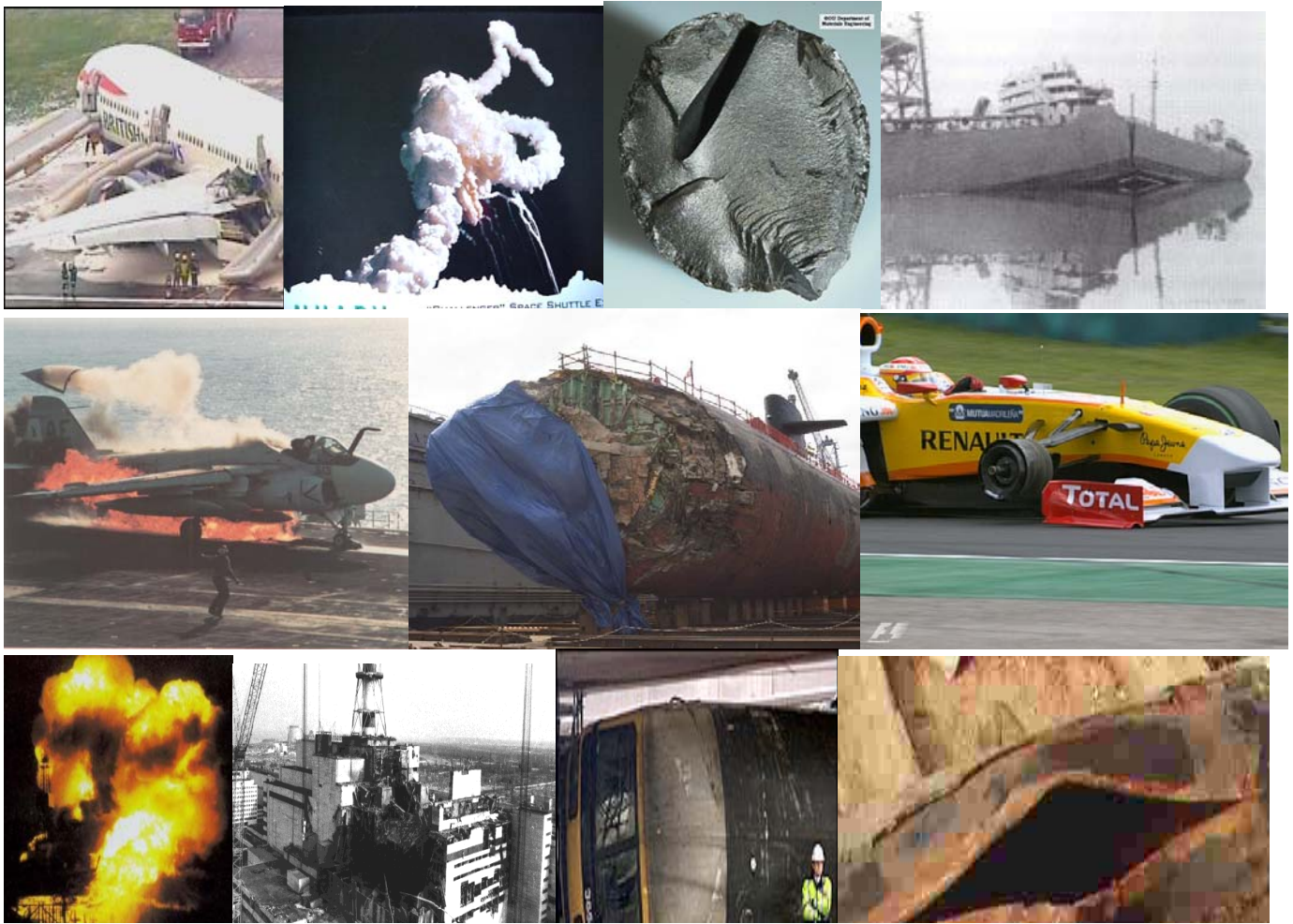


2nd International Symposium Understanding Machine Failures

7 – 9 June 2010, Woodbury Park, Exeter, EX5 1JJ, United Kingdom

“I believe that the concept of failure is central to understanding engineering,..... . To understand what engineering is and what engineers do is to understand how failures can happen and how they can contribute more than successes to advance technology.” Professor Henry Petroski, Duke University, USA

To Engineer is Human, The Role of Failure in Successful Design, Vintage Books, 1992, ISBN 0-679-73416-3



The MIRCE Akademy invites you to participate in this international event the objective of which is the further expansions of science based knowledge for understanding failure **mechanisms, causes and modes**. Scientific understating of these phenomena and their accurate predictions requires research within physical scale between 10^{-10} metre (atomic/molecular phenomena) and 10^{+10} metre (space and environmental phenomena). This knowledge is paramount for the further reduction of the probability of occurrence of machine failures and magnitudes of their consequences.

