provide a substitute for traditional urinals that is hygienic, odour less, and genuinely environmentally friendly.

We went to a beautiful pumpkin farm near the Urimat factory for lunch. It was a nice, peaceful place to be after the day's technical lessons. The farm was in the middle of broad fields and had seasonal decorations all around it.

Image: 12 – Interaction with URIMAT Team- Mr. Achim Schröter, CEO, URIMAT & Mr. Marcel Näpflin, Director of Sales & Marketing, URIMAT

2. Training at URIMAT

The training program at URIMAT provided comprehensive exposure to the design, functioning, and sustainability principles behind advanced waterless urinal technology. The sessions covered both technical and practical components, enabling a detailed understanding of URIMAT's innovative approach to sanitation systems.

A major learning area was the operational mechanism of waterless urinals. Practical demonstrations explained the functioning of the MB Active Trap and membrane trap systems, which ensure odor-free performance by directly channelling urine into the sewage system while effectively sealing odors. The training also included the installation process, covering mounting techniques, connection requirements, gradient considerations for smooth drainage, and the correct procedures for sealing and fixture alignment.

Maintenance was another key component, involving hands-on guidance on odor trap replacement, membrane inspection, and the use of microbiological cleaning agents that enhance hygiene compared to traditional flush urinals. The training also detailed the distinct advantages of waterless systems over conventional units in terms of water conservation, operational savings, and hygiene.

I was introduced to the materials used in URIMAT products, including high-tech polycarbonate and 100% recyclable ceramic, along with insights into the company's CO_2-neutral manufacturing processes. The program emphasized sustainability achievements such as CO_2 reduction (approximately 350 g per m^3 of water saved), pure urine collection for fertilizer reuse, and internationally recognized certifications including IAPMO, TUV, EcoVadis Gold, and Solar Impulse "1000 Solutions."

The training also highlighted URIMAT's commitment to waste minimization through recyclable packaging and reusable logistics materials. The visit concluded with an experiential learning exposure to the surrounding environment near the URIMAT facility, reinforcing the company's integration of technological innovation with environmental responsibility.

3. URIMAT Achievements:

- Bowls that have been manufactured with no net carbon emissions and are totally recyclable. A reduction of approximately 350 grams of carbon dioxide emissions for every cubic meter of water saved.
- The use of pure urine collection allows for the reuse of fertilizer, and it does not require the diluting of wastewater or the addition of chemical additives.
- EcoVadis Gold (which certifies the top 5% of sustainable firms) and the Solar Impulse Foundation (which certifies clean, profitable technology) have both certified us.

There were pumpkins of all shapes and sizes on the property, which made it feel like a warm and welcoming country environment. The natural beauty of the area and the calm countryside made it a great spot to stop, think, and talk about the technical visits and talks from the morning.

Image:13 - Pumpkin farm

C. VISIT TO VIEGA *(20th October 2025)*

1. Introduction to Viega World:

Viega World serves as an interactive seminar centre and flagship reference project for digital construction, designed for partners and the global industry. The facility allows visitors to apply theoretical training directly to its advanced technical systems through hands-on practice. Viega World exemplifies sustainable construction practices, implemented so comprehensively that it stands as a model for holistic, efficient building design.

Objective: Investigate digital construction reference projects, sustainable methodologies, and practical technical training systems.

2. Training at Viega, Atterndon Germany

I started my day in the Viega Sphere, a chamber that surrounded me on all sides and let me use augmented reality to explore the building's digital doppelganger. I imagined how BIM planned every aspect, from 20,000+ press fittings to sanitary modules, so that energy, water, and system performance could be monitored in real time. This digital foundation made it possible for practical modules to be built. It also showed off Viega's hybrid training strategy, which combines on-site and digital training and can handle 10,000+ participants each year at 21 sites across the world.

Image: 14 - Visit to Veiga

I spent time at the Press Technology Lab getting hands-on experience with the installation of Profipress, Sanpressin, and Prevista systems for heating, fire protection, and potable water. I worked on pressing fittings on live mockups under the supervision of an expert. I also gained knowledge about problem detection by using interactive touchscreens that simulated obstructions or leaks. I investigated Prevista Dry Plus drainage systems for skyscrapers and systems that rely on siphons for roof drainage (Pluvia). I observed the flow dynamics firsthand,

taking use of the multiple-floor settings that the Sanitary/Heating Towers made available. The emphasis of these zones was on best practices for the reduction of noise and leak-proof joints, with the goal of bridging theory and execution.

This training improved my abilities in the areas of digital planning, press technology, and sustainable systems, putting Viega World in a position to lead the way in the education of the industry's future. I was motivated to incorporate these advancements into multi-story constructions in my hometown as a result of the open and cooperative environment. the aforementioned individual

3. Viega Dry wall system for easy and fast Installation

Viega's Prevista Dry and Prevista Dry Plus are innovative pre-wall systems that are designed for quick installation with few tools in drywall buildings. They may be used for half-height and full-room height applications.

Main Benefits of Installation

- No tools needed to put together: You don't need any tools to snap pre-mounted cisterns (3L/3H types) onto frames. They work with all Visign flush plates for front and top actuation. You may change the depth with wall brackets or quick-release clamps.
- Rail System (Dry Plus): 5m extensible rails (40x40mm profile) make it easy to place custom gypsum panels accurately and securely. The feet click in and out.
- Speed and Flexibility: Elements that are ready to install cut down on time spent on site because they don't need to dry first. Frames can hold up to 400 kg, have heights that can be adjusted from 820 to 1120 mm, and can be connected to AquaVip flushing stations or shower WC rail connections, which let you position them with mm accuracy, making them perfect for walls that aren't straight or for restorations.

a. Pre-Vista Dry Plus

In both private and public restrooms, Viega Prevista Dry Plus is a state-of-the-art pre-wall installation system made for maximum flexibility, quick assembly, and customization. WC, urinal, washbasin, and bidet modules may be easily integrated thanks to its modular rail-based architecture, which also supports height modifications and inventive configurations for any bathroom project, whether it's a new construction or refurbishment. The system offers a variety of contemporary design options and is compatible with all Viega Visign actuation plates.

Engineered for robust performance and convenience, Prevista Dry Plus ensures straightforward assembly with tool-free component adjustments, precise rail connections, and noise insulation. It also supports innovative features such as electronic actuation plates with programmable hygiene functions and can incorporate the AquaVip system for automated, water-saving hygiene flushing—helping maintain drinking water quality and sustainability standards in modern buildings.

