

19th Industrial Summer School

7 - 11 July 2008, Woodbury Park, Exeter, United Kingdom

MIRCE-Mechanics for Engineers and Managers

Engineers and Managers create 'what never was'. Hence, at every stage and every level in the machine life, they have to make a single choice decision. In the areas of designing for delivery of physical function(s) and performance a great deal of help could be obtained from the calculations and predictions made by applying the well-known laws of science. Hence, the knowledge discovered and formulated by Newton, Maxwell, Hook, Faraday, Kirchhoff and many other scientists is used daily by engineers and managers.

Extensive global competition increasingly demands from engineers and managers to create and support machines that will have to deliver, through their function(s) and performance, some of the following **customer's requirements or expectations**:

- Every scheduled flight will leave on time with a probability of 0.97 or in other words, it is acceptable to have three delays, on average, out of 100 flights
- The direct maintenance cost will not exceed 25 % of the purchase cost with a probability of 0.99.
- The probability that the production line will be fully operational during the specified in-service time will be not less than 0.88.
- In the fleet of machines, at least 90% of them will be operational at all times with a probability not less than 0.925.
- The mission reliability will be greater than 0.98 for the missions shorter than 500 hours
- There should be less than 1 in 100,000 chance that machine will fail during first 10 years of service

However, there is a problem here. There are no known laws of science that could be used by engineers and managers to calculate the probability that their machines will successfully deliver customer's requirements or expectations.

If you and your organisation are facing the same problem please turn the page.

At the MIRCE Akademy we have discovered and faced this problem for many years. During our extensive research studies, by numerous students and members of staff, we have observed and analysed large number of failure phenomena - **inherent failures, maintenance errors, foreign object damage, as-bad-as-old repairs, not fault found, ageing processes, storage and transport related phenomena, fatigue cracks, impact of solar radiation, sand, wind, ice on machine durability, material vacancies** and many, many more. These required us to carry out visual checks, inspections, operational test, non-destructive tests, reliability parameter and indicator monitoring, failure data recording and analysis and generate the need for maintenance, spares and repair and test equipment and facilities. We have understood a large number of mechanisms, the frequencies, and the consequences of their occurrences by studying lives of a large number of machine copies. We have quantitatively determined and analytically formulated their relationships. Finally, their physical relationships have been captured and described through mathematical equations that enable accurate predictions to be made. All of that has given birth to the *MIRCE-Mechanics: the science of the motion of failure phenomena through the Machine In-service Reliability, Cost and Effectiveness*.

On this occasion we would like to share our knowledge with practising engineers and managers whose business pressure is preventing them doing this type of research, but who are never the less asked to deliver this type of requirements or expectations.

Dr Jezdimir Knezevic, the host of the Summer School, has been facing these problems for over 30 years. His multi disciplinary theoretical knowledge, huge “hands-on” practical experience and an 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 the MIRCE-Mechanics, is the Founder and President of the MIRCE Akademy. It is an independent research and educational institution established to enhance, disseminate, apply and recognise the knowledge of the MIRCE-Mechanics.

