

Chhotubhai Gopalbhai Patel Institute of Technology

Department of Chemical Engineering

A report of GUJCOST sponsored Two-day Workshop
on
‘Design of Experiment and Artificial Neural Network’

Title	Design of Experiment and Artificial Neural Network	
Organizer	Department of Chemical Engineering, CGPIT	
Sponsoring Agency	GUJCOST	
Organizing Committee	Mr. Shrinivas Mundkar Mr. Manu Saji Samuel Ms. Parvathy S Chandran	
Institute	CGPIT, UTU	
Date & Venue	12-13 March, 2020; Jatin Desai Auditorium, CGPIT	
Speakers	Day 1	Dr. Rajkumar Patil – Director, CGPIT Dr. M. S. Rao – Professor and Head, Chemical Engineering Department, Dharmsinh Desai University, Nadiad
	Day 2	Dr. Harshit Dave – Associate Professor, Mechanical Engineering Department, SVNIT, Surat. Dr. Meghal Desai – Associate Professor, Chemical Engineering Department, SVNIT, Surat.

Details of workshop:

The objective behind organizing the workshop was to impart the concepts of Design of Experiment and Artificial Neural Network which are strong statistical data analyzing tools used in research, as well as to provide hands-on training on them using some available software. Design of Experiments (DOE) is a majorly used statistical tool for various types of system, process and product design, development and

optimization. It finds its application in areas such as design for comparison, variable screening, transfer function identification, optimization and robust design. DOE basically deals with planning, performing and analyzing the experiments to find a factor which can control the value of a group of parameters. DOE simply helps in carrying out the experiment in well planned manner and to analyze the effect on a response variable due to one or more parameters which in turn helps the designers to fix or eliminate the potential threats hindering the high yield process. Taguchi method basically focuses on the sensitivity of response variables to control parameters with an intention to optimize the value of control parameters. They are mainly known for their application in optimization of process parameters. Artificial Neural Network (ANN) is a computational model based on the structure and functions of biological neural networks which consist of several processing elements which can operate in parallel to achieve, store and use experimental knowledge. ANN is also considered as a nonlinear statistical data modeling tool used for modeling or finding the relationship between the inputs and outputs in a much simpler way. There were 105 participants (UG students, faculties and research scholars) in the workshop and total 6 sessions were conducted which included 4 lecture and 2 hands-on sessions.

Day 1

First day of the workshop was started with an inaugural session immediately followed by a lecture session on ‘Design of Experiment using RSM approach’ by Dr. Rajkumar Patil, Director of CGPIT. He gave an introductory speech on DOE, its relevance in research and various methods available for statistical analysis of data such as Taguchi method, Response Surface Method (RSM), etc. Further, he explained all the aspects of designing a process using RSM in detail with the help of case study. He briefly showed how to analyze data using Analysis of Variance method and find out their influence on the results.