Image:15 - Prevista Dry Plus

b. Training on Multi-Floor Storey Flush system:

This a lab consist of multi storey plan of the different floor which are running at the same time without lose of pressure. The design, installation, and operation of multi-floor storey flush systems—which are crucial for intricate, contemporary structures with high

Image: 16 - Multi-Floor Storey Flush System

performance requirements—are covered in specific courses at the Viega World training center in Attendorn. Modern facilities and visible technical installations (like open shafts and transparent piping runs) at the training center allow participants to watch and interact directly with real-life situations, such as pipe routing, flushing cycles, and pressure management in high-rise plumbing systems.

In order to precisely control potable water hygiene and flushing schedules across multiple stories, Viega's advanced flushing and water management technologies, such as hidden cisterns and the AquaVip Solutions system, are demonstrated in these hands-on sessions along with theoretical instruction. In order to implement effective, sustainable, and code-compliant plumbing methods for multi-story buildings, trainees must be able to monitor water flow, detect pressure changes, and comprehend the effects of peak load scenarios on building infrastructure.

Self-Cleaning Drains

Viega's self-cleaning drains, which include Advantix Vario and odor traps, have smooth internals and high-capacity designs (such as 0.63 l/s at 60 mm accumulation) to prevent the building of residue and to assure cleanliness. The installation of features such as adjustable height grates, elbows that can bend, and parallel pipe routing make the process easier when it comes to showers, bathtubs, and flooring. These advantages are stressed throughout training, and they include the following: the ease of cleaning, the capacity to adapt to sanitary applications or many floors, and the relevance to your knowledge in plumbing.

Image: 17 - Self Cleaning Drainage

D. VISIT TO ROBERT BOSCH MAYER SCHOOL *(22nd October, 2025)*

1. Introduction to Robert Bosch Mayer School

Vocational school for installation and metal construction technology since 1911. The vocational school is the core type of school in every industrial school. It is compulsory for all young people in an apprenticeship and fulfills its role as a dual training partner for everyone involved in vocational training, especially training companies and chambers of commerce. Around 70 percent of our students are in dual apprenticeships, including vocational school students.

Image: 18 - Visit to Robert Bosch Mayer School with Mr. Wolfgang Steinle

The approximately 350 apprenticeship occupations that have existed in Germany since 2011 under the Vocational Training Act are divided into three occupational types. Within the industrial-technical occupations.

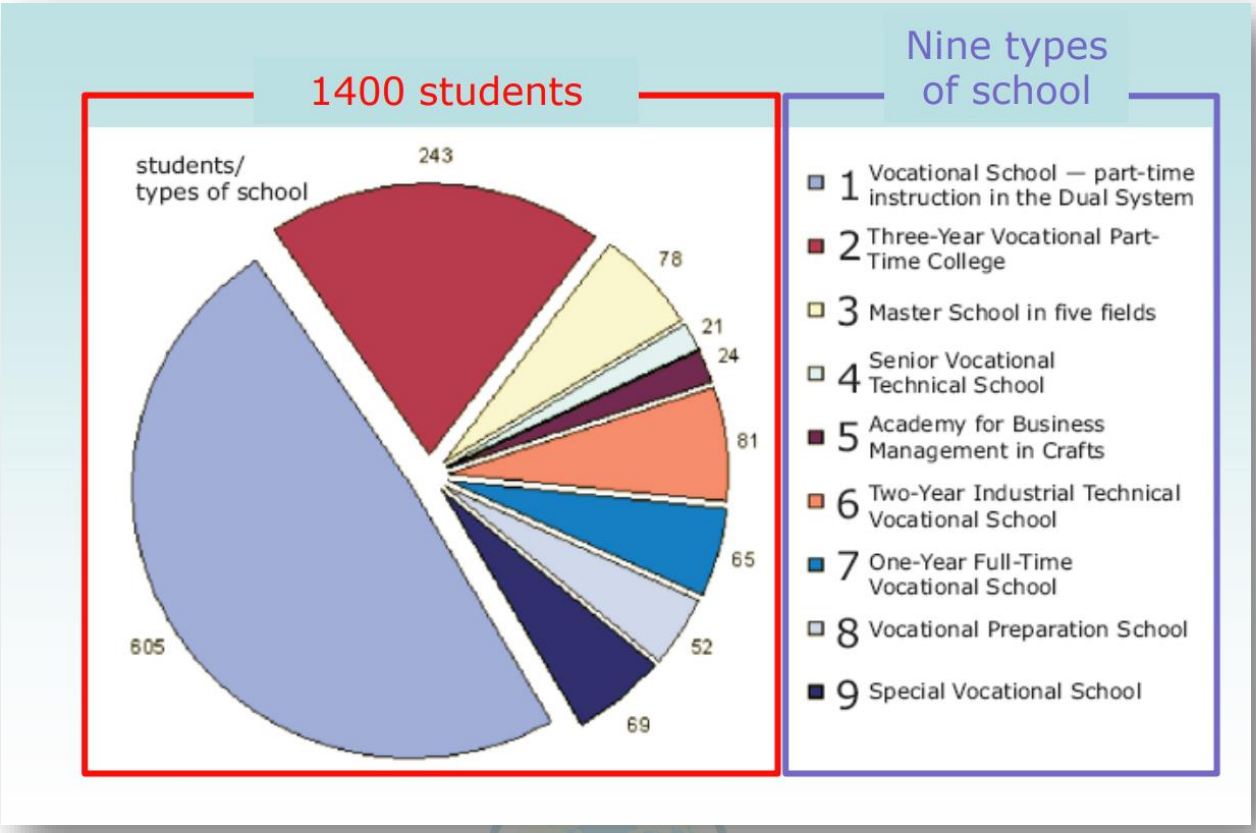

Image:19 - Types of school in Germany

Vocational school culminates in the final examination. In Baden-Württemberg, the vocational school final examination and the written part of the chambers' final examination are administered jointly. This ensures that the shared responsibility of the dual partners in the dual system is reflected in the examination and avoids double testing for students. Good grades in both the vocational school leaving certificate and the lower secondary school leaving certificate qualify students for the intermediate secondary school leaving certificate.

Dual System of study in plumbing for 3.5 years which is very unique system in Germany

In this system candidates need to find a company for the training which will be for the 1.5 years and rest will be in institute for 2 years.

One-year vocational training program Many craft businesses entrust the Robert Mayer School with the entire first year of their apprenticeships before the apprentice's transition into the regular dual vocational training program in their second year. A preliminary agreement between the student and the training company establishes the legal framework for this arrangement.

