

20th International MIRCE Symposium

7 – 9 December 2010, Woodbury Park, Exeter, UK

In-service Cost Reduction through Failure Management

- methods, procedures, software, tools and initiatives -

There is saying that main business of any business is staying in business. For that purpose business managers prepare business plans execution of which should keep them in business. However, failures of machines and human errors are the single biggest obstacle in delivering business plans.

Consequently, the objective of this Symposium will be introduction of the science-based methods, tools and latest initiatives for the managing failure phenomena in the way that the reliability and safety of materialising business plans is maximised while reducing in-service costs.

Methods to be presented at this Symposium are expected to represent a unique approach where system operational process is considered as one single entity that integrates system structure, reliability of components, maintenance policies and strategies with corporate plans, revenues and costs.

Fundamental body of knowledge for managing failure phenomena should be based on the proven laws of science that define the motion of in-service reliability, cost and effectiveness through system operational process resulting from natural causes and human actions.

Examples from aviation, defence, motorsport, nuclear and other industries are used to illustrate the methods and tools presented.

The Symposium could be very beneficial to design engineers, project managers, analysts, maintainer, planners and similar professions that are keeping business in business by making cost effective decisions based on the information available.

Exhibitors:

The TFD Group, Monterey, USA

A world leader in the development of analytical methods and software tools to support economic and strategic decisions that the designers, manufacturers, owners and maintainers of hardware systems, both military and non-military, are called upon to make. TFD tools are being used in support of ship, aircraft, tank, missile and C3I programs by defence departments and companies engaged in aerospace and defence business in more than 15 countries. TFD tools are also finding application in commercial aviation, urban transit and automotive manufacturing

Acquisition Logistics Engineering, Ohio, USA

A full-service logistics engineering firm with the experience and technical expertise to solve our clients' most challenging issues. Our service offerings include a full range of technical, analytical, management, and logistic product services. ALE also offers a wide range of training and workshop opportunities in each of our service areas in an effort to strengthen the capabilities of your staff. Our long list of satisfied customers in both the defence and commercial sectors continue to look to ALE to help them improve their products and reduce their costs, effectively helping them improve their bottom line.

Relex Software, PTC, USA

Creating reliable, high-quality products is an essential part of ensuring customer satisfaction, maintaining a great reputation as a company, and securing repeat business for years to come. With a wide range of analysis techniques, Relex software delivers the reliability, maintainability, and safety metrics you need to provide the high-quality products your customers expect. And Relex's world-class services, which range from enterprise-wide consulting projects to industry-leading training and support, help you meet product reliability goals and gain a competitive edge.



M.I.R.C.E. Research Centre at the Exeter University and the MIRCE Akademy have been the leaders of generation and dissemination of the science base knowledge for **M**anaging **I**ndustrial **R**eliability, **C**ost and **E**ffectiveness, throughout the world collaborating with Industry, Government and academic Institutions.