This Symposium could be beneficial to all engineers, managers and analysts involved in any of the following tasks: Physics of Failures, Reliability Predictions, Reliability Testing, Maintenance Concept Development, Failure Mode, Criticality and Effect Analysis (FMECA), Reliability Centred Maintenance, (RCM), Condition Based Maintenance (CBM), Logistics Support, Life Cycle Costing (LCC), Spare Parts Modelling and Prediction, Fault Tree Analysis (FTA), Safety Cases, Risk Analysis, Scheduling Preventive Maintenance Tasks, Maintainability Predictions, Reliability Testing (HALT and HASS),

Day One – Monday 7th June 2010

08.15 - 09.00 Registration

09.00 - 09.05 Opening Address

09.05 Key note presentation by Dr John Thompson, Fellow of the MIRCE Akademy

10.30 **“What is Failure?”**

Does a “random failure” exists and can we predict the “failure” if it does not exist?

10.30 - 11.00 Tea/Coffee

11.00 **“Failure Causes, Mechanisms and Modes”** Dr J. Knezevic, MIRCE Akademy

13.00 Fundamental physical differences between these three types of failure phenomena will presented and their impact to machine operation, maintenance and support processes will be discussed through numerous real life examples, from “big machines” like airplanes and submarines to “small machines” like pumps and power supplies.

13.00 - 14.00 Lunch

14.00 **“Failure Mechanisms and Failure Factors”** Dr J. Knezevic, MIRCE Akademy

14.45 Failure Events are occurring in accordance to the probabilistic laws, but probabilistic laws are goveren by the physical mechanisms and events that cause them. Failure Factor is the numerical representation of failure mechanisms that uniquely determines the probabilistic law that defines the occurrence of specific types of failure events.

14.45 **“Failure Mechanisms with Failure Factors less than 1”**

15.30 This presentation discusses failure mechanisms which are belonging to this category of failure factors and will be illustrated with numerous experiential and experimental examples

15.30 - 16.00 – Afternoon Tea

16.00 **“Failure Mechanisms with Failure Factors equal to 1”**

16.45 This presentation will cover failure mechanisms which are belonging to this category of failure factors and will be illustrated with numerous experiential and experimental examples

16.45 **“Failure Mechanisms with Failure Factors greater than 3”**

17.30 This presentation will cover failure mechanisms which are belonging to this category of failure factors and will be illustrated with numerous experiential and experimental examples

17.30 – 18.30 Get Together Drink at Woodbury Golf & Country Club

Day Two – Tuesday 8th June 2010

08.30 - 09.00 Registration

09.00 Key note presentation by Dr John Crocker, Science Fellow, MIRCE Akademy

10.30 **“How accurate does time-to-failure data need to be”?**

There is no simple answer to this question as it depends on for what purpose the data will be used. If it is to gain an estimate of how many spare aircraft, engines or modules will be required then it is likely that this is relatively insensitive to the parameters. However, if it is to estimate how many spare parts will be required then it is likely to be a little more sensitive although probably only to the mean of the distribution if there is no preventative maintenance policy. If there is preventivecome to hear John’s conclusions.

10.30 - 11.00 Tea/Coffee

11.00 **“Diary of Failures”** Step by step analysis of the sequence of failures through the life of Apollo

13.00 13 - starting from inadequate specification for electrical system via false production testing to the final event described by Jim Lowell, Apollo 13 commander: “I could see a gaseous substance escaping That’s was when it definitely occurred to me that we are in deep trouble. Very shortly, we’d be completely out of oxygen.” 200,000 miles from Earth and 3 years from the moment when the failure took place.

The presentation is followed by Documentary film from NASA archive, 80 min

13.00 - 14.00 Lunch

14.00 **Why do things break?** Dr Leslie Henshall, Science Fellow, MIRCE Akademy

15.30 This presentation covers in details physical mechanisms that lead to breakings of components or machines and is illustrated with numerous practical examples from well researched author.

15.15 - 15.45 Afternoon Tea

15.45 **Why do things wear out?** Dr Leslie Henshall, Science Fellow, MIRCE Akademy

17.00 This presentation addresses physical side of wear mechanisms of components and machines.

19.00 – 22.00 Symposium Dinner

Day Three – Wednesday 9th June 2010

08.30 09.00 Registration

09.00 **Key note presentation** by Robert Foggon, NAMSA, (NATO Maintenance and Support Agency)
 09 45 Luxembourg
“Water Gets Everywhere”
 This presentation is focused on a design that looked good on paper but because of maintenance issues failed and allowed ingress of water under certain circumstances.