For most apprentices in the metal construction and installation technology sector, the one-year vocational school fulfils the dual role of company and vocational school in one. The theoretical instruction, structured according to learning modules, takes place in the classroom, while the practical basic training is conducted in our modernly equipped workshops and laboratories.

Regular company days (internships) are arranged to familiarize students with the training company and the workplace environment.

If the practical exam is passed at the end of the school year and the apprentice's academic performance meets the training company's expectations, the vocational school year is credited towards the standard three-and-a-half-year apprenticeship duration, and the apprentice is then accepted into the second year of their apprenticeship. In principle, completion of the one-year vocational school entitles the holder to enter into training in the corresponding professional field at the advanced level I (2nd year of apprenticeship).

RMS has a good network with the government, Companies, Manufacturers etc.

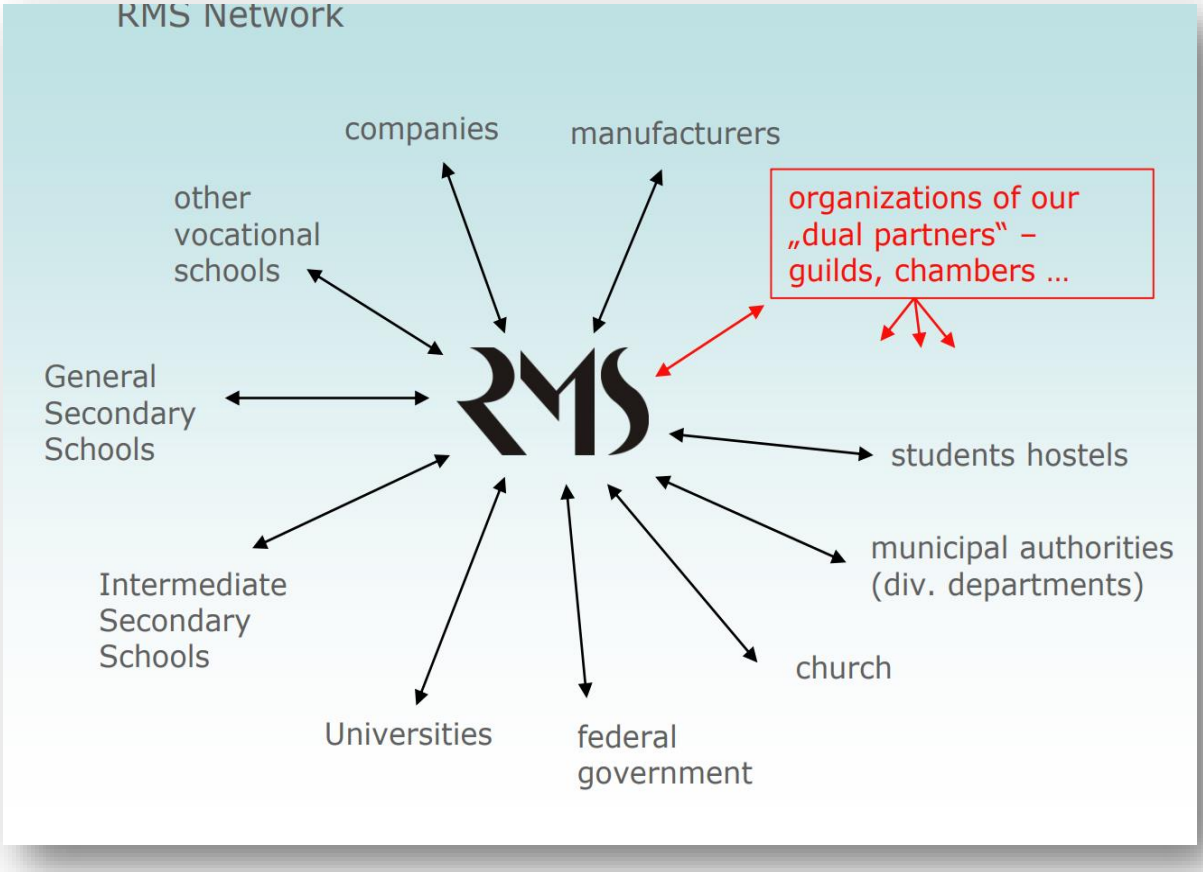

Image: 20 - Networking of Robert Mayer School

The Robert Mayer School, is not simply "a vocational school," but rather unites many schools under one roof. In the following overview, the types of schools and educational programs offered at School.

