

DETROIT	SOUTHWEST	1409	3:45P	121	ON TIME
FT LAUDERDALE	SOUTHWEST	1269	4:05P	123	ON TIME
FT LAUDERDALE	SOUTHWEST	270	3:00P	123	CHECK IN

**MIRCE Akademy**

**LAST CALL**

DALLAS/FT WORTH	AMERICAN	1281	6:32A	17	ON TIME
HARTFORD	US AIRWAYS	2712	3:35P	52	ON TIME

# 1<sup>st</sup> World Congress of MIRCE MECHANICS\*

Woodbury Park, Exeter, United Kingdom, 28 – 30 May 2012

KANSAS CITY MO	SOUTHWEST	109	4:35P	122	ON TIME
LONDON HEATHROW	UNITED	918	2:19P	42	BOARDING
LOS ANGELES	DELTA	333	3:25P	73	ON TIME
LOS ANGELES	SOUTHWEST	143	3:40P	126	ON TIME
LOS ANGELES	UNITED	231	4:25P	40	ON TIME
LOUISVILLE	DELTA	2409	2:20P	94	ON TIME

\* **MIRCE Mechanics** is a body of scientific knowledge for Managing In-service Reliability, Cost and Effectiveness.

MEXICO CITY	AMERICAN	2115	2:55P	13	ON TIME
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## A personal welcome from Dr Jezdimir Knezevic, Founder & President of the MIRCE Akademy

With the greatest organisational pride and personal excitement I wish to invite you to join us all at the MIRCE Akademy and become a part of this historic Event.

We have prepared a very interesting Programme consisting of internationally respected and influential presenters and contributors who have decided to come to Exeter and make their unique scientific contribution to the pioneering studies of Mirce Mechanics. Papers will cover a large spectrum of knowledge including Quantum Mechanics, Neuroscience, Complexity Theory, Thermography, Standardised Technical English, Maintenance Process, Nanomechanics, Damage Mechanics, Logistics Support of Suborbital commercial space tourist operation, to name just a few.

In January this year the MIRCE Akademy lost Professor Richard F.W. Bader, one of the world leading quantum chemists and a Grand Fellow. As a sign of our deep appreciation for his “larger than life” personality and no nonsense approach to science and life, both of which are core values of the MIRCE Akademy, we have decided to dedicate this Congress to his memory and establish “The Richard Bader Memorial Lecture”. I am certain that Richard would have approved our decision to ask Professor Mark E. Eberhart from Colorado School of Mines in USA to deliver the 2012 Memorial Lecture.

I am delighted to inform you that my professional “love story” with the office of the Boeing Chief Mechanic, which started in 1990s with the great Jack Hessburg, is continuing with Justin Hale who is coming to tell as how they made the latest Boeing 787 Dreamliner, a maintenance friendly airplane by design, or as I like to call it functionability by design.

It is our great pleasure to announce that Mr Jean Todt, the President of the Fédération Internationale de l'Automobile, FIA, will be admitted to the MIRCE Akademy as a Grand Fellow for his unique contributions to the knowledge of Experimental Mirce Mechanics. His hands-on experience started in the early 1960s with the preparation of his father's Austin Mini for rallying to multi World Championships titles in Rallying, Sports Cars and Formula 1, as a co-driver, Team Manager and the Team Principle.

We have prepared a very interesting programme for the partners of the Congress participants, which include a visit to Exeter, which was the most southwesterly Roman fortified settlement in Britain. Exeter Cathedral was founded in the early 12th century and has several notable features, including an early set of misericord, an astronomical clock and the longest uninterrupted vaulted ceiling in England. Today, Exeter is identified as one of the top ten most profitable locations for a business to be based.

It is worth pointing out that all participants of the 1<sup>st</sup> World Congress of Mirce Mechanics will have an opportunity to experience the atmosphere of a traditional English village and taste the world famous fish & chips.

I do hope that all of you who are already exposed to Mirce Mechanics and the majority of you, who are not, will look at this historic event very closely and hopefully the Programme presented below along with your professional dedication and curiosity will bring you to Woodbury Park in May this year.

Very much looking forward to welcoming you personally to the MIRCE Akademy.

A handwritten signature in black ink that reads "Knezevic". The signature is stylized, with a large, looped initial 'K' and a trailing flourish.

