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World Plumbing Council Education and Training Scholarship 2016

Visit to Switzerland, Germany and Prague July 7 -24, 2017

Report by





1. Objective:

I was fortunate to receive the World Plumbing Council Education and Training Scholarship 2016. Under this scholarship, I visited Switzerland and other European countries as advanced and latest technologies such as pre-plumb systems; water efficient fixtures, etc. are practiced there in the domain of Plumbing and sanitation..

The objective was to visit good and sophisticated training institutes in Switzerland and other European countries and study their curricula, methodologies of teaching, duration of courses, minimum qualification of students, etc.

In addition, I aimed at getting advanced knowledge in plumbing that will benefit me as a faculty, my college and my country in commencing the world class plumbers' training school.

2. Introduction:

About the Author

Dr. Nitin M. Mohite works as Assistant Professor of Civil Engineering at College of Engineering Pune (COEP), Maharashtra, India. He has been working at COEP since 2009. Besides civil engineering, he teaches Plumbing Services – an elective course to final year B. Tech. students of Civil Engineering. He is In-charge of the Plumbing Laboratory at COEP which was developed by Indian Plumbing Association. Every year, many students and faculty, professionals, contractors, military engineers, ITI students and plumbers from architectural, civil engineering, interior design visit the COEP Plumbing Laboratory. At the Lab, Dr. Mohite conducts an orientation lecture in a classroom followed by a tour to the plumbing lab. Additionally, various courses based on the Uniform Illustrated Plumbing Code- India (UIPC-I) are conducted for Civil, Mechanical and Architectural professionals and students. UIPC-I is developed jointly by Indian Plumbing Association (IPA) and International Association of Plumbing and Mechanical Officials (IAPMO).

About India

At present, there are many training institutes in India that provide vocational training to students. These institutes are called industrial training institutes (ITIs). They have

different curricula and customized programmes designed to meet specific needs of learners. However, a training course for plumbing professionals is not available.

About 90% of the plumbing industry workforce in India is not professionally trained. Most of the skill learning in industry happens through unstructured, on-the-job training (OJT). Lack of professionally trained plumbers is a major drawback for the country's construction and related sectors. To understand the greater need, the Government of India has started Indian Plumbing Sector Skills Council (IPSC) under the umbrella of National Skills Development and Entrepreneurship (NSDE). IPSC endeavors to address these issues and brings the skill levels in our country to the world standards.

About Indian Plumbing Association (IPA)

IPA is a voluntary organization of plumbing professionals, having more than 2,500 members across the country from every segment of building industry including consultancy, manufacturing, contracting, trading, academia and architecture. IPA is to promote the advancement of plumbing services in the country by organizing seminars, exhibitions, symposia to educate members of the trade and general public.

3. Plumbing Education in India, Germany and Switzerland

To understand the plumbing education framework in India and European countries like Switzerland and Germany, I visited two Plumbing Schools namely Rober BOSCH Vocational Training School, Dortmunt, Germany and Werstatt Vocational Training School in Rapperswill, Switzerland. In technical training, instruments and tools play an important role. I visited Schreiner Didaktik, a company which manufactures plumbing and sanitary equipment. The company provides technical teaching equipment required for plumbing schools. The equipments are very handy and various experiments can be carried out with them. This company also provides hands-on training to aspiring candidates.

To understand the plumbing educational framework of European countries, the following criteria are considered and a comparative analysis is carried out.

A general comparative analysis of the plumbing regulatory and educational frameworks in Switzerland, Germany and in India

Description	Switzerland	India
Minimum age limit	16-24	16
Minimum qualification for a plumber	High School	High school
		(10th)
Duration of the course:	3-4 years	3 years
Timing (Full time, Part-time (Morning / Evening,	Part time	Full time
Saturday and Sunday)		
	(4 days in	Full time in
	company, 01	house
	day in school)	
Curriculum	Yes	Yes
Certified Private Training Institutes or Government	Recognized by	Government
Recognized Institute	plumbing	recognized
	organization	
Hands on experience or internship	Yes in	In house
	company,	
	Sites, etc.	
Training of Plumbing Apprentices for selection and	Yes	No
identification of products and material in internal		
plumbing services		
Examination and Certification	Every year	Every year
	(twice)	(once)
Validation of Certificate	Yes	Yes
Process of renewal of Certificate or re-examination	No	No
Any entrance examination to be conducted (every	No	Yes
year, twice or thrice a year, etc)		
Career progression from craft to degree	Yes	Yes
qualification		
Arrangement for continuing professional	Yes	Yes
Development in the Plumbing Industry		

