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GLOBAL INITIATIVE OF ACADEMIC NETWORKS



Government of India  
Ministry of Human Resource  
Development

**One Week GIAN Course on  
"QUALITY CONTROL FOR PRODUCTS, PROCESSES, OR  
SERVICES"**

**from 22-27 July, 2019**

**Course Code:176021L01**

*Sponsored by*  
**Ministry of Human Resource Development (MHRD)**  
under  
**the scheme Global Initiative for Academic Network (GIAN)**



**Organised by:**

Department of Mechanical Engineering  
University Institute of Engineering & Technology  
Maharshi Dayanand University  
Rohtak-124001 Haryana INDIA

# QUALITY CONTROL FOR PRODUCTS, PROCESSES, OR SERVICES

22-27 July, 2019

## 1. Overview

The twenty first century has created tremendous opportunities for the Indian market ó be it in manufacturing or in services. With the promotion of the concept of 'Make in India', there exists the opportunity for all industries, small, medium or large, to participate in this venture. However, such opportunities also bring forth some challenges. The current environment is one that is competitive in nature. Further, the product that is manufactured or the service that is delivered must meet or exceed the needs of the customer. Such requirements impose some quite stringent demands on the organization that is either making the product or is providing the service. In a nutshell, the product or delivered service must not only be at a *competitive price* but also meet the *high standards of quality*. The aim of the proposed course will attempt to address these issues with a focus on striving to *improve quality* within feasible constraints.

Having validated the importance of quality in products, processes, or services, a road map is necessary for accomplishment of the same. Thus, for an organization, it is important to devise a systematic process, that can be adopted, to meet or exceed customer requirements. At the upper echelon of the organization, mission and strategic plans are necessary, while at the mid-management or operational level, particular processes and steps are required to meet the desired quality level.

This program will deal with the operational level decisions and the tools and techniques available to monitor a process, either manufacturing or service, such that *quality* remains at the forefront. The theme of 'Do it right the first time' has to be emphasized. Hence, if some changes take place in the process, there must be some techniques that one could utilize to identify the change and take remedial actions as quickly as possible. This is the essential theme of 'Quality Control'. Therefore, the goal of this course will be to expose the participants to the various methodological techniques of *statistical quality control* (SQC). Often times, such techniques are also classified under *statistical process control* (SPC).

In general, processes are used to create products and/or deliver services. So, the objective will be to study, identify, and discuss applicable tools in SPC, as dictated by the parameter of interest that is to be controlled. For example, this could be the tensile strength of a beam, the diameter of a part, or the delivery time of a finished product. Initially, some guidelines will be discussed in selecting the quality characteristics of interest. Thereupon, the statistical theory behind the construction of control charts will be exposed. Utilizing this theory, two classes of control charts will be presented ó one for variables and the other for attributes.

Bringing a process to a state-of-control through remedial actions will be discussed. Finally, a measure of the performance of the process, once it is in a state of control, will be presented. In this context, several measures of process capability analysis will be introduced.

Throughout the course, the fundamental statistical concepts and techniques will be supplemented by applications and case studies, as available. Statistical software entitled Minitab will also be introduced and demonstrated.

## 2. Objectives

The primary objectives of the course are as follows:

- i) Exposing participants to the fundamentals of statistical process control through control charts.
- ii) Building in confidence and capability amongst the participants to be able to use control chart techniques to monitor their respective processes.
- iii) Providing exposure to practical problems and their solutions, through case studies and live projects in the field of quality control.
- iv) Enhancing the capability of the participants to identify, control, and remove quality-related problems and propose remedial solutions.
- v) Reduce the gap between demand and supply of technically-trained manpower in the field of quality.

### 3. Course details

The main topics that will be covered are as follows:

1. The importance and role of quality in a dynamic and competitive environment.
2. Challenges in manufacturing and service organizations in quality-related issues.
3. Statistical process control using control charts.
4. Control charts for variables.
5. Control charts for attributes.
6. Process capability analysis.

