

Encourage

Motivate

Awareness

Corrosion Engineering

Open Ended Lab Exhibition

20th December 2022

Inspire

Idea

Innovate

Organized by
**Institute of Metallurgy and Materials Engineering,
University of the Punjab, Lahore**

in collaboration with
AMPP Pakistan Chapter

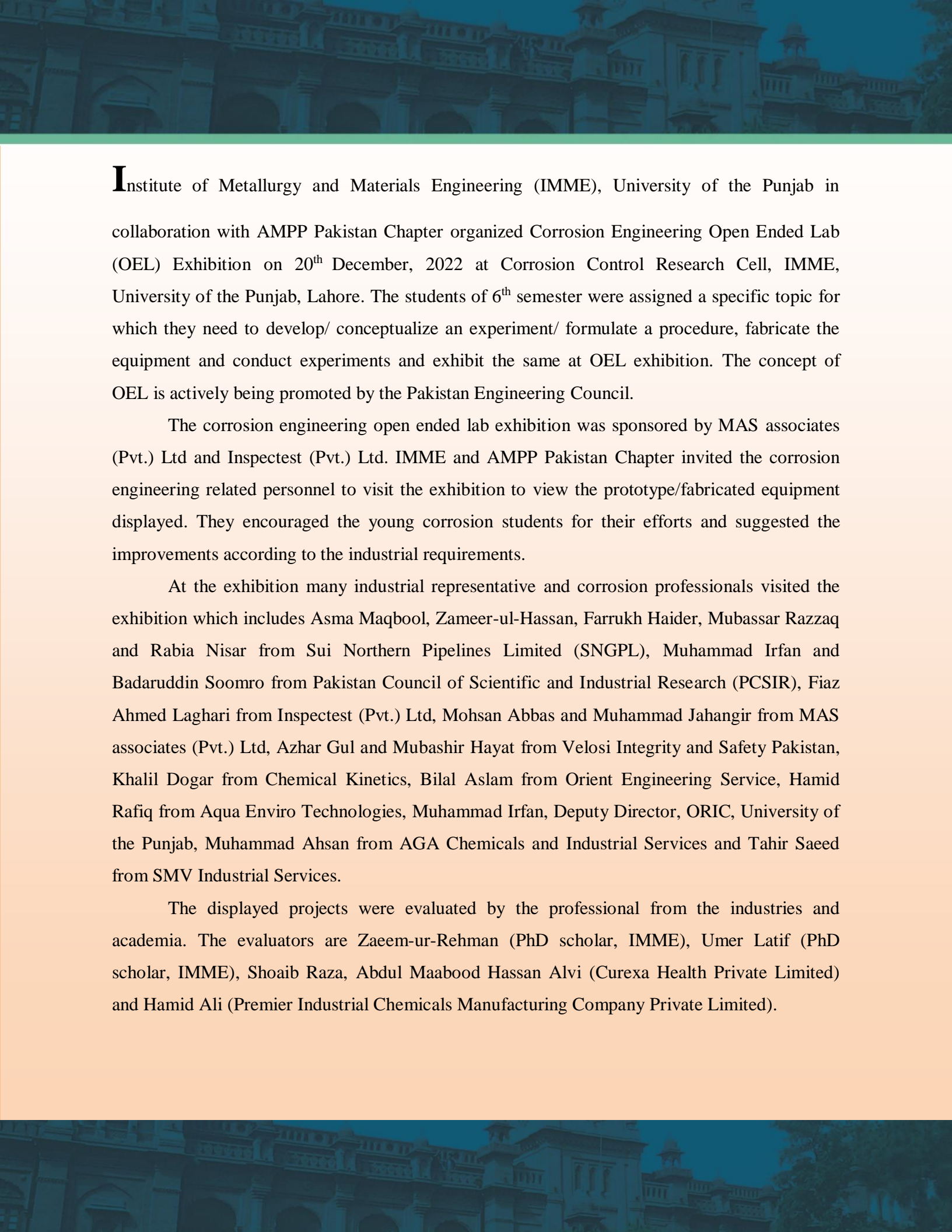
Sponsored By



MAS associates (Pvt.) Ltd.



Inspectest (Pvt.) Ltd.



