MIRCE Akademy

20th Industrial Summer School
22 – 26 June 2009
Woodbury Park
Exeter
United Kingdom

Mirce Mechanics for Functionability Engineering and Management

Do you need answers?

◼ **What will the operational reliability be?**
◼ **What will the system availability be?**
◼ **What will be the expected whole life costs?**
◼ **How many and what types of failures will occur?**
◼ **Which spares should be ordered, when and how many?**
◼ **What will be the time maintenance?**
◼ **What will be the expected cost of maintenance?**
◼ **What will be the time in support?**
◼ **What will be the expected cost of support?**
◼ **......**

Register now

☎ **+44 (0) 1395 233 856**
🖷 **+44 (0) 1395 233 899**
🖳 **quest@mirceakademy.com**
🖳 **www.mirceakademy.com**

Basic questions

What is it for?

The purpose of the Summer School is to introduce participants to Mirce Mechanics and how its methods can be applied to improve operational effectiveness, operating revenues and reduce whole life costs.

What is Mirce Mechanics?

Mirce Mechanics is the body of knowledge that scientifically deals with system performance in terms of functionability that is typically defined in the following manner –

■ Every scheduled flight will leave on time with the probability of at least 0.97 (no more than three delays on average out of 100 flights)

■ The direct maintenance cost will not exceed 25% of the acquisition cost with a probability of 0.95

■ The probability that the production line will be fully operational during a specified in-service time will not be less than 0.88

■ At least 90% of systems in a fleet will be operational at all times with a probability not less than 0.925

■ The mission reliability will be greater than 0.98 for missions shorter than 500 hours

■ There should be less than 5 failures among 100,000 systems during the first 10 years of service

Mirce Mechanics predicts the functionability trajectories of system alternatives over different time horizons at a time when changes can be effectively applied.

This data can be used to identify the system configuration and in-service policies from alternatives that will maximise the system functionability performance at least cost.

Who is it for?

The Summer School has been devised for Functionability Engineers and Managers.

It will be of interest to a worldwide audience from industry, government, academic and research organisations.

Who are Functionability Engineers and Managers?

■ Systems Engineers and Managers focus primarily on the design and delivery of system functionality at entry into service.

■ Functionability Engineers and Managers focus on the design, delivery and sustainment of system functionality through the whole life.

Why attend?

Participants will –

■ Gain an appreciation of the power and place of Mirce Mechanics based prediction methods in support of engineering design and in-service management decision-making processes.

■ Understand the accuracy of predictions made by applying experimental, theoretical or computational methods, and the level of effort required.

■ Gain full understanding how to apply selected methods to a system of their choice to identify the best design alternative based on objective numerical values calculated for each.

■ Be able to order alternatives from the best to the worst and to numerically define the magnitude of the differences.

■ Learn how to use science to enhance their business opportunities.

Programme

Day One

Introduction to Mirce Mechanics

Aim: to introduce participants to the concept of the Mirce Mechanics and enable them to systematically address the complexity of the motion of functionability through the life of a system and to observe the physical causes and human actions that shape it

- System Functionability Concept (Definition, Laws, Rules, Case Study)
- System Functionability: Processes, Events, States, Trajectory
- System Functionability Drivers:

  - Physical Environment (Atoms, Molecules, Materials, Components)

  - Natural Environment (Solar System, Earth, Climate, Weather)

  - Human Environment (Physical, Cognitive, Cultural, Organisational)

Day Two

Experimental Mirce Mechanics

Aim: to enable participants to quantitatively determine the functionability trajectory through the life of a system, for an existing set of observed data, and to quantify some of the following system functionability performance measures:

- Observed Time To and Between Functionability Events
- Observed Number of Functionability Events
- Observed Direct Cost of Functionability process:
- Observed Time-dependent Throughput/Production Rate
- Observed Time-dependent Reliability
- Observed Time-dependent Availability

Each participant will calculate the above listed measures of the system functionability performance using the individually provided data.

EXCEL will be used as a "number crunching tool".

Participants are welcome to bring their own laptop computers to work with during the Summer School should they prefer.

Summer School Director

Dr Jezdimir Knezevic will lead the 20th Industrial Summer School.

Dr Knezevic has worked in the field of functionability engineering and management for over 30 years.

His multi-disciplinary theoretical knowledge, considerable hands-on practical experience and endless passion for the subject have attracted over 5000 engineers, managers and students to his courses and educational programmes in over 40 countries in Europe, North and South America, Asia, Australia and Africa, at universities, professional institutions, industry and government.