During the discussion with the trainers of both the schools in Germany and Switzerland, it was observed that each class had a strength of 15 to 25 students. The average age of the students was between 16 and 24 years. The students took admission after their schooling. There was no fee for students.

The students are usually sponsored by companies and they also get a stipend during these years. For the first and second years of the school, students work two days in the company and 3 days in the school. In the third and final years, students come to the school for a day and for the remaining days, s/he works with the company. During his/her 4 years, the company provides a stipend to the student. The student gets a field experience during his/her stay in the company and theoretical knowledge is given in the school.

The syllabus covers water technologies, heating and ventilation, environmental and solar techniques. Apart from plumbing, the syllabus includes other subjects like English Communication Skills, Soft Skills, Mathematics, Economics, Business, Politics, English Grammar, Symbol Understanding, Understanding of Drawings and Sports. With these courses, an overall development of students is easily achieved.

An examination is conducted twice a year. The examination consists of theory as well as practical. In a theory examination, questions are divided in three types namely Business, Planning and Analysis. 40% weightage is given to planning and analysis each and 20% weightage is given to business.

Examinations consist of working with different pipe materials, i.e. copper, iron, multilayer pipes, pex pipes, etc. icluding their cutting, fitting methodology. During the examination, the following tasks are given to students:

Free wall preparation, noice installationgs, installation of toilet and wasbasin, installation of different pipe systems, toilets, washbasin, urinals, etc. The maintenance of plubming installations is also given to students as a part of the examination.

During examinations, the following skills of students are usually observed:

- How do they work?
- How do they treat the material ?
- How does the material look after treatment and its finishing?
- Soft welding, measurement skills, pressure tests, etc. are tested.

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The grades are given to students in a range of 1 to 6. Only if a student gets more than 4 grades, s/he gets a certificate of plumbing. Otherwise, s/he fails and re-appears for the examination. Students get two attempts only. If s/he cannot clear the examination, s/he remains a helper forever.

In a practical examination, students identify faults and repair a plumbing assembly. Or the new plumbing assembly is prepared based on the drawings given. In the final year, more weightage is given to a practical examination.

Examiners are invited from companies or from other plumbing training institutes. They are designated as Master Plumbers.

After completion of the certificate programme, the young plumber gets ≤ 1200 to 1300 per month. The salary increases with his/her experience. Maximum salary offered is ≤ 2000 per month.

If a student fails, s/he is allowed to appear for a re-examination. However, the student is not allowed more than 2 attempts. If s/he does not clear the exam, s/he is de-barred from the school and s/he will not appear for the course.

Psychological support is also offered by the training institutes to all their candidates.

3.1 Career progress of students:

To get a Master's Plumber's designation, the student must work for 5 years in a company. After completion of his/her 5 years of experience in a company, s/he will again apply for the 1 year full time master plumbers' course or a 3 year part time course. Fee for the Master Plumber course is \notin 10,000.

After completion of Master Plumber, the student can start his/her own company and start business under his leadership. S/he may further increase his/her qualification by taking an examination to become an engineer.



Plumbing classroom, Rober BOSCH Vocational Training School, Dortmunt, Germany



Mr. Busch, Master Trainer, Rober BOSCH Vocational Training School, Dortmunt, Germany



Cut section of Multi-stage pump

Students Sample Score Sheet

Visit to Werkstaktt School of Plumbing, at Rapperswil, Switzerland

Mr. Peter Stucki, Eidg, Dipl, Sanitarinstallateur, has a master's degree in plumbing and has additional 2 year study experience specifically on water supply and drainage



With Mr. Peter Stucki, Werstatt Vocational Training School in Rapperswill, Switzerland





Display of Models at Vocational Training School in Rapperswill, Switzerland

Schreiner DIDAKTIK, Remscheid, Germany

Mr. Tim Hankel: is a Supply Technician and Mr. Wolfgan Schreiner,

Schreiner Didaktik is a plumbing and sanitary equipment manufacturing company. The company provides technical teaching equipment required for plumbing schools. These equipments are very handy and one can carry out various experiments. The equipments listed below were observed.