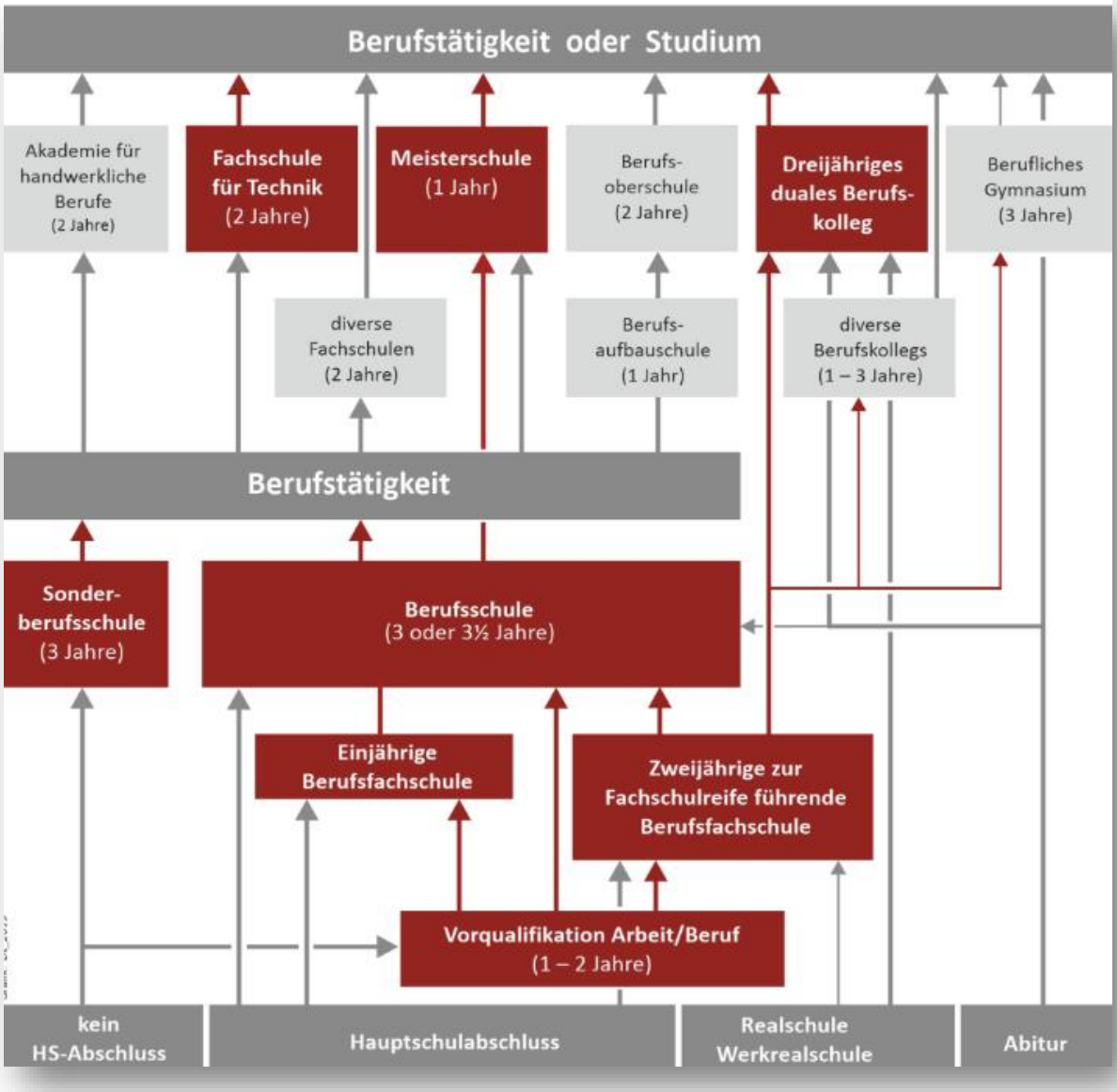

Image:21 – Details of Employment or Studies

Courses they Offer:

a. Master school for Plumbers & Heating Engineers (FMIH)
b. Master School for Plumbing Technology
c. Master School for Stove and Air Heating Engineers (FMOL)
d. Technical College (Technical School), Specializing in Heating, Ventilation and Air Conditioning Technology (FTHLK)

And many more courses in different domain.

Image: 22 – Lab visit

They have excellent lab for all the domain for the real time trouble shooting practice

This lab has all the equipment and tools which are required for the installation in plumbing and heating. There are many different types of pipes and insulation are also installed for the training of the candidates, and the system was connected with the building of the school which is running with all the pipes and air con

2. About Installer and Heating Engineer:

Master School for Plumbers and Heating Engineers provides the necessary professional qualifications to meet the demands of a leadership position in the skilled trades. Offered as a one-year, full-time program in close cooperation with the examination boards, the Master School prepares students for the master craftsman's examination, which is administered by the relevant Chamber of Skilled Crafts**.**

The course provides a comprehensive understanding of computer-aided planning for plumbing and heating systems, combining theoretical foundations with contractual principles and the preparation of service proposals. Participants enrolled in the master craftsman program are required to bring their own laptops.

Practical sessions enhance participants' expertise in pipe installation and involve hands-on training in the adjustment and maintenance of gas appliances, oil boilers, and control systems.

Image: 23 – Training on Gas Boilers

In addition, the curriculum addresses essential legal and economic aspects of managing a craft business and includes the qualifications necessary for training apprentices.

Participants also have the opportunity to take the certification examination to become qualified electricians for specific tasks within the plumbing, heating, and air-conditioning (SHK) trade. The program is enriched by company visits and guest lectures, providing valuable exposure to industry practices, manufacturers, and professional networks.

Image: 24 - Interaction with Robert Mayer School Students

The relief operation of the RMS “Plumber Master Course 2006/2007” at the Cathedral of Palotta in Romania represents a strong example of how vocational training can be combined with meaningful social engagement.