**Monday 28<sup>th</sup> May 2012**

<b>0830- 0915</b>	<b>Registration and welcome coffee, Woodbury Park Hotel, Colin Chapman Room</b>
<b>0900 - 0905</b>	<b>Welcome by Dr Jezdimir Knezevic, Founder &amp; President, Mirce Academy, UK</b>
<b>0905 - 1030</b>	<i>Inaugural Presentation by Dr Knezevic</i> Brief overview of Philosophy, Science, Mathematics, Computation, Technology and Applications of Mirce Mechanics since 1971 till today. Although it has been used and studied over the decades, today is the official birthday of Mirce Mechanics.
<b>1030-1100</b>	<b>Morning Coffee</b>
<b>1100-1200</b>	<b>Key Note Presentation by Justin Hale, The Boeing Corporation, USA</b> <i>Functionability by Design, Boeing 787 Dreamliner</i> Aircraft design is the single greatest factor in determining the cost of maintenance to the operator. As such, each all-new aircraft design holds the potential for a step-change in reducing maintenance costs. Recent advances in materials, as well as systems and information technologies hold great potential for driving down the operational costs of new aircraft. Boeing has embraced these new technologies, enhancing design methods, and even reorganised design and support teams in order to achieve significant maintenance cost reductions for operators of the 787 Dreamliner.
<b>1200-1300</b>	<b>Professor George Rzevsky,</b> Complexity Science and Design Research Group, The Open University, UK <i>Complexity Science and Mirce Mechanics</i> Complexity Science provides insight into behaviour of systems consisting of large numbers of diverse and interdependent elements, which have a certain degree of autonomy and are not centrally controlled. Key features of Complex Systems, including those listed below, will be reviewed: Interdependence of constituent elements, Emergent properties, Constraints, which limit degrees of freedom of elements, Nonlinearity of relations, Behaviour far from equilibrium, Self-organisation, and Co-evolution A method for managing complexity developed by the speaker will be introduced and applied to managing life of aircraft under conditions of operation, failure and repair, which is the central theme of Mirce Mechanics.
<b>1300 -1400</b>	<b>Lunch</b>
<b>1400-1500</b>	Professor Chris Harris, University of Plymouth, UK <i>Human Reaction Time</i> This presentation addresses mechanisms of human behaviour, as a part of the functionability system, from the neuroscience point of view. Traditionally, neuroscience has been seen as a branch of biology. Today, it is an interdisciplinary science that collaborates with other fields such as chemistry, computer science, engineering, linguistics, medicine, mathematics, and allied disciplines, philosophy, physics, and psychology.
<b>1500 -1600</b>	Claude Hirtz, NATO Maintenance and Supply Agency, NAMSA, Luxembourg <i>Impact of Environmental Conditions on Duration of Maintenance Tasks</i> Maintainers, being humans, suffer some physical and psychological limitations. Hence, it is necessary to assess the impact of these limitations onto maintenance task in cases of sickness, lack of training, inappropriate clothing, frozen fingers, different culture, language and similar phenomena. This paper illustrates how controlled experiments regarding the execution of maintenance tasks performed by various mechanics, in various environmental conditions and various parts of the day, in workshops and operational fields that becomes possible by applying principles and methods of Mirce Mechanics.
<b>1600</b>	<b>Afternoon Tea Break</b>
<b>1700 -1815</b>	<b>Richard F.W. Bader 2012 Memorial Lecture</b> <b>Professor Mark E. Eberhart</b> Molecular Theory Group, Department of Chemistry and Geochemistry, Colorado School of Mines, Golden, Colorado, USA
<b>1900 - 1930</b>	<b>Get Together Sherry Reception at Woodbury Park Golf Club Terrace</b>
<b>1930 -2300</b>	<b>Gala Dinner of the 1<sup>st</sup> World Congress of Mirce Mechanics</b> <b>Guest Speaker: Polly Vacher Aviatrix – Solo Flight around the World via Poles</b> <b>MIRCE Academy Fellowship and Graduation Ceremony</b>



## ***Richard F.W. Bader***

(15 October 1931 – 15 January 2012)

BSc (1953) and MSc (1955) from McMaster University, Hamilton, Ontario, Canada and PhD (1958) from the Massachusetts Institute of Technology (MIT). in USA. 1966-1996, a full Professor, at McMaster University.  
1980 Elected a Fellow of the Royal Society of Canada  
2010 Elected a Grand Fellow of the MIRCE Akademy, UK.