www.mirceakademy.com

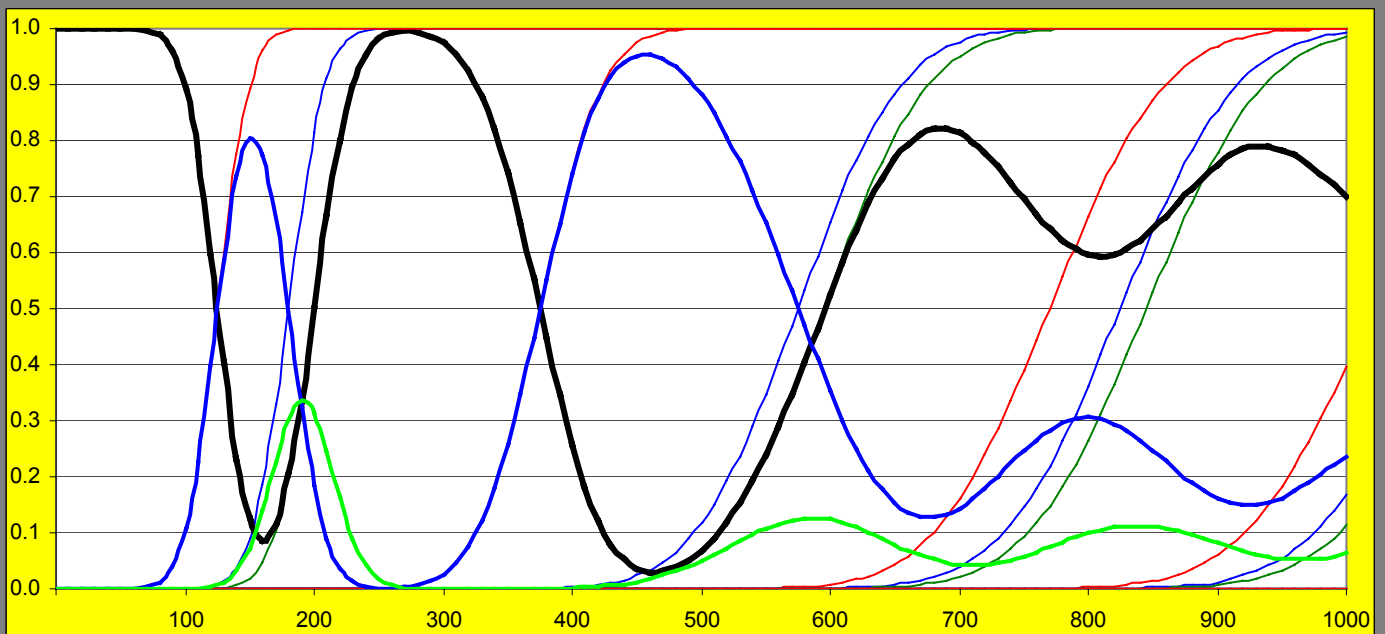


Figure 1: Time-dependent Failure, Supportability, Maintainability, Durability and Availability Functions.

Summer School Programme

Monday, 7th July 2008

Machine: Physical, Economic & Mathematical Approach

Failure: Physical, Economic & Mathematical Approach

Tuesday, 8th July 2008

Time To First Failure:

- Machine Durability Function and Measures
- Machine Reliability Function and Measures

Time At Failure:

- Repair, Replacement and Recycling

A technical visit to the MIRCE Akademy F1 Reliability and Effectiveness Centre followed by a visit to the Nigel Mansell World of Racing (1992 F1 and 1993 Indy Champion)

Wednesday, 9th July 2008

Time In Failure:

- Supportability Function, Tasks & Measures
- Maintainability Function, Tasks & Measures

Time Between Failures: Concept and Measures

Thursday, 10th July 2008

Prediction of Availability - Concept and Equation (see Figure 1)

Prediction of the Number, Frequency and Type of In-service Events – Concept and Equations

Prediction of In-service Costs: Price and Quantity of Operation, Maintenance and Support Resources.

Summer School Gala Dinner

Friday, 11th July 2008

Case study 1: Reliability, Cost and Effectiveness of a 10-Component Machine and of 10-Machine Fleet

Case Study 2: Reliability, Cost and Effectiveness of a 1000-Component Machine and of a 1000-Machine Fleet operating at 100 locations in 10 countries..

Lessons Learned, Feed Back and Graduation



MIRCE Akademy

In summary:

The main objective of the Summer School is three fold:

1. To explain to engineers and managers, linguistically, the concept and axioms of the MIRCE-Mechanics, developed at the Akademy for the predictions of the motion of failure phenomena through the life of a Machine
2. To expose engineers and managers to the “physical meaning” of the multi-dimensional, time-dependent equations of the MIRCE-Mechanics necessary for the accurate calculation of the motion of failure phenomena through time.
3. To discuss with engineers and managers methods available for the quantitative evaluation of the MIRCE-Mechanics equations, at the time when it is required from them to “design customer’s requirements and expectations” and when changes are possible with least time and cost penalties.

Venue

The Summer School will be held at Woodbury Park, which is approximately eight miles from Exeter by road.

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 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 normally requires a car or taxi.

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

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

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✉ enquiries@woodburypark.co.uk

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19th International Industrial Summer School

Registration Form

THIS FORM MAY BE PHOTOCOPIED

Fax +44 (0) 1395 233 899

Phone +44 (0) 1395 232 653

Mail MIRCE Akademy, Woodbury Park, Woodbury, Exeter, EX5 1JJ, United Kingdom

Email: quest@mirceakademy.com

Web site: www.mirceakademy.com

Summer School Prices (in GB Pounds £)

	Fee	VAT	Payable
• Participants	1495.00	261.63	1756.63
• MIRCE-Fellows	1450.00	253.75	1703.75
• MIRCE-Students	1250.00	218.75	1468.75

The Price includes:

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

Value Added Tax (VAT)

Unless special exemption exists, under UK Customs and Excise regulations delegates from all countries are required to pay UK VAT @ 17.5% on all courses taking place in the UK. Non-UK delegates may be able to recover VAT incurred via the relevant tax authority in the country of origin of the delegate.

PAYMENT DETAILS

Please invoice my organisation

(Note: UK MOD personnel can pay by BACS through the DBA – Contractor Number will be supplied with invoice)

For the attention of _____

Purchase Order No. _____

Please find enclosed a cheque for £ _____
(Made payable to MIRCE Akademy)

Please charge credit card

Visa MasterCard Amex

Cardholder _____

Card No. _____

Expiry Date _____

Cardholder's Signature _____

PERSONAL DETAILS (Please print clearly)

Surname _____

First name _____

Organisation _____

Department _____

Position _____

Address _____

Postcode _____ Country _____

Tel _____ Fax _____

E-mail _____

Special requirements Yes No

Please specify

I understand and accept the registration terms and conditions as shown

Signature _____ Date _____

Terms and Conditions

Substitution of participants may be made at any time. If you intend to do this, please advise the MIRCE Science ('the organiser') 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 Summer School. MIRCE Science regrets that no refunds or credits will be made after the deadline unless the organiser cancels the Event.

The organiser reserves the right to alter the programme or cancel the Summer School at its discretion. All places offered are subject to availability.