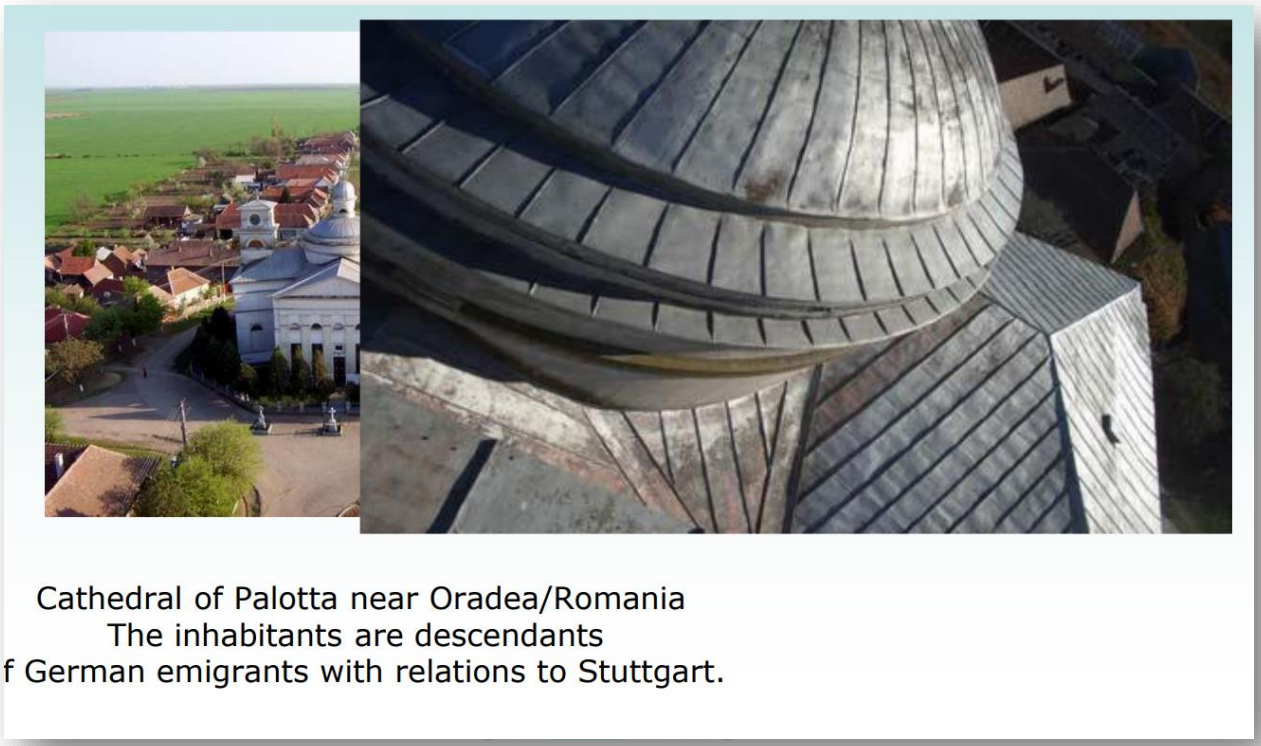

Image: 25 – Cathedral of Plotta

E. VISIT TO ADIRO *(22nd October, 2025)*

1. Introduction to ADIRO

With a strong dedication to sustainability and ongoing education, ADIRO Germany is a forward-thinking business that specializes in automation and robotics. Since its establishment in 1990, ADIRO has established a solid reputation as a dependable partner that prioritizes skill, trust, openness, and collaboration. The organization prioritizes individuals in order to foster innovation and preserve adaptability in a dynamic setting. ADIRO is to stay at the forefront of industry development by cooperation and flexibility, delivering solutions that have a positive influence on society and the environment.

Their focus is not only technical innovation but also creating positive social and environmental impacts through advanced solutions in automation and didactics. ADIRO aims to shape a sustainable future by integrating creativity and vision into its operations, making it a pioneering partner in industrial automation and educational technologies

Image: 26 - Visit to Adiro trained under Mr. Aswatha Narayana Sanagavarapu, Engineer, ADIRO Germany

2. Objectives of the Training

The primary objectives of this training day were:

- To understand the functionalities and practical applications of the Edukit system, a modular educational and training platform designed to simulate real-world industrial automation scenarios.
- To explore the role of automation in modern water treatment systems, illustrating how Edukit can aid in understanding, designing, and troubleshooting these processes.
- To facilitate hands-on interaction with Edukit modules related to water treatment, allowing participants to gain experiential knowledge under expert supervision.
- To foster collaborative learning and real-time problem-solving in an applied technological environment.

Image: 27 - Edukit System

3. Training Content and Learning Modules

The training was structured into theoretical explanations combined with practical exercises, making the session highly interactive and effective. Key content areas covered included:

- Introduction to Edukit: Overview of the Edukit platform, its modular design, user interface, and educational capabilities. This covered hardware components such as sensors, actuators, controllers, and software integration for automation simulation.
- Automation in Water Treatment: An explanation of water treatment procedures and how contemporary automation solutions maximize sustainability, efficiency, and quality. Filtration, chemical dosing, flow control, and monitoring systems within the treatment cycle were all discussed.
- Hands-on Session: During the hands-on sessions, participants practiced water treatment using Edukit modules. During these exercises, process flows were set up utilizing Edukit devices. installing and managing the actuators and sensors that regulate water flow. monitoring water quality parameters with Edukit interfaces. troubleshooting scenarios to enhance diagnostic abilities.
- Case Studies & Applications in Business: Using real-world examples that highlight the effects of automation in water treatment facilities, Edukit's training modules replicate industrial settings for hands-on learning.

4. Trainers' Expertise and Delivery

Mr. Wolfgang and Ashwath Narayan led the training with professionalism and deep subject matter knowledge. Their teaching combined theoretical depth with practical insights, making complex technological concepts accessible. They also emphasized the importance of sustainability and innovation in water treatment and industrial automation, thus aligning the training with current industry trends and future technological needs.

The trainers encouraged active participation, collaborative problem-solving, and peer learning, which enhanced the overall effectiveness and retention of the knowledge imparted

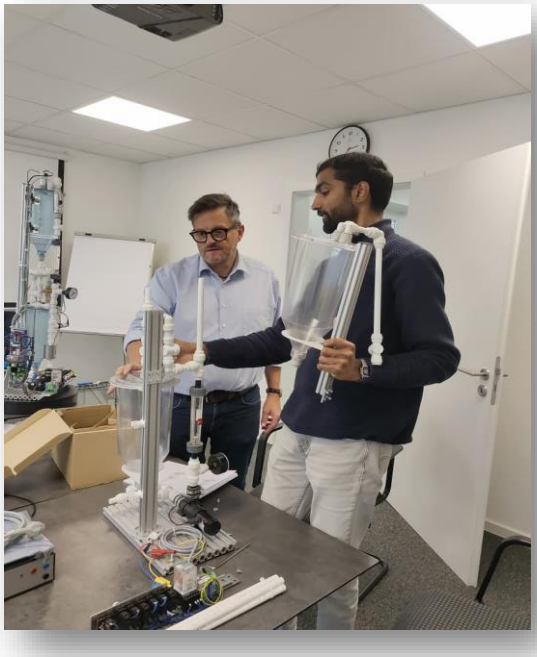

Image: 28 – Edukit Training with Mr. Wolfgang and Mr. Ashwath Narayan

5. About Edu kit:

This is a system designed for a compact miniature module of wastewater treatment.
This training report details my practical experience with the ADIRO EduKit PA Advanced, an educational process automation kit extensively employed for instructing and exercising the principles of industrial measurement, control, and automation. The EduKit PA Advanced enhances the EduKit PA Basic by incorporating automated measurement, sensor integration, and PLC control functionalities, rendering it a versatile instrument for both vocational training and engineering education.

Objectives of Edu Kit Training

The primary aims of this training program were:

- To understand the assembly and expansion of EduKit PA from Basic to Advanced.

- To gain practical skills in wiring and commissioning industrial sensors (level, flow, pressure) and actuators.
- To interface the kit with PLCs or PC-based controllers for closed-loop and open-loop control.
- To develop troubleshooting and process optimization skills through real experiments.
- To relate theoretical principles of automation to hands-on applications in a safe training environment.

Description of the Product

The ADIRO EduKit PA Advanced is a modular, compact tabletop plant designed to simulate industrial process automation for liquids. Its key components include:

- Two polycarbonate tanks (one large, one small)
- Industrial sensors: pressure, flow, ultrasonic level sensor (IO-Link capable)
- Actuators: 2/2-way solenoid valve, pump, process valve
- I/O interface board compatible with various PLCs (Siemens, Codesys, etc.)
- Tubing, connectors, and manual/automation switches
- Teachware: Structured exercises, wiring guides, and project documentation
- The EduKit PA Advanced is focused on teaching practical skills in sensor wiring, process control concepts, and PLC automation, with realistic experiments mirroring industry scenarios.
- Assembled the basic EduKit PA hardware.
- Installed Advanced components (pressure, flow, and ultrasonic level sensors) on the plant model.
- Wired the sensors and actuators to the I/O panel, following updated manufacturer instructions (noting specific changes for the new IO-Link ultrasonic sensor wire connection as of 2025).
- Verified the physical build against schematics and circuit documentation.