- 1) Modular kit drinking water installation, mounted on a trolley
- 2) Training station drinking water protection Legionella prevention and domestic water supply
- 3) Training station solar system, tube collector and flat plate collector, etc.

The main objective of visiting this company was to see working models of plumbing and sanitary equipment and study how training is provided. I also studied the number of training modules in sanitary, heating and air conditioning and the training facility. These equipments are required to train students in my institutes.

A good set in manufacturing and assembly facility is available. A variety of equipments related to plumbing and sanitation modules are available. These modules are mounted on a bench so that there is flexibility and freedom to carry out various experiments.



With Mr. Wolfgan Schreiner and Mr. Tim Hankel, Schreiner DIDAKTIK, Remscheid, Germany



Model kit electronic sanitary control and training station drinking water protection - Legionella Prevention and Domestic Water Supply



Training Station Solar System, Flat Plate Collector

4.0 Product Approval, Testing and Certification

To understand product approval, testing and certification system, I visited various factories like ACO Factory at Brono, Prague, GEBERIT, URIMAT, in Rapperswill, Switzerland, George Fischer, Schaffhausen and Sissach in Switzerland. GEBERIT and George Fischer have their state-of-the-art training facility. The purpose-built Training Academy offers customers free training modules covering full breadth of the company's product ranges. The facility enables merchant staff to benefit from hands-on training with the latest piping systems and sanitary solutions, whilst the showroom and training facilities offer space and technical information in abundance.

Visit to ACO factory at Brono, Prague

Mr. Martin, Mr. Pravel Hermanek and Mr. Stanislav Tejkal

This company is engaged in manufacturing of material and ensuring safe food and adequate sanitation protocols. Equipments for the processing and handling food products must be designed, fabricated, constructed, and installed according to the sound hygienic design principle. The company provides more attention to these aspects.

the process of cutting, forming and welding may introduce impurities on the surface of the material which can cause corrosion. Gratings for hygienic channels and gullies and slot tops are manufactured by this company. This company tests the material in 'in-house' laboratory. The material is further sent to European Hygienic Egnineering Group (EHEDG) labs for certification. The principle goal of EHEDG is a promotion of safe food by improving hygienic engineering and design in all aspects of food equipment manufacture.

The main objective to visit ACO was to see various products used in food processing industries. The manufactured products for the food and beverage industries are well tested by various agencies like European hygienic engineering and design group (EHEDG). With reference to EN 1253 -2 standard in development Gullies for buildings, roof drains and floor gullies without trap are designed as per EN 12056 Gravity drainage system inside buildings.





Visit to ACO Factory at Brono, Pargue

With Mr. Martin, Mr. Pravel Hermanek and Mr. Stanislav Tejkal



Visit to Moravia Milk Processing industri in Brono, Pargue

GEBERIT, Rapperswill, Switzerland

Mr. Abdullaha Oengueren, Head Basic Sanitation Technologies Head, GEBERIT

I visited Basic Sanitory Technologies Laboratory at GEBERIT. New products are designed and varios tests are carried out in the in-house laboratory. The automated testing facility carries out various tests on durability of various products and their accessories.



Mr. Abullaha, Head of BasincSanitation Technologies

The facilities include a flushing performance test: Toilet test. Test material – wood. Wood dust is placed on toilet surface and flushed to see how much portion of toilet is cleaned.



GEBERIT Pre-plumbing system



Durability Testing Lab at GEBERIT

Various durability tests are carried out in this lab i.e. flush test, flushing valve test, flush tank test, faucets, etc. Pipe testing is also carried out in this lab as per the EN norms. A pressure test, temperature fatigue test are carried out at 10 bar. Once these tests at GEBERIT lab are satisfactory, the product is sent to the certified agencies like SVGW and DVGW.