Dr Knezevic, the father of Mirce Mechanics, is the Founder and President of the MIRCE Akademy.

The Akademy is an independent research and educational institution established to enhance, disseminate, apply and recognise the knowledge of the Mirce Mechanics.

For more information on the work of the Mirce Akademy, please visit our website at –

www.mirceakademy.com

Day Three

Theoretical Mirce Mechanics

Aim: To enable participants to scientifically understand the experimentally observed functionability trajectory through the life of a system and to expose them to the Mirce Mechanics formulated law of that motion, which enables the functionability trajectory to be calculated for a future system of a given structure, under given in-service rules and conditions

Each participant will learn how to calculate the trajectory of the functionability for a given future system and will compare the results with the experimentally obtained data, used in the Day 2. Based on the calculated trajectory, participants will predict some of the following system functionability performance measures:

- Expected Time To and Between Functionability Events
- Expected Number of Functionability Events
- Expected Direct Cost of Functionability Events
- Expected Time-dependent Throughput
- Expected Time-dependent Reliability
- Expected Time-dependent Availability

EXCEL will be used as a "number crunching tool".

Day Four

Computational Mirce Mechanics

Aim: to expose participants to methods available for solving numerically non-solvable multi dimensional time dependent integral equations that define the trajectory of the motion of functionability through the life of a system. This is essential for the construction of models that accurately represent the observed reality of a system life, rather than to simplify system reality to cope with mathematical limitations.

The Monte Carlo method has proved very successful in Quantum Mechanics for finding practical solutions to multi-dimensional integral equations and will be introduced for predicting the motion of functionability trajectory through the life of a future system. Once, the functionability trajectory is calculated, for a given system and in-service rules and conditions, it becomes possible to predict summary measures of the following in-service characteristics of a system:

- Predicted Time To and Between Functionability Events
- Predicted Number of Functionability Events
- Predicted Direct Cost of Functionability Processes
- Predicted Time-dependent Throughput Parameters
- Predicted Time-dependent Reliability Measures
- Predicted Time-dependent Availability Measures

Each participant will learn how to predict the trajectory of the motion of functionability for a given future system, and will compare the results obtained with the experimentally observed data given in the Case Study and theoretical calculation, where possible.

EXCEL will be used as a "number crunching tool".

Day Five

Applied Mirce Mechanics

Aim: to provide opportunities to participants to apply the generic knowledge obtained thus far to:

- <u>Engineer in</u> the motion of functionability through the life of a system, which will deliver maximum performance with least possible investment.
- <u>Manage on</u> the motion of functionability through the life of a system, in the manner that will maximise economic and social benefit to the users, customers and society.

The above objectives are achievable by developing models for the prediction of the motion of functionability through the life of a future system, for a given configuration, in-service rules and conditions.

The final output is the calculation of the trajectory of functionability through time, which enables the prediction of the following measures of system in-service, reliability, cost and effectiveness to be made:

- What will the system availability be?
- What will the operational reliability be?
- What will the operational revenue be?
- What will be the expected cost of the operational system?
- How many maintenance tasks will be needed?
- How durable will the system be?
- How many and what types of failures will occur?
- When should the system be maintained?
- Which spares should be ordered, when and how many?
- What the total time in the maintenance state the system will be?
- What the total time in the support state the system will be?
- What the total time in the transport state the system will be?

The purpose of the analysis and, the culmination of the Summer School, is to determine the best solution of the future in cases where the optimisation criteria are, some of or the combination of, the following:

- **Maximum:**

  - Profit
  - Revenue
  - Time in Operation
  - In-service Reliability
  - In-Service Availability

- **Minimum:**

  - Number of Failures
  - Time out of Operation
  - Investment in resources
  - Whole Life Cost

Venue

Woodbury Park is a magnificent 500 acre leisure and sporting complex set among green rolling hills above the South West English coastline, only a few miles from the ancient city of Exeter.

Communication between Exeter and other parts of the United Kingdom are excellent. By road, the M5 motorway links Exeter to London, the Midlands, Scotland and Wales. Regular rapid coaches run services to and from London and Heathrow Airport. By rail, a regular fast service is available to and from Exeter (St David's Station) and London (Paddington Station). By air, Exeter Airport offers regular flights to many British and Continental destinations and is situated near to Woodbury Park. Travel between Exeter and Woodbury requires a car or taxi and takes about thirty minutes.