Institute of Metallurgy and Materials Engineering (IMME), University of the Punjab in collaboration with AMPP Pakistan Chapter organized Corrosion Engineering Open Ended Lab (OEL) Exhibition on 20th December, 2022 at Corrosion Control Research Cell, IMME, University of the Punjab, Lahore. The students of 6th semester were assigned a specific topic for which they need to develop/ conceptualize an experiment/ formulate a procedure, fabricate the equipment and conduct experiments and exhibit the same at OEL exhibition. The concept of OEL is actively being promoted by the Pakistan Engineering Council.

The corrosion engineering open ended lab exhibition was sponsored by MAS associates (Pvt.) Ltd and Inspectest (Pvt.) Ltd. IMME and AMPP Pakistan Chapter invited the corrosion engineering related personnel to visit the exhibition to view the prototype/fabricated equipment displayed. They encouraged the young corrosion students for their efforts and suggested the improvements according to the industrial requirements.

At the exhibition many industrial representative and corrosion professionals visited the exhibition which includes Asma Maqbool, Zameer-ul-Hassan, Farrukh Haider, Mubassar Razzaq and Rabia Nisar from Sui Northern Pipelines Limited (SNGPL), Muhammad Irfan and Badaruddin Soomro from Pakistan Council of Scientific and Industrial Research (PCSIR), Fiaz Ahmed Laghari from Inspectest (Pvt.) Ltd, Mohsan Abbas and Muhammad Jahangir from MAS associates (Pvt.) Ltd, Azhar Gul and Mubashir Hayat from Velosi Integrity and Safety Pakistan, Khalil Dogar from Chemical Kinetics, Bilal Aslam from Orient Engineering Service, Hamid Rafiq from Aqua Enviro Technologies, Muhammad Irfan, Deputy Director, ORIC, University of the Punjab, Muhammad Ahsan from AGA Chemicals and Industrial Services and Tahir Saeed from SMV Industrial Services.

The displayed projects were evaluated by the professional from the industries and academia. The evaluators are Zaeem-ur-Rehman (PhD scholar, IMME), Umer Latif (PhD scholar, IMME), Shoaib Raza, Abdul Maabood Hassan Alvi (Curexa Health Private Limited) and Hamid Ali (Premier Industrial Chemicals Manufacturing Company Private Limited).



(Left to Right) Ahmad Jawad Khan, Muhammad Irfan, Badaruddin Soomro, Azhar Gul, Khalil Dogar, Asma Maqbool, Zameer-ul-Hassan, Fiaz Ahmed Laghari, Muhammad Jahangir, Muhammad Ahsan, Tahir Saeed and Hamid Rafiq



(Left to Right) Prof. Dr. Mohsin Ali Raza, Ahmad Jawad Khan, Zaeem-ur-Rehman, Umer Latif, Abdul Maabood Hassan Alvi, Shoaih Raza

First group led by Hammad Ahmed, group members were Kainat and Muhammad Fakhir. They were assigned to fabricate a soil resistivity box as per ASTM G 57. The fabricated equipment is



(Left to Right) Kainat, Hammad Ahmed and Muhammad Fakhir

fully functional and low in cost as compared to imported. After fabrication, they calculated resistivity of the soil which was collected from the refinery surroundings. The professional visitors from corrosion engineering background were impressed by their efforts and advised that as a next step they need to have their prototype calibrated. To check the accuracy, offer sample to service companies to conduct field trial and obtain feedback for further improvement.

Second group led by Usama Sarwar, group members are Muhammad Bilal Asghar, Sumbal Munawar and Esha Maham. They fabricated a circulating flow loop line to check the corrosion



(Left to Right) Sumbal Munawar, Usama Sarwar, Bilal Asghar and Esha Maham

rate in different medium of corrosion coupons of different metals/alloy. The coupons are inserted in the loop line to check the corrosion rate in different aggressive electrolyte. In addition to measuring corrosion rate, the prototype can be used to check the performance of various type of inhibitors. The prototype may also be coupled with the Potentiostat to conduct the electrochemical testing. The effort of the students was greatly appreciated. As a next step the recommendation is that they should prepare descriptive and detailed presentation to be sent oil and gas producing company and offer to test efficiency of the inhibitor being used by them. Furthermore, study can be undertaken to check the behavior of coolant on aluminum radiator.