URL Link for DVGW:

http://www.waterfiltrations and iego.com/why-choose-pelican/understanding-dvgw-certification

DVGW CERT GmbH is the largest gas and water industry certification body in Europe. DVGW establishes standards and test protocols. It also approves or certifies laboratories to conduct tests according to those standards and protocols. The same can be said for NSF in the US.

DVGW is located in Bonn, Germany. It has its own laboratory called TZW located in Karlruhe, Germany. Beyond that, DVGW has certified around twenty plus privately owned laboratories throughout the Central Europe area who are authorized to conduct certification testing. The same holds true for NSF. It has its own laboratory and those certified by NSF like WQA, UL and Pace Laboratories, to name a few.

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DVGW also issues test marks or certifications (i.e. the WQA equivalent of a "Gold Seal") like "W510" standard. Their internal code for the W510 certification is "9191 – Kalkschutzanlage" (scale protection device). In order to obtain the W510 certification seal or certification mark, the applicant has to pass a total of three test protocols: Efficacy (W512), material safety and structural integrity.

SVGW and SSIGE water certification body certifies and controls the installation parts such as valves, appliances, etc. for drinking water facilities with respect to. hygienic, hydraulic, mechanical and physical properties. If the minimum requirements defined according to the state-of-the-art are met, the water conformity mark is granted.

SVGW is a national umbrella organization of water supply companies. With its codes of practice, advocacy, education and training, its consulting services and the certification of products, SVGW significantly contributes to the reliable supply of drinking water to the Swiss population.

GEBERIT has a training facility at Rapperswill. The famous two-storey installation tower certainly left its mark when I visited the facilities. There is a 30-meter tower consisting of waste water drainage system, rainwater drainage system and the syphonic drainage system. The single foor and many floor system testing is carried out, also the testing is carried out for the entire system. With a balcony view, visitors can witness good and bad plumbing practices – all controlled electronically. But during my visit the tower is under maintenance.

Training Facility at George Fisher

During my visit to the Training Centre, Mr. Michael Ries mentioned that if they have to start to develop a new product, they have to do a type test (by an accredited test house). If this test is successful and if they receive a product approval (DVGW), then they have verification test every half year (for systems) / every two years (for valves), a surveillance audit in the mentioned plant(s). This, of course, is from an accredited test house. The third "pillar" is self-controlling during the production. Therefore they have to show this data during surveillance audits of the test lab.



Mr. Michael Ries, Mr. Jurgen Harsh and Mr. Martin Reinhart

It therefore means that if all three "pillars" are fine, DVGW approval is valid until the expiry date. And if necessary (decision from the Product management and the GF sells in different countries) one can renew the product approval.

The material which comes in contact with drinking water, the hygen parts of that particular product need to be checked form certified agencies. It is a very important process. The raw material supplied by a vendor is also to be certified from the agencies. The testing certificates are attached in Annexure I.



Training Facility at GF++



Training Facility at GF++

Test and Approval Procedure



URIMAT

Urimate manufactures waterless urinals. These urinals ensure an oder free experience. They are made of high quality polycarbonate. In the production process, zero-waste rate is achieved. All the materials are recyclable. Hence, these water less urinals are more environmental friendly than any other urinals in use today. All the parts of these urinals are certified by various agencies. The mechanical trap used in waterless urinals is certified by IAPMO as per Uniform Plumbing Code (UPC) and National Plumbing code of Canada. Similarly, other certified agencies like TUV certify other parameters. The certificates are as given below in annexure I.



Visit to Urimat Factory with Mr.Morwan Raza

Site Visit:

Site visit, Sissach, Switzerland



Installation of pex pipes for water supply, in apartment building



Installation of water supply and drainage pipe



Toilet for Disabled Persons



Moveable Public Toilets



Moveable Urinals

Role of a Plumber

A plumber works with a company. If something goes wrong, the company is responsible for any damange and not the plumber as an individual.

For construction of new buildings and aprartments, water supply and drainage drawings need to be submitted to district water supply office.