Among the outstanding leisure facilities at Woodbury Park are two golf courses including the magnificent Oaks Championship course, tennis courts, a swimming pool, spa, sauna and fully equipped gymnasium and well appointed lounge areas and bars.
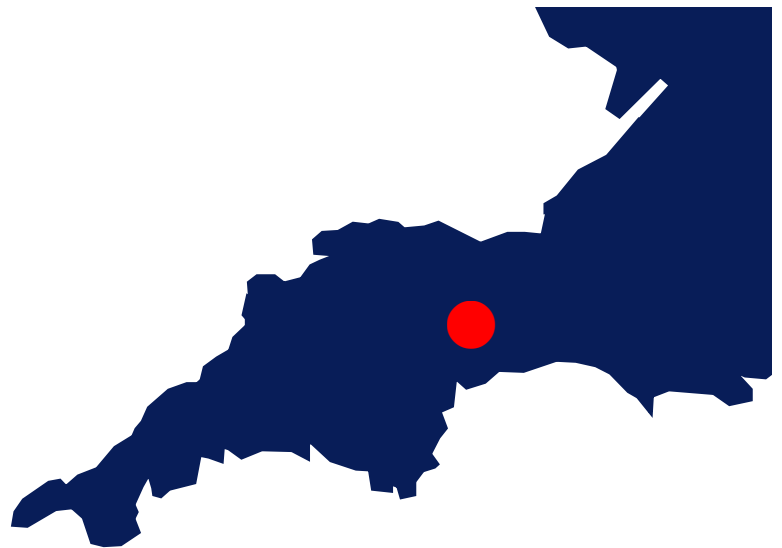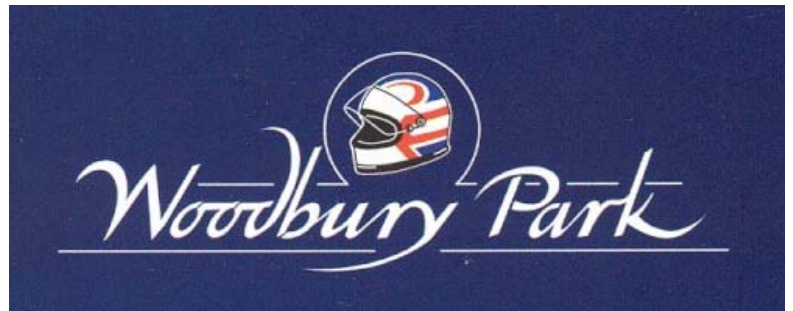
Woodbury Park is also home to the Nigel Mansell World of Racing that celebrates the remarkable career of one of the world's great champions. The exhibition includes Formula 1 racing cars, video coverage of many outstanding racing achievements, in addition to trophies and memorabilia, marking Nigel Mansell's world-wide successes in the '92 Formula 1 and '93 Indy World Championships.

Key Information

Price
(GB Pounds £)

Package	Fee	VAT	Total
Standard Participant	1295.00	194.25	1489.25
MIRCE Felllow	1250.00	187.50	1437.50
MIRCE Student	950.00	142.50	1092.50

The Price includes:

- Tuition
- Study Materials
- Lunches
- Light Refreshments
- Summer School Dinner
- Visit to the Nigel Mansell World of Racing

Group Discounts For Standard Participants

Groups of 3 or more booking at the same time from the same organisation will receive a 10% discount. For 5 or more there will be a 15% discount.

Location and Accommodation

The Congress will be held at **Woodbury Park Hotel, Golf and Country Club**, which is approximately eight miles from Exeter by road.

Participants are responsible for the arrangement and payment of their own travel and accommodation. Participants wishing to take advantage of preferential room rates should contact Woodbury Park Hotel Reservations quoting 'MIRCE'.

The contact details are:

Woodbury Park Hotel, Golf and Country Club, Woodbury, Exeter, EX5 1JJ, United Kingdom

Tel   +44 (0) 1395 233 382
Fax   +44 (0) 1395 233 384
Email   enquiries@woodburypark.co.uk
Web   www.woodburypark.co.uk

A list of alternative accommodation in other hotels and guesthouses in the vicinity is available from Mirce Akademy on request.

Travel

For travel details to Woodbury Park and a map visit our website at www.mirceakademy.com.

Messages

During the Summer School participants may be contacted by telephone on +44 (0) 1395 233 856 or by fax on +44 (0) 1395 233 899. Messages will be passed to participants during breaks.

Language

The Summer School language will be English.

Recommended Attire

Smart casual is recommended dress code for the Summer School and in the in the grounds of Woodbury Park.