Wiring and Commissioning

- Connected all sensors and actuators to the interface board.
- Integrated a Siemens PLC (S7-1200) for process control, ensuring correct signal mapping.
- Performed initial process checks for individual sensor/actuator operation.
- Used FluidLab-PA closed-loop or similar software for PC-based monitoring and control.

Experimentation & Practical Learning

- Conducted basic fill/drain operations manually to understand the process flow.
- Automated level and flow control using PLC, implementing PID controllers.
- Monitored real-time process variables (level, flow, pressure) on the PLC/HMI.

- Ran open-loop and closed-loop control experiments, tuning controller parameters to achieve stable process performance.
- Applied diagnostic skills in troubleshooting sensor connections and control logic.

Learning Outcomes

- Developed confidence in sensor wiring, signal testing, and troubleshooting.
- Achieved a clear understanding of process instrumentation for level, flow, and pressure.
- Demonstrated ability to automate process operations using PLC platforms common in industry.
- Gained exposure to the structure of industrial documentation, work instructions, and project-based learning in automation.
- Built teamwork and organizational skills during group activities and collaborative problem-solving.

The EduKit PA Advanced provides an effective, realistic approach to practicing process automation in a safe educational setting. The modular design makes it adaptable for diverse training needs, while the ability to integrate with standard controllers (PLC/PC) enables bridging the gap between classroom theory and real industry practice

Image: 29 - EduKit PA Advanced Training

Life cycle of Water supply in town:

1. Abstraction of drinking Water
2. Drinking Water Treatment
3. Drinking Water Storage
4. Drinking Water network
5. House/Trade/ Industry
6. New Sanitary Systems/Rainwater Harvesting
7. Drainage Systems
8. Rainwater Management (Sponge City)
9. Wastewater Treatment Plant
10. Sewage Sludge -Energy Management
11. Water reuse/Utilization of Agriculture Sewage sludge
12. High Flood pumping station/Discharge.

Image: 30 – Life Cycle of Water Supply

6. Conclusion

The training day at ADIRO Germany on Edu kit and water treatment was a highly productive learning engagement that combined cutting-edge technology education with practical implementation. ADIRO's forward-thinking approach, coupled with expert instruction from Mr. Wolfgang and Ashwath Narayan, provided participants with a comprehensive

understanding of how educational platforms like Edukit can simulate, teach, and improve industrial automation processes.

This visit not only enhanced technical competence but also highlighted the importance of continuous learning and sustainable innovation in today's dynamic industrial environment. The hands-on training experience is expected to greatly benefit future professional undertakings in automation, robotics, and environmental technology sectors.

F. VISIT TO INNUNG SANITAR HEIZUNG KLIMA *(Schweinfurt On -23rd Oct 2025)*

1. Introduction

The Guild for Plumbing, Sanitary, Heating, and Air Conditioning Technology is a voluntary organization of independent craftsmen from the plumbing, heating system, and gas and water installation industries. The guild advocates for and represents the common commercial interests of its members. The guild is a publicly traded company. It is a legally required member of the municipal chamber of skilled trades and a voluntary member of the Bavarian Plumbing, Heating, and Air Conditioning Association (SHK Bayern).

In Schweinfurt, Germany I visited Sanitar Heizung Klima where I got a toured in their organisation and attended a class of Master plumber.

2. Purpose of Visit:

(Organizational tour, curriculum review, and master plumber training observation)

I went to the SHK training center in Schweinfurt, where I learned a lot about Germany's best vocational school system for plumbing, heating, and air conditioning trades. The facility is a good example of the dual apprenticeship approach since it combines hands-on workshops with theoretical lessons that meet WorldSkills requirements.

Image: 31 – visit Innung Sanitar Heizung Klima, Schweinfurt with Mr. Stefan Köppe

I looked at places that were set up for hands-on learning, like working installations, diagnostic tools, and simulation labs while I was on my organizational tour. I saw trainees practice duties

that are needed in the real world, like installing pipes, making changes to gas appliances, starting up heating systems, and doing maintenance.

I had a detailed discussion with the instructor who is a master plumber about the organization of the course, the curriculum, the patterns of the examinations, and the requirements for eligibility. A participant is required to first finish a period of apprenticeship training that lasts for three years before they can move on and begin their instruction as a master craftsman, which lasts for one to two years. This is a prerequisite for participation in the program. The criteria that must be met in order to qualify include passing the practical skills assessment with a score that is deemed sufficient, having a high school diploma, and demonstrating proficiency in mathematics and physics. The curriculum encompasses a wide range of subjects, including, but not limited to, computer-aided design for building systems, boiler maintenance, heating controls, renewable energy integration, and compliance with German building rules. Furthermore, it includes multi-floor drainage and water supply installations. The exam consists of a combination of written examinations and practical projects, the latter of which are evaluated based on the quality, safety, and efficiency of the work that is produced.

Image 32 – Wilo Brain Box (Miniature Heating System)

In addition, I had conversations with some students who are now enrolled, and they provided me with the specifics of their training regimen. They gave a description of days that alternated between workshops and classroom instruction, company internships, and capstone projects that focused on actual building retrofits. The guidance provided by expert craftspeople was emphasized by students, who paid particular attention to problem-solving, professional judgment, and advancement from basic fittings to sophisticated system design.

Image: 33 – Training at Lab with BOSCH Team

As a result of this tour, I was able to gain insight into the high standards, industry links, and pathways to master-level expertise of SHK. This, in turn, improved my comprehension of the state of advanced plumbing education in Germany.

3. Comparison: SHK Plumbing Education (Germany) vs. India Plumbing Training Systems

The SHK (Sanitär Heizung Klima) system in Schweinfurt, Germany, exemplifies a cohesive dual vocational strategy, in stark contrast to India's fragmented apprenticeship and certification frameworks.

Aspect	SHK (Germany)	India Plumbing Training
Duration	3-year apprenticeship + 1-2 years master craftsman	1–2-year ITI certificate or 6–12-month apprenticeships
Delivery	Dual system: 70% workplace, 30% vocational school	Primarily classroom/ITI-focused with limited on-job
Progression	Apprenticeship → Journeyman → Master (business/legal)	ITI → Craftsman → Supervisor (via CTS/NCVT)

Table:3 - Comparison between German and Indian Plumbing Training

G. VISIT TO GEBERIT RAPPERSWELL, SWITZERLAND *(29th Oct 2025)*

1. Introduction to GEBERIT

GEBERIT has been a world leader in sanitary technology since 1874. Every year, the company spends millions of dollars on research and development. In 2024, for example, it spent CHF 74 million (2.4% of net sales) on core areas like hydraulics, materials technology, sound insulation, statics, fire protection, electronics, surface technology, process engineering, and virtual engineering. This commitment leads to long-lasting new ideas that make sure plumbing systems around the world use water in a dependable and cost-effective way. While I was there, I looked at how these investments lead to better products, strict quality control, and useful training options.