**4.1 Duration:** July 22 ó 27, July 2019 (6 days) : 12 hrs lectures and 8 hrs Tutorials

#### 4.2 Schedule

##### Day – 1 ( 22 July, 2019)

Lecture 1: 1 hrs: 10:00 ó 11: 00 AM

Challenges in manufacturing and service organizations in quality-related issues

Lecture 2: 1 hrs: 11:30 AM ó 12:30 PM

Quality Management System and its importance

Lecture 3: 1 hrs: 2:00 to 3:00 PM

Importance of quality in a dynamic and competitive environment

Lecture 4: 1 hrs: 3:30 PM to 4:30 PM

Statistical measures of process location and process variation, causes of variation, special causes and common causes

##### Day – 2 ( 23 July, 2019)

Lecture 5: 1 hrs: 10:00 ó 11: 00 AM

Continuous Quality Improvement in Manufacturing

Lecture 6: 1 hrs: 11:30 AM ó 12:30 PM

Statistical basis for control charts, selection of control limits, making inferences from control charts, Type I and Type II errors

Tutorial 1: 2 hrs: 2:30 PM to 4:30 PM

Identification of variables that are to be monitored via control charts, sample problem solving session

##### Day – 3 ( 24 July, 2019)

Lecture 7: 1 hrs: 10:00 ó 11: 00 AM

Preliminary decisions in construction of control charts, selection of rational samples and sample size

Lecture 8: 1 hrs: 11:30 AM ó 12:30 PM

Control charts for variables, control chart for the mean and range, control chart for individuals and moving range

Tutorial 2: 2 hrs: 2:30 PM to 4:30 PM

Problem solving session using control chart for mean and range and control chart for individuals and moving range, discussion of a case study as appropriate

##### Day – 4 ( 25 July, 2019)

Lecture 9: 1 hrs: 10:00 ó 11: 00 AM

Control charts for attributes, advantages and disadvantages of attribute charts, control chart for proportion nonconforming

Lecture 10: 1 hrs: 11:30 AM ó 12:30 PM

Control chart for number nonconforming, control chart for number of nonconformities control chart for number of nonconformities per unit

Tutorial 3: 2 hrs: 2:30 PM to 4:30 PM

Problem solving session using control charts for attributes, discussion of a case study as appropriate

### **Day – 5 ( 26 July, 2019)**

Lecture 11: 1 hrs: 10:00 ó 11: 00 AM

Process capability analysis, specification limits and control limits, natural tolerance limits, specifications and process capability

Lecture 12: 1 hrs: 11:30 AM ó 12:30 PM

Process capability indices, upper and lower capability indices, comparison of capability indices, benchmarking a process

Tutorial 4: 2 hrs: 2:30 PM to 4:30 PM

Problem solving session calculating various process capability indices given data from a process, discussion of a case study as appropriate

### **Date of Examination: ( 27 July, 2019)**

#### **5. Who can attend?**

- Executives, Engineers, Scientists and Researchers from Manufacturing and Service Industries and government organizations including R&D laboratories.
- Faculty members from Academic Institutions and Universities.
- Student/Research Scholars at all levels (BTech/MSc/MTech/PhD)

#### **6. Fee Structure (The fees for attending the Course (*other than one time (Non-Refundable)*)**

##### ***GIAN Course Registration fees INR 500/-):***

Participants from Countries other than INDIA : USD 200

Industry Participants : INR 5000

Faculty : INR 3000

Students/Research Scholars : INR 1000 (UR/OBC); INR 500 (SC/ST)

*The participation fee includes instructional lecture materials, computer use for tutorials and assignments and 24-hr internet facility. The participants will be provided with accommodation on payment and prior request basis.*

**7. Maximum Number of seats:** Number of participants for the course will be limited to fifty (50).

## **How to Apply**

**Registration Process:** Registration for GIAN courses is not automatic because of the constraints on maximum number of participants allowed to register for a course. In order to register for one or multiple non-overlapping courses, you have to apply online using the following steps:

1. Create login and password at <http://www.gian.iitkgp.ac.in/GREGN/index>
2. Login and complete the registration form.
3. Select courses
4. Confirm your application and payment information.
5. Pay INR 500 (non-refundable) through online payment gateway. INR 500 ( Non-Refundable)

The course coordinators of the selected course will go through the submitted application and will confirm the selection as a participant . After shortlisting and selection, the participant(s) have to pay the required registration fees within a stipulated time. The Bank and other details for the payment and course registration will be send to the shortlisted participants through an E-mail.