*“The goal of a scientist is to uncover new ideas, concepts and tools, practical or theoretical, that extend our understanding of the world around us and enable us to do new things. In chemistry, the theory of Atoms In Molecules (AIM) developed in my laboratory, is being increasingly used by workers in all fields of chemistry and also in solid state physics. Because AIM has increased our understanding of how atoms behave, it is used in many ways - to develop new alloys and new and better drugs, for example. Nothing pleases me more than the knowledge that each year sees an ever increasing use of AIM by other scientists in the pursuit of their own research.”* **Thank you Richard, you were an inspiration for all of us, Dr K.**  
For more information go to <http://www.mirceakademy.com/index.php?page=grand-fellows/#bader>

## **Richard F.W. Bader 2012 Memorial Lecture**

***The challenges to Bader's vision of QTAIM as a conceptual basis of chemistry***

**Professor Mark E. Eberhart**

**Molecular Theory Group, Department of Chemistry and Geochemistry, Colorado School of Mines, USA**

For thousands of years new materials have been "stumbled upon" and materials were improved with trial and error experimentation--unreliable, slow, and costly processes all. If we are to meet the challenges of this century, we must find ways to design materials, much like we design buildings, bridges or circuits. In these examples the engineer starts with a set of performance criteria and work backwards to a structure that optimally satisfies these criteria. When it comes to designing materials, it will be necessary to create atomic, molecular and condensed phase structures with optimal properties. This is a very hard problem to solve. For though it is conceptually straightforward to use theoretical methods to calculate the properties of a given structure, how one determines which of an infinite number of possible structures will be, for example, the hardest, strongest, and lightest, is unknown. In the computational materials world this challenge is called the "inverse problem." Professor Eberhart and his research group are using quantum mechanical methods, some of which are based on Professor Bader's work, in an attempt to understand the atomic origins of material properties, particularly mechanical properties (hardness, strength, ductility). It is his belief that with such an understanding it will be possible to *solve* the inverse problem.

He is the author of these two popular books: **Why Things Break:** Understanding the World by the Way it Comes Apart and **Feeding the Fire:** The Lost History and Uncertain Future of Mankind's Energy Addiction.



**Gala Dinner Guest Speaker**  
**Polly Vacher MBE Aviatrix**  
**Grand Fellow of the MIRCE Akademy**  
**Mirce Mechanics Flying Laboratory**



Polly has collected thousands and thousands of technical, physical, and personal data during her flight around the World via Poles. Natural World is the only laboratory where Mirce Mechanics events take place resulting from physical causes and human action. Polly's Wings Around the World II, Voyage to the Ice flight between 6 May 2003 and 27 April 2004 landed in aviation *Record Breaking Flight*

- **First woman to fly solo over the North Pole in a single engine aircraft**
- **First woman to fly solo in Antarctica in a single engine aircraft**
- **First person to fly solo around the world landing on all seven continents**

While making records Polly generated hundreds of thousand of pounds for Flying Scholarships for the Disabled, known British charity named after a legendary disabled Second World War Pilot Douglas Bader