Tuesday 7th December 2010

0830– 0900	<i>Registration and welcome coffee</i>
0900 – 0905	<i>Welcome by Dr Jezdimir Knezevic, Founder & President, Mirce Academy, UK</i>
0905 – 09.50	Key Note Address: Robert Butler TFD Group, Monterey, USA Profit Maximization Strategies for In-Service System Management As momentous and difficult as the decision to purchase a complex, expensive system might be, the decisions required to operate and maintain it during its service life more and more often have greater potential to influence the bottom line. Whether the bottom line is profit or net public benefit matters not a whit; in-service management decision-makers earn their wages by making decisions that allow systems to produce the utility for which they were purchased – or they aren't earning their wages. Among the strategies that can improve the outcome of these decision processes, some have to do with reduction of supply chain delay times, some with improvement of reliability and, among the most exciting are those that seek to reduce the influence of stochastic variation on required action. Even a high failure rate, if the mean of a compact density function, will prove to be less costly than a low failure rate with a much dispersed density function. However, methods to neutralize high variance problems, such as condition-based maintenance, depend on the collection, management and maintenance of the data required to use them. This has traditionally been a weak spot in the development of adequate logistic decision support capability and will prove to be a problem for these new methods and technologies as well. This paper addresses the need for, and characteristics of, a generic decision support infrastructure capable of addressing this problem.
0950-1030	Chris Swallow, Technical Specialist, Relex Software, PTC, USA Solving Through Life Ownership – Where is the Profit?
1030 – 1100	Morning Coffee
1100 – 1145	Charles Coogan, CPL, Founder and Director, Acquisition Logistics Engineering, ALE, Ohio, USA "Applying Systems Engineering to reduce sustainment cost for legacy systems". The paper describes how considering a wide range of alternative solutions for cost reduction improves on the classic method of attempting to reduce cost by "fixing" the problem; that causes the high cost. The method presented emphasizes low cost solutions such as training or operating procedure changes over re-design of the hardware.
1145-1230	Phil Sturgess, Director, Systecon, UK, Weymouth, UK Reduction of In-service Cost of Commuter Trains in Sweden, through accurate predictions of Maintenance Resources, The model for the accurate prediction of in-service resources (Tracks, Crew, Spares...) required to maintain the vehicles that return from traffic to deliver the right amount of vehicles at the right time, to meet traffic demands (the traffic production plan) is presented in this paper. Also, the fundamental question of in-service management: What is the Economic Value of 1.5 % Increased Availability?, has been addressed and answered.
1230 – 1400	Lunch
1400 – 1530	John Thompson, Science Fellow, MIRCE Academy, Exeter, UK Where are the extra costs (savings) in the OEM to end user cycle model Most current methodologies for spares optimisation and estimates of cost of spares & repairs assume a constant parameter say, MTBF, and that the behaviour of the supply chain and end user is under control. i.e. as contracted. This conditions only likely apply either at the beginning of the support contract or at the end of development period. However, in the in-service phase the equipment MTBF varies for many reasons other random failure, like corrosion, misuse, design fault etc. Also, the supply chain lead times will change for many reasons such as: queues in the repair depot, quantity of new buys because items are lost in the supply loop and end user different usage of the equipment. The methodology in this presentation will provide techniques to measure, with minimum error, these parameters [MTBF, number of spares, lead times]. Thus ensuring that spare & repair cost are controlled at minimum, reduced, cost and, end user equipment performance is maintained or improved. The method uses computers to carry out most of the analysis, and provides warning flags to the decision makers. Statistical filters/error trapping & rules are built into the software. Thus users knowledge of the methodology is minimised.
1530 – 1600	Afternoon Tea
1600 – 1730	John Thompson, Science Fellow, MIRCE Academy, Exeter, UK Where are the extra costs (savings) in the OEM to end user cycle model continue
1830 - 1930	2010 MIRCE Academy Annual Lecture Unit of Functionability – 1 Senna Dr Jezdimir Knezevic, Founder and President of the MIRCE Academy Functionability , the ability of being functional, is the fundamental property of a system in-service performance. Its motion through time is fully defined by the Mirce Functionability Equation. In the sign of the respect for the unique ability to maximise functionability during all of his F1 races, the unit of functionability for any system is named 1 Senna (Ayrton Senna de Silva, 1960-1994). It is equal to the average probability of unity for a system being functional at any instant of time.

Wednesday 8th December 2010

0830– 0900

Registration and welcome coffee

0900 – 1000

Kay Note Address:

Wing Commander Chris J. Hockley OBE, CEng, MRAeS, RAF(Rtd),
College of Management & Technology, Cranfield University, The Defence Academy, UK
In-Service Cost Reduction with Condition Based Maintenance (CBM) and Health & Usage Monitoring Systems (HUMS) in the UK Defence Land Environment

Despite the launch of a UK MOD policy and a Defence Standard in 2004 for HUMS in the land environment for vehicles, little progress seems to have been made. The presentation will consider the possible reasons why military vehicles are still so far behind their commercial counterparts. Despite standard, on-board systems for vehicle crews and interrogative systems for vehicle maintenance staff to be able to plan the most cost effective maintenance actions, few military vehicles are exploiting the advantages. Even with HUMS, progress in the UK Military land environment to adopt CBM is also not being developed and the presentation will consider why this situation exists and what can be done to improve the situation.

The presentation will first look briefly at the history of HUMS and CBM policies for vehicles in the UK military land environment and how the policies have, or have not been implemented. Some example case studies will be reviewed to draw out the reasons for the lack of progress. Difficulties encountered, such as engaging the operational user community to show the benefits of improved availability, the difficulty of making the business case for the military user and the connectivity between the two, will be some of the lessons learned. The presentation will consider both what has hampered progress and propose some solutions

1000 – 10.30

Stuart Peake, QuorSym Ltd., UK

Mirce Mechanics Based Computational Method for In-service Cost Reduction

The paper shows how the Mirce Functionability Equations are used to produce an analysis of a system life and the support infrastructure required to maintain an acceptable level of reliability throughout the contracted period.

1030 – 1100

Morning Coffee

1100 – 1200

Dr John Crocker, Science Fellow, MIRCE Akademy, Exeter, UK

"Why might Easyjet be less punctual than Air Zimbabwe?"

In order to minimize costs, low-cost operators have to operate with very small margins for error. It therefore takes very little to upset their schedules which can result in significant costs. This paper looks at some of the ways such an operator may be able to reduce the impact of these factors by recognizing the signs in advance and taking the appropriate actions.