Third group led by Usman-ul-Hassan Pirzada and group member Moazzam Ahmad Chishti and Faseeh Ali. The group fabricated remote monitoring device through which the potential of the pipe to soil can easily be measured by using the GPRS system. This prototype was fabricated in house and considerable efforts was made in making the remote monitoring unit. Thanks to Engr.



(Left to Right) Usman-ul-Hassan Pirzada, Moazzam Ahmad Chishti and Faseeh Ali

Farrukh Farid (Research Engineer in Chair on Gas Engineering Research Project) for his guidance and input to encourage the group to work devotedly on that project. During the exhibition, the corrosion professionals and project evaluators showed interest in the prototype and a leading CP contractor expressed his interest if further development work is undertaken.

Fourth project was related to the survey conducted by the group led by Muhammad Aqsan Naveed and group members are Munnam Farooq, Zain Ali, Bilal Ahmad and Talha Nawaz. The team conducted analysis of corrosion coupons by placing them in the vicinity of the sewerage



(Left to Right) Bilal Ahmad, Munnam Farooq, Zain Ali, Muhammad Aqsan Naveed and Talha Nawaz

manholes in different localities of Lahore. A small amount CO_2 , SO_2 and H_2S are released from the manholes in the atmosphere. These gases cause corrosion of the copper coupons and which effects the functioning of the copper containing electronics/electrical devices. The service provider companies appreciated the efforts of the students and expressed interest in having such type of survey conducted for their client as well.

Fifth group also fabricated the prototype for remote monitoring of the potential of the pipeline.



(Left to Right) Muhammad Ayub Alam, Abdullah Khan, Sabika Naveed and Sadia Majid

The group led by Sabika Naveed and the group members are Abdullah Khan, Sadia Majid and Muhammad Ayub Alam. The fabricated unit has a feature of measuring pipeline potential and location of the pipe. During exhibition, the SNGPL professional expressed interest in the project and advised additional feature should be incorporated like voltage and current controller etc. in the unit.

Sixth group fabricated Cathodic disbondment kit and conducted test on the epoxy coated steel substrate. The group led by Syed Muhammad Abdullah Gilani and group members are Furqan



(Left to Right) Muhammad Arbab Haseeb, Muhammad Usman, Furqan Asghar, and Syed Muhammad Abdullah Gilani
Asghar, Muhammad Usman and Muhammad Arbab Haseeb. They used the canal water as an electrolyte to check the integrity of the coating. During exhibition, the coating professional showed interest and made suggestions for the improvement to the existing testing setup.

Seventh group fabricated the welded coupon of stainless steel according to the standard (ASTM



(Left to Right) Tasawar Hussain, Arslan, Attiq-ur-Rehman and Faqeh ul Islam

G31) and conducted analysis of the coupon in the simulated cooling water environment. The project led by Attiq-ur-Rehman and the group members are Tasawar Hussain, Arslan and Faqeeh ul Islam. During exhibition, the evaluator and the industrial professionals showed interest and suggested to conduct the similar test on steel welded specimens etc. which are used in the industries.

Eighth group fabricated the extended copper-copper sulphate reference electrode. The project led by Muhammad Ali Ghous and the group members are Muzammil Habib, Ahmad Saud Bhatti



(Left to Right) Muzammil Habib, Ibrahim Shahid, Muhammad Ali Ghous and Ahmad Saud Bhatti

and Ibrahim Shahid. This extended reference electrode measures the pipe to soil potential and it's extended length help field engineer to easily perform their field survey.

Ninth group led by Iqra Falak Sher and the group members are Sibtain Ali Sajid, and Muhammad Ahmad Sajid. The group conducted Microbiological Influence Corrosion analysis,



(Left to Right) Muhammad Ahmad Sajid, Sibtain Ali Sajid and Iqra Falak Sher

the group prepared the MIC standard coupons from the 316L mesh and then immerse them in the pseudomonas inoculation for two weeks. The biofilms were removed from the coupons and the pitting which occurred on the surface of the coupons were analyzed and conducted. Microscopic analysis was performed to check that which phase of 316L is more susceptible to corrosion due to microorganism. The visiting corrosion professional appreciated the efforts and suggested that similar study needs to be conducted for Sulphate Reducing Bacteria (SRB) as the oil and gas companies face problem due to these bacteria.