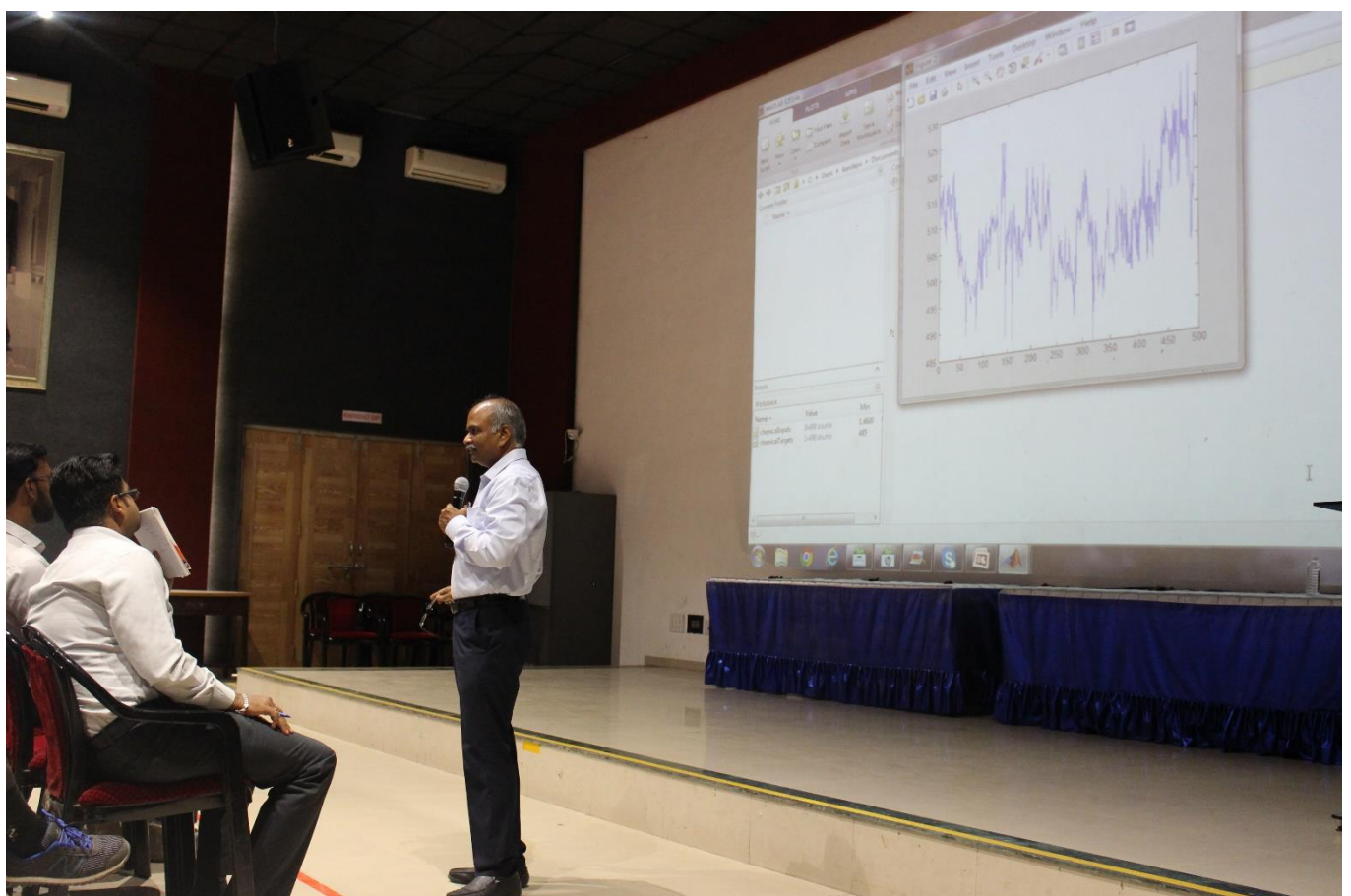
The second session was on ‘Artificial Neural Network’ by Dr. M. S. Rao, Professor and Head, Chemical Engineering Department, Dharmsinh Desai University, Nadiad. He started with basics of system modelling and categorization of models. Later on, he explained Artificial Neural Network (ANN) in depth using case study. Methodology adopted in ANN for system or process modelling was demonstrated step by step.

Third session of the workshop was a hands-on training of ANN using MATLAB and was conducted by Dr. M. S. Rao. He trained the participants for generating neural networks using suitable commands and prediction of required response. Day 1 was concluded with felicitation of the speaker and feedback from some participants.











Day 2

Second day of the workshop was started with a lecture session on 'Taguchi Robust Design' by Dr. Harshit Dave, Associate Professor, Mechanical Engineering Department, SVNIT, Surat. Initially he briefed about robustness of system, Taguchi method, its prerequisites and applications, further discussed the steps involved in Taguchi based design one by one with live examples and case study. The session was a quite interactive one and definitely informative too.

Second session of the day was taken by Dr. Meghal Desai, Associate Professor, Chemical Engineering Department, SVNIT, Surat, on 'Optimization of process parameters using Taguchi method'. He demonstrated how Taguchi method is used in designing a process and obtaining optimized conditions through case study, along with its advantages as well as limitations. He also presented a comparative study of Taguchi approach and RSM along with their application. Later on, he discussed about qualitative as well as qualitative analysis of input parameters for their influence on desired response.

Last session was a hands-on training on Taguchi method using MINITAB software, which was taken by Dr. Meghal Desai. He trained the participants to analyze data to obtain required number of experiments to be carried out to obtain a specific output and effect of each input parameters on it using the software. Also, he explained how to interpret the obtained data.

A valedictory function was arranged soon after the completion of the hands-on session along with participants' feedback. The workshop was a grand success with nice presentations, interactions and hands-on training.