A Building Inspector visits the site and checks the installations. The number of water supply connections are checked. He also checks if the installations are as per the drawings or not, and certifies them.

A pressure test is carried out for water supply. For draiange, a smoke test is performed. Gas installations are aslo checked.

Salary for a plumber is 4,100 CHF and for a Master Plumber, it is 8,000 CHF.

Conclusion:

I sincerely believe that the scholarship has benefited to a great extent to me personally in gaining knowledge on better training practices in plumbing and it will soon, through College of Engineering Pune and IPA, be made available to the Indian Plumbing Industry.

Acknowledgements

- The Chairman and Executive Board of the **World Plumbing Council** for selecting me for the WPC Trainers Scholarship 2016.
- Special thanks to Mr. Shayne La Combre, Chairman, WPC and Tom Bigley, Deputy Chairman, Education and Training for providing Switzerland links.
- All resource persons particularly Mr. Tim Hankel, Mr. Wolfgan Schreiner, Mr. Busch, Mr. Peter Stucki, Mr. Martin, Mr. Pravel Hermanek & Mr. Stanislav Tejkal, Mr. Abdullaha Oengueren, Mr. Michael Ries, Mr. Jurgen Harsh, Mr. Martin Reinhart, Mr. Patrick Wittwer, Morwan Raza and Alexander Reush.
- Members, Board of Governors, COEP, Prof. B. B. Ahuja, Director: COEP, Prof. B. N. Chaudhari, Deputy Director: COEP, Prof. Sutaone, Dean: Academics and Prof. Bhosale, Head: Civil Engineering Department for all their support and encouragement.
- President and National Executive Committee of Indian Plumbing Association.
- Mr. Pravin Bora, Chairman and all members of Indian Plumbing Association Pune Chapter
- Mr. Subhash Deshpande, Plumbing Engineer and previous recipient of WPC Scholarship
- Dr. M. K. Ranjekar Professor who helped and encouraged me during this scholarship.
- Last but not the least, my Father Dr. Mahadeo Mohite, Mother Sharada, my wife Avantika, daughter Anushka and son Arjun for tolerating with my love for plumbing and supporting me in every academic endeavour.

Contact details:

Dr. Nitin M. Mohite

Assistant Professor, Civil Engineering Department College of Engineering Pune (COEP) Gandh–4, Rectors Quarters, Hostel Campus, College of Engineering Pune Shivaji Nagar, Pune 411 005 Maharashtra State, India Mobile : +91 95526 30232 Email: nitinmohite265@gmail.com

Annexure-I

ADDRESSEARCH AND ALL STATUS AND A	
APMO RESEARCH AND TESTING, INC. (ERTIFICATE OF LISTING) Fage 2 Void After: Product: Urinals with Mechanical Traps Issued To: Urimat Schweiz Ag non-standard nature of the fixture. Characteristics: Flushing and non-water-consuming urinals with mechanical traps. Fixtu include ceranic, stainless steel, or plastic urinals. To be installed accordance with the manufacturer's installation instructions. Products listed on this certificate have been tested by an IAPMO RAT recognized laboratory. This recognition has been granted based upon the laboratory's compliance to the applicable requirements of ISO/IEC 1702 Products are in compliance with the following code (s): Uniform Plumbing Code (UPC ⁸) Maiconal Plumbing Code of Canada Products are in compliance with the following standard(s): IAPMO IGC 161-2014 and ASME Al12.19.2-2013/CSA B45.1-13 including Updat 1 dated October 2013	
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	te No.