No formal dress is required for the Summer School Dinner.

Smoking

Woodbury Park does not permit smoking in any of the leisure and sport complex facilities and in the hotel.

Mobile Phones

Out of consideration to speakers and the audience, mobile phones should be switched off during the formal sessions.

Further Information

- ☏ +44 (0) 1395 233 856
- 🖷 +44 (0) 1395 233 899
- 🖳 quest@mirceakademy.com
- 🖳 www.mirceakademy.com

Booking Form
Please photocopy for each additional participant

☎ **telephone**
+44 (0) 1395 233 856

📠 **fax**
+44 (0) 1395 233 899

💻 **email**
quest@mirceakademy.com

✉ **post**
Mirce Akademy
Woodbury Park
Woodbury
Exeter EX5 1JJ
United Kingdom

Terms and Conditions

Substitution of participants may be made at any time. If you intend to do this, please advise Mirce Akademy as soon as possible.

Cancellation of a booking must be received in writing by the organiser at least 14 days before the commencement of the event in order to receive a refund of payment. Mirce Akademy regrets that no refunds will be made after the deadline.

Mirce Akademy reserves the right to change the advertised programme or location or to cancel the event at its discretion. In the event of cancellation of the event by Mirce Akademy payments received at the cancellation date will be refunded. All places offered are subject to availability.

Mirce Akademy is not responsible for any loss or damage as a result of substitution, alteration or cancellation of the event.

Mirce Akademy is unable to accept liability for the loss of, or damage to, the belongings of those attending the event.

Participant Details

Surname	
First Name	
Position	
Department	
Organisation	
Address	
Zip/Post Code	Country
Telephone	Fax
Email	
Special Dietary Requirements	

I understand and accept the terms and conditions and payment as shown.

Signature	Date

Payment Method

☐ Cheque

I enclose a cheque for GB £   payable to Mirce Science Ltd.

☐ Bank Direct Transfer

Bank details (please quote Summer School on remittance advice): National Westminster Bank plc, Exeter Bank Branch, 59 High Street, Exeter, EX4 3DL, United Kingdom. Sort Code: 56 – 00 – 49 Account: MIRCE Science Limited Account No. 25189603 IBAN: GB07 NWBK 5600 4925 1896 03 BIC: NWBK GB 2L.

☐ Credit Card

Please debit my credit card	☐ Visa	☐ MasterCard	☐ Amex
Cardholder			
Card No.		Expiry Date	
Cardholder's Signature		Security Code	

☐ Invoice

Please invoice my organisation	
For the attention of	
Purchase Order No.	
Address (if different from above)	
Zip/Post Code	Country

Value Added Tax (VAT)

Unless special exemption arrangements exist, under UK Customs and Excise regulations participants from all countries are required to pay UK VAT @ 15% at the time of publication. Non-UK participants may be able to recover VAT incurred via the relevant tax authority in their country of origin.

MIRCE Akademy
Membership Scheme

The Membership of the Mirce Akademy is open to anyone with an interest and enthusiasm in the body of the knowledge of Mirce Mechanics.

For an annual membership fee of £99 (and a one off joining cost of £15) members will be able to enjoy the following privileges:

- Associate themselves with the Mirce Akademy, the birth place of Mirce Mechanics
- Work with the Akademy to undertake the research, dissemination and application of Mirce Mechanics based knowledge
- Meet and establish contacts with worldwide leading Scientists, Engineers and Managers
- Receive information about activities and services provided by the Akademy
- Enjoy access to the Mirce Akademy Resource Centre
- Benefit from the preferential rates for –
    - Communication Events: Summer/Winter schools, short courses, Symposia, Congresses and Technical Visits
    - Educational Programmes: Master Diploma Programme and Doctoral Diploma Programme
    - Products made and distributed by the Akademy: Reports, Books, Monographs
- Receive priority booking for all events organised by the Akademy
- Opportunity to publish technical papers, monographs and books in conjunction with the Akademy
- Participate in events organised by the Akademy, as keynote speakers, session chairmen, visiting professors, instructors and similar
- Free attendance of the Traditional MIRCE Akademy Annual Christmas Dinner
- Permission to use the designation Member of The Mirce Akademy, that my be abbreviated to MMAk

Application Details: http://www.mirceakademy.com/index.php?page=Membership

☎ +44 (0) 1395 232 653
🖨 +44 (0) 1395 233 899
💻 quest@mirceakademy.com
💻 www.mirceakademy.com