09 45 Stuart Peake, Master Diploma Student, MIRCE Akademy
 10 30 **Use of In-service Failure Data for Simulation based Failure Predictions**

10.30 11 00 Tea/Coffee

11.00 Ian Zaczyk, Doctoral Diploma Student, MIRCE Akademy
 11 45 **Single Event Upsets – From Observation to Science**
 This paper discusses the in-flight experiments that proved the existence of SEUs failure mechanisms.

11 45 **“Failure Mechanisms with Failure Factors from 1 to 3”** Dr J. Knezevic, MIRCE Akademy
 13 00 Final part in the process of relating physical mechanisms to corresponding failure factors.

13 00 14 00 Lunch

14 00 **“Formula 1 Failure Analysis 1950 – 2009”** Dr J. Knezevic, MIRCE Akademy
 15.30






Formula 1 Reliability & Effectiveness Research Centre, FIRE, is a part of the MIRCE Akademy specially established to study the failure phenomena associated with Formula 1 Racing System. This presentation will cover analysis of failures associated with formula 1 cars designed and produced by Ferrari, Lotus, BRM, McLaren, Williams, Benetton, Tyrell, Brabham, Red Bull and others.

15. 30 16 00 Afternoon Tea

16 00 Visit to the Nigel **Mansell World of Racing**
 17.00 Remarkable Life Story of the 1992 F1 World Champion and 1993 Indy PPG World Champion, presented through original: racing cars, winning trophies, technical data and numerous memorabilia

The Venue

The Symposium will be held at **Woodbury Park Hotel, Golf and Country Club**, 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 fast service is available to and from Exeter (St David’s Station) and London (Paddington Station).

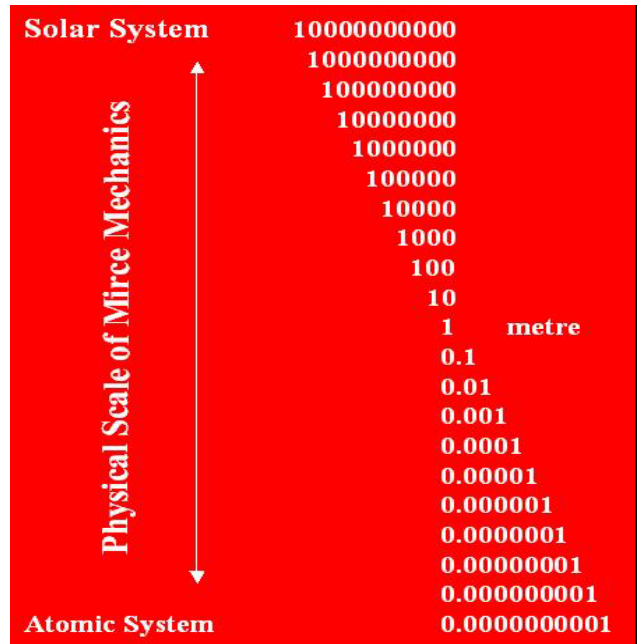
By air, Exeter Airport offers regular flights to many British and Continental destinations and is situated near to Woodbury Park. Travel between Exeter and Woodbury normally requires a car or taxi.

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’.

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 on request.



MIRCE Akademy is an independent research and educational institution dedicated to the enhancement and promotion of Mirce Mechanics - the scientific study of the motion of functionality (absence of failures) through the system operational process.

2nd International Symposium on Understanding Machine Failures

Registration Form (This form may be copied)

Fax +44 (0) 1395 233 899

Phone +44 (0) 1395 233 856

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

Email: quest@mirceakademy.com

SYMPOSIUM PRICES (in GB Pounds £)

Full Programme	Fee	VAT	Payable
• Participants	595.00	104.13	699.13
• MIRCE-Members	545.00	95.38	640.38
• Paper Presenters	495.00	86.63	581.63
One Day Programme			
• Each day	245.00	42.88	287.88
• Please select	7 th June	8 th June	9 th June
Other Rates			
Symposium Proceedings	150.00	26.25	176.25
Symposium Dinner	42.55	7.45	50.00

COST

The full Programme Package includes: Attendance to all Sessions, Supporting Materials, Lunches and Light Refreshments and Symposium Dinner

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 No. will be supplied with invoice)

For the attention of _____

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Please find enclosed a cheque for £ _____
(made payable to MIRCE Science)

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Postcode _____ Country _____

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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 Symposium. MIRCE Science regrets that no refunds or credits will be made after the deadline unless the organiser cancels the Symposium.

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