Testing and Approval Certificates





CERT

NW-6130BS0167

DIN-DVGW-Baumusterprüfzertifikat DIN-DVGW type examination certificate

10.238 IT 11.8			Registriernummer registration number
Anwendungsbereich field of application	Produkte der Wasserve products of water supply	arsorgung	
Zertifikatinhaber owner of certificate	Georg Fischer JRG AG Hauptstraße 130, CH-4	450 Sissach	
Vertreiber distributor	Georg Fischer JRG AG Hauptstraße 130, CH-4	450 Sissach	
Produktart product category	Absperrarmaturen für 7 (6130)	rinkwasser: Schrägsitzventil in	Durchgangsform
Produktbezeichnung product description	Schrägsitzventil für die	Trinkwasserinstallation	
Modell	52		
Prüfberichte test reports	Kontrollprüfung Labor: Baumusterprüfung: 060 KTW-Prüfung: KA 0238 Mikrobiologische Prüfun KTW-Prüfung: K-27796	TA 052/15 vom 30.11.2015 (TZ V3 - 5058 vom 08.06.2007 (SVG V16 vom 20.10.2016 (TZW) ng: MO 150/09 vom 29.08.2014 816-Ko vom 22.11.2016 (WHY	w))) (TZW)
Prüfgrundlagen test basis	DVGW W 570-1 (01.03 DIN EN 1213 (01.12.19 UBA METALLE (15.03. UBA ELASTOM (16.03 UBA KTW (07.03.2016 DVGW W 270 (01.11.2	.2013) 99) 2017) 2016)) 007)	
Ablaufdatum / AZ date of expiry / file no.	08.06.2022 / 17-0231-V	VNV	
10.07.2017 GI A-1/2	Bolywich		DVGW CERT GmbH. Zertifizierungsstelle
Datum, Bearbeiter, Blatt, Leiter der Zert date, issued by, sheet, head of certificat	ifizierungsstelle lion body	(DAkkS	Joser-Wirmer-Str. 1-3 53123 Bonn
DVGW CERT GmbH ist von der Dikks akkreditierte Stelle für die Zertifizierung	von Produkten der Energie- und	Deutsche Akkreditierungsstelle D-ZE-16028-01-05	Tel. +49 228 91 88 - 888 Fax +49 228 91 88 - 993

DVGW CERT GmbH is an accredited body by DAkkS according to DIN EN ISO/IEC 17065:2013 for certification of products for energy and water supply industry.

4

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Prüfbericht-Nr.: 21255569 001 Seite 8 von 8 Test Report No.:	roducts		A TÜVRhei	inland®
1 490 0010	Prüfbei	icht-Nr.: 21255569 001	S	eite 8 von 8
	Test Re Absatz	DIN EN 1672-2	Messergebnisse - Bemerkungen	Page 8 of 8 Bewertung

Folgende Punkte sind am Aufbau und an der Konstruktion positiv zu bewerten: / The following points are positive for assembly and construction:

- glatte Oberflächen / the plane surfaces
- Auswahl an den Materialien Polycarbonat und Keramik / the selected materials polycarbonate and ceramic

Die Reinigung ist aufgrund der glatten Oberflächen und der Materialien als sehr gut zu bewerten. / The cleanability is very good because of the plane surfaces.

IV. Zusammenfassung / Summary

Im Anlieferungszustand weisen die Urinale eine mäßige mikrobielle Kontamination an Bakterien auf. Diese stammt wahrscheinlich aus dem händischen Transport der Urinale. / At delivery state the Urinals showed a moderate microbiological contamination of bacteria. This obviously stems from the manual transport of the test objects.

Die Ergebnisse der Oberflächenuntersuchungen zeigen, dass nach der Reinigung der Oberflächen ein geringes Wachstum an Bacillus subtilis nachzuweisen ist. / The results of the surface tests show that after cleaning of the surfaces a minor growth of the used germ Bacillus subtilis can be detected.

Insgesamt gesehen weisen die geprüften Urinale aus hygienischer Sicht Oberflächen-und Konstruktionsmerkmale auf, die den Reinigungsaufwand erleichtern.

Lediglich im Bereich des Ablaufs kann ein hygienisches Risiko bei unregelmäßler Reinigung nicht ausgeschlossen werden. / Viewed altogether the Urinals shows surface- and construction characteristics from a hygienic view which consider the cleaning effort as easy. Merely in the area of the drainage hygienic risk regarding irregular cleaning can not be ruled out.

Insgesamt gesehen, lassen die getesteten Urinale, anhand ihrer Oberflächenstruktur, eine effektive Reinigung zu. / Overall, the surface structures of the tested Urinals admit an effective cleaning.

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