## Foreign Faculty



**Dr. Amit Mitra** is a Professor of Quality and Business Analytics in the Harbert College of Business in the Department of Systems and Technology at Auburn University (USA). He is a former Associate Dean of the College of Business at Auburn University. His research interests are in the areas of quality assurance, statistical process control, regression analysis, warranty analysis, applied statistics, and multi-criteria modeling. Dr. Mitra has published numerous articles, some of which have appeared in journals such as Management Science, Decision Sciences, Journal of the American Statistical Association, International Journal of Production Research, Journal of the Operational Research Society, American Journal of Mathematical and Management Sciences, European Journal of Operational Research, IEEE Transactions on Engineering Management, Computers and Operations Research, Naval Research Logistics, MIS Quarterly, IEEE Transactions on Reliability, Quality Engineering, and International Journal of Quality and Reliability Management. Dr. Mitra is also the author of the book titled, Fundamentals of Quality Control and Improvement, Fourth Edition, John Wiley & Sons, Hoboken, New Jersey, 2016, which is used both nationally and internationally. He has conducted short courses for professionals in Six Sigma Black Belt certification, Certified Quality Engineer (CQE), Total Quality Management, Quality Assurance, Statistical Process Control, and Design of Experiments, and has also assisted with implementation of statistical process control in industries. Dr. Mitra is listed in several national and international biographical listing, among which are: Who's Who in the South and Southwest, Personalities of America, Men of Achievement, Who's Who of Emerging Leaders in America, and Who's Who in American Education.

## Course Coordinator



**Dr. Ashwani Kumar Dhingra** is presently working as Associate Professor with the Department of Mechanical Engineering, University Institute of Engineering and Technology at Maharshi Dayanand University Rohtak. He awarded with Doctorate Degree from National Institute of Technology (NIT) Kurukshetra Haryana, India in 2011 and Master's Degree in Mechanical Engineering from Panjab Engineering College Chandigarh in 2004. He has authored more than fifty research papers in reputed International journals including SCI and SCOPUS Indexed, presented number of papers, delivered Talks as a Keynote/Plenary Speaker and Chaired number of

Technical Session(s) at the International Conferences in INDIA and ABROAD. He has also been the Visiting Researcher in the field of Micro-Machining at Indian Institute of Technology Kanpur. He has also been Awarded with International Travel Support/Grant twice under young Scientist by Department of Science & Technology for presentation of Research paper(s) in an International Conferences ABROAD. He is having more than 15 years of teaching/Research Experience and guided number of PhD and M.Tech dissertation(s) in the area of Production and Industrial Engineering and others. His research interests include Sequencing and Scheduling, Metaheuristics and Optimisation methods, Lean Manufacturing, Modern Machining Methods, Biofuels etc.

## Course Co-Coordinator



**Dr. Deepak Chhabra** is presently working as an Assistant Professor (Senior) with the Department of Mechanical Engineering, University Institute of Engineering and Technology at Maharshi Dayanand University Rohtak. He obtained his Doctorate Degree from National Institute of Technology (NIT) Kurukshetra Haryana, India and Master's Degree in Mechanical Engineering from Maharshi Dayanand University. He has authored more than thirty research papers in international/national journals/book chapter (Elsevier) and visited number of countries for the International conferences. He is having more than 14 years of teaching Experience and guided number of PhD and M.Tech dissertation in the area

of Computer Aided Design/ Manufacturing (CAD/CAM), optimisation and Mechatronics. His research interests include Active Vibration Control, 3D Printing, Mechanobiology etc.

## Contact Details:

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### Local GIAN Coordinator:

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