Image:34 - Visit To Geberit trained under Mr. Michael Drollinger, Senior Product Manager GEBERIT Switzerland

2. Science of Manufacturing and Product Development

I was able to gain a thorough understanding of the complete lifecycle, which involved everything from virtual engineering and building information modeling (BIM) for fast hydraulic calculations to precise manufacture in automated factories, such as ceramics in Pfullendorf and plastics in Jona. Among the new features are VariForm washbasins, FlowFit plumbing, and energy-retaining valves. In comparison to previous approaches, BIM expedites the process of transdisciplinary planning by a factor of ten.

3. The Training Centre and the Famous Wastewater Tower:

Since the middle of the 20th century, Jona's GEBERIT Information Centre has been teaching about 50,000 professionals each year through hands-on courses. The famous 30-meter wastewater tower, which has been in use since 1970 and has been copied in Pfullendorf/Manno, has:

- Sovent/Pluvia siphonic systems, rainwater drainage, and wastewater drainage
- Testing on one or more floors (up to 60 scenarios)
- Clear pipes for seeing good and bad behaviours from the balcony
- Live demos with electronic controls

While I was there, the mobile towers were being worked on, but they show siphonic flow (negative pressure fills pipes completely during rain).

Image: 35 - Famous Wastewater Tower at GEBERIT, Rapperswill, Switzerland

4. Important Real-World Solutions Noise-Free Cistern Filling: Delta21/UP320 mechanisms with built-in silencers

- **Easy Actuators:** You can install Sigma10/20 plates in only a few minutes.
- **BIM Integration:** Quickly does flow and noise calculations for tall buildings Jona's ecosystem, which includes a mechatronics lab (for sanitary-BMS connectivity) and global certification, makes GEBERIT the leader in sanitary technology. They teach more than 30,000 professionals throughout the world while also decreasing CO_2 emissions through resource-efficient designs.

Image: 36 - GEBERIT Actuators model

H. VISIT TO EAWAG, RAPPERWILL *(31st oct 2025)*

1. Introduction to EAWAG

Eawag is one of the world's leading aquatic research institutes. With its professional diversity, close relationships with partners in the field and an international network, Eawag offers an excellent environment for comprehensively understanding the habitat and resource of water, identifying problems at an early stage and developing widely accepted solutions.

During this training at Eawag, I learned about the VUNA project (Valorization of Urine Nutrients in Africa, 2010–2015). This project came up with ways to turn source-separated urine into high-value liquid fertilizer, which helped with problems like water scarcity, pollution from wastewater, and making fertilizer. The session showed how urine, which has 85% of the nitrogen in wastewater, might avoid the energy-intensive Haber-Bosch processes (which utilize 1% of the world's energy) and phosphate mining dependence.

There is one more project which is called The NEST (Next Evolution in Sustainable Building Technology) is a living lab of Empa and Eawag in Dübendorf (Switzerland). There, researchers have been testing and investigating innovative technologies in collaboration with industry and practice since 2016

Image: 37 - Water Hub Nest

The basement is the location of the Water Hub, which is the platform where waste-water is seen as a valuable resource. The research environment allows a broad portfolio of decentralised technologies to be tested and further developed for the recovery of resources from wastewater. In this way, different local framework conditions can be addressed in a modular and flexible way.

At Eawag researchers from the natural, engineering and social sciences work closely together. With its special combination of competences in the areas of knowledge creation and provison, Eawag contributes to solving the challenging .This makes Eawag reaserch an effective tool for tackling current and future challenges in Switzerland and worldwide.

2. Teaching at Eawag

Many professors and lecturers are involved in teaching at Eawag, the course content is based on, Eawag research and conveys the latest findings. The teaching is as broad-based as Eawag itself: the focus is always on water, the various aspects of water use and its students find excellent conditions for a dissertation. Eawag supports talented people impact on ecosystems. Students participate in projects from the outset and doctoral network in specialist circles. Students from economically developing countries are with special programmes and offers them career opportunities and the chance to given the opportunity to conduct research at Eawad, establish contacts and pass on the expertise they have acquired in their home countries. Eawag is also international-ally networked and represented in teaching, emphasising a scientific and practical orientation.

With its programme for vocational trainees, Eawag also develops the skills of young adults and thus creates the basis for a successful career start. To this end, Eawag trains several apprentices each year in the fields of chemistry, biology, ICT and busi-ness administration and imparts practical technical, methodological, social

3. Training at EAWAG

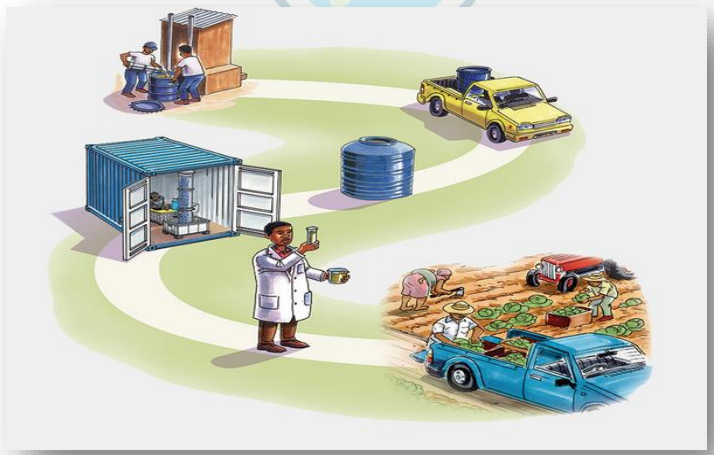

Image: 38 – Process flow of Fertilizer from Urine

The story of Vuna and VunaNexusVuna means "harvest" in isiZulu, the language of the Zulu people in South Africa. The VUNA project began in 2010 in Durban, when the city was looking for a suitable treatment for large quantities of urine. In 2016, Vuna was founded as a spin-off

from Eawag. Since 2022, VunaNexus SA has been developing and marketing urine valorization systems.

