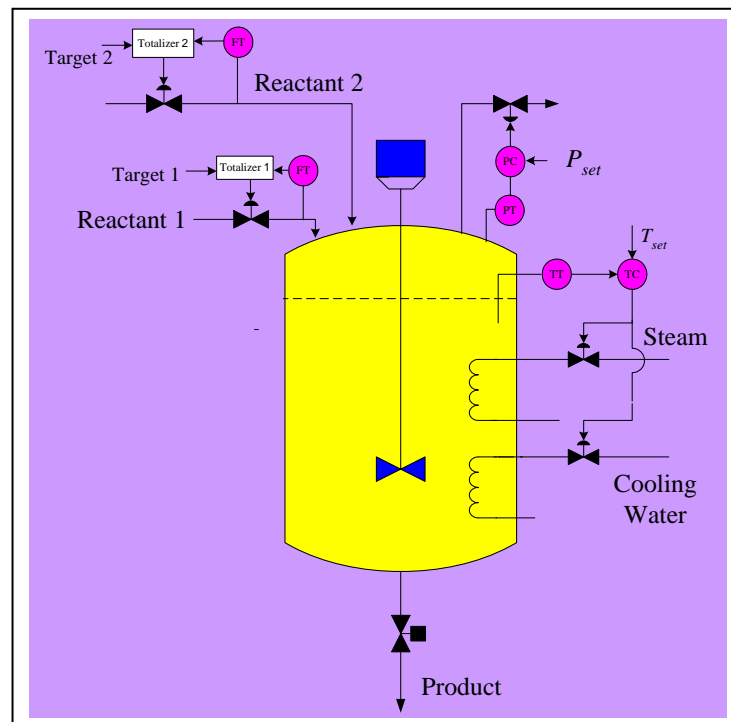




Process Control in the Chemical Industries

9-13/3/2002
25-29/12/1422



Chemical Engineering Department
King Saud University

INTRODUCTION

The last two decades have seen unprecedented developments in the field of process control, touching both the theoretical and implementation sides of the field. These developments were greatly helped by the explosion in computer power making possible the implementation of the most complex control algorithms. Computers have also become an integral part in the hardware implementation of modern control strategies. As result of these developments, chemical and petrochemical industries in the kingdom and around the world have realized the potential benefits of modernizing their control systems. The direct benefits range from substantial increase in process productivity through savings in energy and raw materials, better control on products quality and in many cases a better compliance with regulations dealing with emissions.

Besides direct material benefit, the modernization of control systems offers better management of operation, provide more safety for the equipment, better handling of the often-complex interactions between conflicting control loops and possibilities for optimization.

The proposed workshop addresses the different aspects of process control both the classical and the modern ones. Through a series of lectures and printed notes both the theoretical aspects and real case computer applications will be presented side by side. The workshop will also present the different steps in the design and analysis of control systems.

In the first part, this will include model building either theoretically, or through identification, simulated applications on some commercial software, the quantification of loop interactions and the selection of adequate control structure. In the second part, the classical PID feedback control, feed-forward, inferential and cascade control will be presented. Subsequent lectures will present the advanced control schemes by viewing the theoretical or practical ideas behind them with the focus on model predictive control strategies and internal model control as well as the practical implementation through DCS systems. The workshop will also tackle the economic aspects through the evaluation of potential benefits of modernizing the control schemes.

Lectures Schedule

First day (25/12/1422):

08:00-08:30 Registration and Inauguration
08:30-09:30 Introduction to Process Control
09:30-09:45 Break & Refreshment
09:45-12:00 Modeling and Simulations
12:00-01:00 Prayer and Lunch
01:00-02:30 Identification and Parametric Estimation

Second day (26/12/1422):

08:30-10:00 Control System Design
10:00-10:15 Break & Refreshment
10:15-12:00 Feedback Control
12:00-01:00 Prayer and Lunch
01:00-02:30 Computer Applications

Third day (27/12/1422):

08:30-10:00 Improvements of Feedback Control
10:00-10:15 Break & Refreshment
10:15-12:00 Computer Applications
12:00-01:00 Prayer and Lunch
01:00-02:30 Computer Applications

Fourth day (28/12/1422):

08:30-10:00 Introduction to Advanced Process Control
10:00-10:15 Break & Refreshment
10:15-12:00 Model Predictive Control
12:00-01:00 Prayer and Lunch
01:00-02:30 Computer Applications

Fifth day (29/12/1422):

08:30-10:00 DCS Systems
10:00-10:15 Break & Refreshment
10:15-12:00 Assessing the Benefits of Advanced Control
12:00-01:00 Prayer and Lunch
01:00-02:00 Computer Applications
02:00-03:00 Discussion

Lecturers

- 1. Dr. M. A. Suliman:** Professor of Chemical Engineering at King Saud University. He Holds a Ph.D. in chemical engineering from University of Waterloo, Canada (1971). Carried out research in modeling, simulation, control and optimization of chemical industries as well as catalysts, reactor design, desalination, polymerization and energy conservation. Participated in several projects with SABIC and KACST.
- 2. Dr. Emadadeen M. Ali:** Associate professor of Chemical Engineering at King Saud University. He Holds a Ph.D. in chemical engineering from the University of Maryland, USA (1996). His major research interests are in process identification, simulation and control. He has practical experience through working as a consultant at SABIC R & T to develop advanced process control systems. He is also involved in research projects with KACST.
- 3. Dr. Khalid I. Alhumaizi:** Associate professor of Chemical Engineering at King Saud University. He received the Ph.D. degree in chemical engineering from the University of Minnesota- USA (1994). He is the author or co-author of several papers that reflects his research interests in application of non-linear system tools and process control techniques to various reaction systems. His research interests include the development of mathematical models to simulate chemical systems. He is also involved in research projects with SABIC and KACST.
- 4. Dr. AbdulHameed M. Ajbar:** Associate professor of Chemical Engineering at King Saud University. He Holds a Ph.D. from Notre dame University, USA (1994) in chemical engineering. He has many published papers in the application of advanced control in chemical processes. He participated in the advanced control and monitoring of distillation columns at Westhollow research center with Shell Oil Company in Huston, USA. He is also involved in research projects with KACST.