1200 – 1245

Ian Zaczyk MMMcs, Reliance Ltd., UK

Single Event Upsets – From Observation to Science

This paper discusses the in-flight experiments that proved the existence of SEUs failure mechanisms, which have become the primary radiation concern for avionics since the late 1980's when the phenomenon which had previously only been observed in orbiting satellites also began to appear in aircraft electronic systems. The primary sources of radiation are low-energy alpha particles from device and packaging contaminants, high energy cosmic particles and low energy, (thermal) neutrons

1230 – 1400

Lunch

1400 – 1500

Dr J. Knezevic, MIRCE Akademy

Understanding Failures

To be managed failure phenomena need to be understood. To be understood it is not enough to study the mode in which they manifest, it is essential to understand the mechanisms that lead to modes. Failure mechanisms from atomic to solar systems will be presented and explained here.

1500 – 1530

Afternoon Tea

1530 – 1615

Predicting Failures

Having understood the failure mechanism in order to manage them it is necessary to predict their occurrences in respect to the future times.

1600 – 1715

Managing Failures

Only physically understood and mathematically predictable failures could be managed and optimised against "business" criteria like maximum profit, minimum life cycle cost, required reliability, agreed availability and similar.

2130 - 2200

**Graduation Ceremony of the MIRCE Akademy
Fellowship Ceremony of the MIRCE Akademy**

2200-2230



Formula 1 Reliability & Effectiveness Centre, of the MIRCE Akademy
Announcement and Award of the

- **2010 Driver Reliability Championship**
- **2010 Team Reliability Championship**

In accordance to the calculations based on the Mirce Mechanics

Thursday 9th December 2010

0830– 0900	<i>Registration and welcome coffee</i>
0900– 0945	Key Note Address Mark Willis, LSC Group, Lichfield, UK Do we really understand the question and is modelling the answer?
0945-10.30	Claude Hirtz, NAMSA, Luxembourg Impact of Weapon System Service Life Extensions upon System Maintenance This paper describes how the 'crisis' in military domain with related budget cuts led countries to decide to increase service life of 'old' weapon systems instead of going for 'new' ones, and how maintenance policies had to be adapted facing spare shortage and obsolescence issues. Also it shows how redesign of training and field test equipment had to be initiated in order to satisfy the new rising demands for 10-15 additional years. Finally this paper will show how our previous in-service support strategy migrated towards redesign and production business in order to satisfy customers operational needs.
1030 – 1100	Morning Coffee
11.00-1145	Dr Steve Bond, City University, London, UK "The aeroplane is talking to you - what you should do to listen to it".
1145 – 1230	Claude Hirtz, MIRCE Akademy Impact of Maintenance Environment on In-service Cost Maintenance process consists of the execution of maintenance task, which are performed by humans in existing maintenance environment. Human physical limitations and cognitive errors are heavily influenced by the physical conditions of the maintenance environment, like temperature, humidity, cleanliness, lighting and similar. This paper presents the results of the study performed to understand this very complex relationship between those two factors in respect to the quality of maintenance tasks and its economic impacts on the direct maintenance cost and consequential impact on the business revenue and profit.
1230 – 1400	Lunch
1400 – 1530	Guided Visit to the Nigel Mansell World of Racing (Dr Knezevic) 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
1530 – 1600	Afternoon Tea and Departure



The Venue



The Symposium will be held at **Woodbury Park Hotel, Golf and Country Club**, 8 miles from 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 or Waterloo Station - connection to Euro Star).

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. Those 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** phone: 01395 233 382, fax: 01395 233 384 web: www.woodburypark.co.uk, email: enquiries@woodburypark.co.uk

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

20th MIRCE International Symposium, 7 - 9 December 2010

Registration Form

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 Web site: www.mirceakademy.com

THIS FORM MAY BE COPIED

Symposium Fees (in GB Pounds £)

	Fee	VAT	Payable
• Participants	595.00	104.13.	699.13
• MIRCE Members	545.00	95.38	640.38
• MIRCE Students	495.00	86.63	581.63

The Symposium Fees includes:

- Attendance
- Supporting Materials
- Lunches
- Light Refreshments
- Symposium Dinner on the 8th December
- 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.

PERSONAL DETAILS (Please print clearly)

Surname _____

First name _____

Organisation _____

Department _____

Position _____

Address _____

Postcode _____ Country _____

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E-mail _____

Special requirements Yes No

Please specify

I understand and accept the registration terms and conditions as shown

Signature _____ Date _____

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 _____ Security Number _____

Signature _____

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 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.