Tenth group led by Muhammad Ammar and group members are Ali Khan and Muhammad Hanan. They analysed the erosion and corrosion on the steel sample. They conducted the erosion



(Left to Right) Muhammad Hanan, Ali Khan and Muhammad Ammar

and corrosion analysis according to ASTM G184 standard. The analysis was carried out at fixed rotational speed using different particle sizes of silica sand in aggressive saline environment of 3.5 wt.% NaCl. Severe damage on the steel substrate was observed due to erosion and corrosion which was further analyzed by stereomicroscopy. The visiting professional were impressed by the input of the students and suggested that in the next phase to conduct tests on different alloys/coatings which are wear resistant to find out extent of erosion/corrosion occurring on them.

Eleventh group led by Muhammad Umair Qureshi and group members are Muhammad Umar, Mubashir Ali and Hassan Ahmed. The group conducted the atmospheric corrosion due to SO₂



(Left to Right) Muhammad Umair Qureshi, Muhammad Umar, Mubashir Ali and Hassan Ahmed

deposition according to ASTM G91 standard. In the industrial zone, the steel corrosion was due to SO₂ gases which are produced during burning of the fuel. The group conducted SO₂ analysis in five different areas of Lahore.

Twelveth group led by Zain Waseem and group members are Muhammad Abdullah and Maryam Zahid, they selected the canal water as an electrolyte to check the integrity of the coating. The coating professional showed interest in the testing and made some suggestions.



(Left to Right) Zain Waseem, Muhammad Abdullah and Maryam Zahid

Thirteen group led by Moaqir Sultan and group members are Muhammad Adnan Raza, Maham Mehmood and Ali Raza. They fabricated a hydrogen evolution kit and measure the amount of



(Left to Right) Ali Raza, Muhammad Adnan Raza, Moaqir Sultan, Maham Mehmood

hydrogen evolved during the test. This is a crucial test to determine the efficiency of the sacrificial anodes used in the cathodic protection system.

Fourteen group lead by Muhammad Usama Butt and group members are Tayyab Hussain, Shahood Moeed and Hamza Ahmed.

The chief guest was Ahmad Jawad Khan, General Manager (Corrosion), Sui Northern Pipelines Limited (SNGPL). He very keenly checked all the projects, expressed interest and made comments for further improvements. Ahmad Jawad Khan was impressed by the efforts made by the IMME and faculty in holding such an exhibition. In particular, he praised the effort by Ameerq Farooq, Lecturer, IMME and Secretary AMPP Pakistan Chapter. He stressed the importance of the OEL should be an annual event as it prepares students to meet the future challenges.

Ahmad Jawad Khan, Prof. Dr. Mohsin Ali Raza and Shafqat Ali distributed the certificate among the participating students and organizing team. The student organizing team led by Muhammad Haris Qureshi and other are Talha Khan, Mirza Haris Aslam, Suhaib Ahmad and Muhammad Muneeb Sajid.

In closing ceremony Prof. Dr. Mohsin Ali Raza thanked Ahmad Jawad (chief guest) for making time to visit the exhibition and encourage the students. He also thanked Shafqat Ali Chair AMPP Pakistan Chapter for his support and managing the exhibition. He deeply appreciated the efforts of Ameer Farooq for converting an open ended lab into exhibition.

Dr. Mohsin Ali Raza and Shafqat Ali presented the shields to the Chief Guest Ahmad Jawad Khan and sponsors of the exhibition, Mr. Fiaz Ahmed Laghari on behalf of Inspectest (Pvt.) Ltd. and to Mohsin Abbas and Muhammad Jahangir on the behalf of MAS associates (Pvt.) Ltd.



(Left to Right) Muhammad Haris Qureshi, Talha Khan, Mirza Haris Aslam, Suhaib Ahmad



Shields presented to Chief Guest and Sponsor of the exhibition



Exhibition Group Photo