Vuna plans and builds your water treatment systems. In addition to VunaNexus urine recovery systems, Vuna offers you a comprehensive and up-to-date overview of drinking water, sanitation, and reuse systems. We design, plan, and build the system best suited to your situation, from the toilet to the end of the recovery process.

Image: 39 – Lab visit with Mr. David Chambrier and Mr.Michel Riechmann in Treatment Reactor Workshop

- The Fertilizer which is coming after treatment of urine is named as "Aurin"
- Urine Recycling is possible at Your home by installing this system
- Fixed installation in buildings produces fertilizer in your residential or commercial building.

Urine recycling in figures:

- A Person produce 500L of urine per year
- Urine needs 2 to 3 days of treatment
- It takes 75kWh to treat 500 L of urine, the Energy equivalent of driving 100 km per year.
- Treating 500 L of urine produces approximately 35 L of urine
- And it also Produces 465L of Water as a by -product
- One person's production can fertilize 500m2 of soil.

The Vuna process for Recycling:

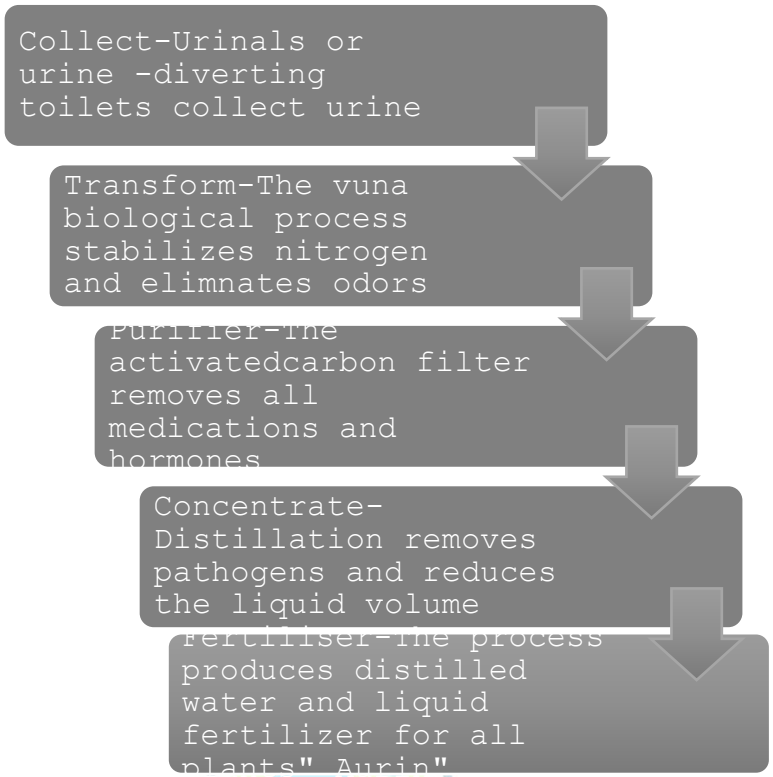

Image: 40 - Process flow diagram of Vuna Process for recycling

I had an Oppurtinity to visit the lab of the Vuna: Urine treatment

Image: 41 - Urine Treatment Plant at EAWAG

CONCLUSION

The World Plumbing Council (WPC) Scholarship Program has been a life-changing educational experience, providing a unique chance to investigate international best practices in water management, sanitation technology, plumbing, and vocational education. The visit to GROHE, URIMAT, Viega, Robert Bosch Mayer School, ADIRO, SHK Schweinfurt, Geberit, and EAWAG in Germany and Switzerland has given me a thorough grasp of how developed nations incorporate innovation, sustainability, and skill development into contemporary plumbing systems.

The teaching at these institutes showed how technology and handicraft can coexist. Both theoretical and practical skills were reinforced by exposure to digital construction techniques, BIM software, sophisticated fixture systems, quick dry wall installations, sustainable urinal technologies, automation tools like the EduKit, and high-rise drainage models. The practical exercises strengthened precision installation, diagnostics, problem-solving, and system optimization—skills crucial for the changing needs of the water and plumbing industries.

Understanding international forms of vocational education, especially Germany's dual apprenticeship system and master craftsman courses, was equally beneficial. These observations emphasized the value of organized training, industry-institution cooperation, and ongoing professional development—all of which have the potential to greatly improve India's skill ecosystem.

By showing how wastewater, urine, and other by-products may be transformed into valuable resources through scientific innovation, the tour to EAWAG and the VUNA Nexus project expanded the viewpoint on circular sanitation and resource recovery. For nations dealing with water constraint and environmental issues, such sustainable solutions provide a template for the future.

Overall, this scholarship experience has not only improved my technical proficiency but also fostered a stronger dedication to promoting sustainable plumbing methods in India. The information acquired will help me to improve training frameworks, encourage water conservation, and motivate me to embrace international norms. This journey has strengthened the conviction that expertise, creativity, and sustainability can all work together to design the future of resilient infrastructure, safe water, and sanitation.

REFRENCES

1. ***URIMAT AG.*** *"URIMAT Waterless Urinals – Product Overview and Technology Details." URIMAT Official Website. Accessed 2025.*
2. ***URIMAT AG.*** *"MB Active Trap and Membrane Odor Trap Technology – Technical Specifications." Product Documentation, 2025.*
3. ***URIMAT Sustainability Report 2025.*** *"CO_2-neutral production, recyclable materials, and environmental performance indicators." URIMAT AG, Switzerland.*
4. ***EcoVadis.*** *"EcoVadis Sustainability Rating – Gold Award (Top 5% of Companies)." EcoVadis Public Rating Report, 2025.*
5. ***Solar Impulse Foundation.*** *"1000 Solutions Label – Efficient and Profitable Sustainable Technologies." Solar Impulse Foundation Database, 2025.*
6. ***IAPMO (International Association of Plumbing and Mechanical Officials).*** *"Certification Listings for Mechanical Odor Traps under Uniform Plumbing Code (UPC)." IAPMO Product Certification Directory, 2025.*
7. ***TÜV Certification Group.*** *"Quality and Safety Certification for URIMAT Waterless Urinals." TÜV International Standards Documentation, 2025.*
8. ***National Plumbing Code of Canada (NPCC).*** *"Technical Standards for Waterless Sanitary Fixtures and Mechanical Traps." Government of Canada, Latest Edition.*
9. ***Training Notes from On-site Visit*** *to URIMAT Factory & Pumpkin Farm, Switzerland (13 October 2025). Field observations and practical demonstrations documented during hands-on training.*


THANKS
"Water is the driving force of all nature."