

The 8th IWC TQM CONFERENCE WORKSHOP PROGRAM

1st June, 2015 / Monday	<i>Place: Mechanical Engineering Faculty, str. Kraljice Marije 16, Belgrade</i>
---	---

16:00 – 18:00

Registration on reception desk (first floor – hall CeNT) in Mechanical Engineering Faculty, str. Kraljice Marije 16, Belgrade.

19.00 – Mechanical Engineering Faculty – Hall CeNT (first floor - str. Kraljice Marije 16, Belgrade).

TQM 2015 / Session1 - Workshop 1 / Round Table Discussion 1: Chairman – Prof. Dr. S. Karapetrovic, University of Alberta, Department of Mechanical Engineering, Edmonton, Canada.

Topics:

1. Critical Incident Technique, Jacqueline A. Douglas, Liverpool John Moores University, UK.

2. Overview of the Industry-University Cooperative Research Center (I-UCRC) on Intelligent Maintenance Systems at the University of Texas at Austin, Prof. Dragan Djurdjanovic, Dept. of Mechanical Engineering, University of Texas at Austin, USA.

3. Writing for Publication in Journal from SCI lists, Prof. Dr. Alexander Douglas, Editor The TQM Journal, Emerald Group Publishing Ltd, Howard House, Wagon Lane, Bingley, BD16 1WA, UK.

(Note: Please ask, as soon as possible jusk@eunet.rs for detailed information. Number of participants are limited).

20:30

Welcome Cocktail - Club CeNT (first level), Mechanical Engineering Faculty, Belgrade.

Sponsored by Abela Pharm d.o.o., Belgrade, Serbia – Cockatil party.

1. Critical Incident Technique Seminar Jacqueline Douglas

Tentative Agenda:

Introduction

2. Sample CIT Study

- illustrative example of how the method fits into a research stream

Using CIT in HE

3. Overview of the CIT method

- high-level overview of Flanagan's (1954) article
- discussion of how it has been used in service research (based on Gremler 2004), including:
 - application of the CIT Method
 - strengths of the method
 - shortcomings of the approach
 - when should it be used

4. Illustrative CIT studies

- illustrations/discussion of studies that have employed CIT well
- participant article reports (on pre-assigned readings):
 - Problem Definition
 - Study Design
 - Data Collection
 - Data Analysis & Interpretation
 - Results

5. Analyzing CIT data

- discussion of Bitner studies:
Bitner, Booms, and Tetreault (1990); Bitner Booms, and Mohr (1994)
- hands-on analysis and coding of sample CIT data using Bitner, Booms, and Tetreault (1990) coding scheme

6. Designing a CIT study

- problem definition
- study design
- data collection
- data analysis and interpretation
- reporting results

7. Collection of CIT data

- design of CIT instrument
- "hands on" data collection of CIT data

8. Debriefing

- discuss analysis strategies of newly collected CIT data
- lessons learned from data collection experiences.

2. Overview of the Industry-University Cooperative Research Center (I-UCRC) on Intelligent Maintenance Systems at the University of Texas at Austin

By Prof. Dragan Djurdjanovic

Dept. of Mechanical Engineering, University of Texas at Austin

dragand@me.utexas.edu

The I-UCRC program at the U.S. National Science Foundation (NSF) aims to bridge the chasm between industries and universities by cosponsoring applied research in selected areas. There are about 50 such centers across the USA, with various research foci (nanotechnology, wireless communications, service logistics, maintenance) and NSF recently granted the University of Texas at Austin an opportunity to pursue such a center in the area of intelligent maintenance. Each I-UCRC is a multi-campus entity, as is the I-UCRC on Intelligent Maintenance Systems (IMS Center), which operates at the University of Cincinnati (lead institution led by Prof. Jay Lee), University of Michigan (led by Prof. Jun Ni), Missouri University of Science and Technology (led by Prof. Jaganathan Sarangapani) and University of Texas at Austin (led by Prof. Dragan Djurdjanovic). Each campus brings its own flavor and expertise to the IMS Center, with UT expertise being in semiconductor manufacturing, energy (oil, gas, windmills) and biomedical engineering (preventive monitoring of human body systems).

The purpose of this workshop is to present an overview of the research taking place at the University of Texas at Austin site of the IMS Center. The US economy spends more than \$1 trillion for maintenance of critical assets, with more than 33% of these costs being wasted on ineffective maintenance (unnecessary repairs, repairs of wrong components, lack of spare parts, etc.). Dr. Djurdjanovic's team in Austin pursues further understanding of generic methods addressing the scientific and practical challenges to remedy these problems. More specifically, the team addresses the following opportunities to further advance maintenance operations:

- **Explorations of new approaches to diagnostics and prognostics in complex engineering systems:** Modern engineering systems, such as semiconductor manufacturing tools, hybrid automotive engines or large energy systems are becoming increasingly complex. In those systems traditional condition monitoring and prediction methods based on characterizing past events of known faults often fail because every faulty situation observed on the system is new – unprecedented. The University of Texas team explores new diagnostic and prognostic methods for faults for which models do not exist *a priori*.
- **Utilization of advanced diagnostics and predictive maintenance methods for monitoring of systems in a human body:** There is a great opportunity to utilize advances in machine diagnostics and prognostics for predictive monitoring of various systems of a human body. Dr. Djurdjanovic's work in the area of diagnostics and fatigue monitoring of human neuro-musculo-skeletal systems is a starting point towards realization of this natural link between predictive maintenance research and medicine.

- **Maintenance decision-making in distributed systems, with limited availability of distributed maintenance resources and uncertain supply and demand characteristics:** Predictive maintenance decision-making in highly distributed systems, where spatial considerations must be made when maintenance is scheduled (wind parks, oil rigs, offshore platforms, fleets of vehicles) and in the presence of fluctuations in supply and demand is significantly underexplored. These challenges are of particular importance to the energy industry in Texas and are explored by Dr. Djurdjanovic's group.

The aforementioned research activities are conducted through the following projects: 1-Information-Theoretical Approaches to Condition-Monitoring Using Physics Driven Models; 2-Operating Regime Dependent Condition Monitoring and Prediction; 3-Immunity Inspired Approaches to Condition-Monitoring; 4-Integrated Condition Monitoring and Process Control in Semiconductor Manufacturing Equipment 5-Predictive Maintenance Paradigms in Biomedicine; 6-Maintenance Logistics and Operations. Since 2013, when the IMS Center at the University of Texas started, these projects are or have been supported by numerous companies, including Samsung, Texas Instruments, Intel, Taiwan Semiconductor Manufacturing Corporation, Lam Research, National Instruments, Canrig Drilling Inc., and others.

The workshop will give an overview of key activities, achievements, findings and plans for future work that have emanated from University of Texas activities in the IMS Center. In addition, the key traits of I-UCRC operation mechanism will be described and possibilities for collaboration will be outlined.