**Tuesday 29<sup>th</sup> May 2012**

<b>0830- 0900</b>	<b>Registration and welcome coffee, Woodbury Park Hotel, Colin Chapman Room</b>
<b>0900 - 1000</b>	<p>Key Note Presentation</p> <p><b>Dr Abhijit Dasgupta</b>, Professor, Mechanical Engineering Dept. Center for Advanced Life Cycle Engineering (CALCE), University of Maryland, Washington DC, USA.</p> <p><b><i>Fatigue Damage Accumulation Rates in Electronic Assemblies under Complex Multiaxial/Random Vibration Histories.</i></b></p> <p>This presentation summarises a much-focused research on nanomechanics, damage mechanics, micromechanics, and computational mechanics with a specific emphasis on mechanics of electronic packaging materials and “smart” composite materials.</p>
<b>1000 - 1040</b>	<p><b>Andy Bates</b>, Artesis, St John’s Innovation Centre, Cambridge, UK</p> <p><b><i>Mathematical model of the change in mechanical, electrical, and operational characteristics of the motor-driven systems</i></b></p> <p>The “model-based fault detection” approach used by Artesis MCM. The advanced algorithm used to develop this mathematical model of the process of change in condition of electrical motor power systems is based on an innovative and advanced technology. Considerable development efforts were made to test on several million electric motors to ensure the accuracy and repeatability of the process defined by mathematical model of the motor-driven system that it is connected to, and then to compare the dynamic behaviour of that model with the actual, measured dynamic behaviour. The model consists of a set of differential equations, which describe the electromechanical behaviour of the motor-driven system, including the full range of mechanical, electrical, and operational characteristics.</p>
<b>1040-1105</b>	<b>Morning Coffee</b>
<b>11.05-1200</b>	<p><b>Orlando Chiarello</b>, Secondo Mona, Somma Lombardo, Italy</p> <p><b><i>Impact of Accuracy of Technical Communication on the Motion of Functionability</i></b></p> <p>Full, accurate and timely provision of technical information could have a significant impact on the “speed” and quality of the motion of functionability through both functionability states, positive and negative. This paper analyses impact of the Simplified Technical English on the reductions of the maintenance and operational errors caused by the misunderstandings in communications between designers and in-service personnel.</p>
<b>1200-1300</b>	<p><b>Austin Dunne</b>, The Institute of Infrared Thermography, Widnes, Cheshire, UK</p> <p><b><i>Role of Thermography in Detection of the Motion of Failure Phenomena</i></b></p> <p>In in-service environment, almost everything gets hotter or cooler before it fails, making infrared cameras extremely valuable diagnostic tools with many diverse applications. Hence, the use of infra cameras and Infrared Thermography, the technique that uses an infrared imaging and measurement camera to "see" and "measure" invisible infrared energy being emitted from an object, to improve functionability, manage energy, improve product quality, and enhance worker safety are addressed in this presentation.</p>
<b>1300 -1400</b>	<b>Lunch Break</b>
<b>1400 -1530</b>	Technical Visit to the Formula 1 Reliability and Effectiveness, FIRE Centre of the MIRCE Akademy and Nigel Mansell World of Racing
<b>1530-1600</b>	<b>Afternoon Tea Break</b>
<b>1600 -1645</b>	<p><b>Ian Zaczyk</b>, Reliance Limited, Southampton, UK</p> <p><b><i>Natural World: Negative Functionability Phenomena investigation</i></b></p> <p>A case study based on Airbus A330-303 In Flight Upset, Western Australia, 7 October 2008. This presentation is based on 4 year long research project performed at the MIRCE Akademy related to the Analysis of the Influence of Atmospheric Radiation Induced Single Event Effects on Avionics Failures.</p>
<b>1645-1730</b>	<p><b>Stuart Peake</b>, Quorsym Ltd, Newton, Dorset, UK</p> <p><b><i>Mirce Mechanics Based Studies of Virgin Galactic In-service Support</i></b></p> <p>The objective of the Virgin Galactic company is to provide suborbital space flights to the paying public, sub orbital science missions and small satellite launches. This paper presents the results of the theoretical analysis of the demand for the logistics support resources required to deliver continuous level of despatch reliability and safety.</p>
<b>1900 -2200</b>	<b>Traditional English Fish &amp; Chips</b>
	Otterton Mill – XIX century working Mill (5mils from Woodbury Park, transport provided)

Wednesday 30<sup>th</sup> May 2012

0830- 0900	<b>Registration and welcome coffee, Woodbury Park Hotel, Colin Chapman Room</b>
0900 - 1030	<p align="center"><b>What is Mirce Mechanics Good For?</b></p> <p>Although science does not have to be useful, it has to be truthful. Mirce Mechanics based predictions related to all phases of a system life cycle could be priceless to design engineers and project managers. Hence, in this session the Mirce Mechanics method for assessment and predictions of System Design-in characteristics, for each design option, regarding properties like:</p> <ul style="list-style-type: none"> <li>• <b>Durability and Reliability</b></li> <li>• <b>Maintainability and Testability</b></li> <li>• <b>Supportability and Availability</b></li> <li>• <b>Life Cycle Cost</b></li> </ul> <p>are presented and illustrated with numerous examples related to defence, aerospace, marine, transportation, motorsport, power, nuclear and other systems, to show that changes are possible to be made early-on at no additional cost and time in respect to later on made modifications and cancellations.</p>
1030-1100	<b>Morning Coffee</b>
1100-1300	<p>In this session, the impact and benefit of making use of the Mirce Mechanics method and analytics at the planning stages of systems and fleets in-service life related to:</p> <ul style="list-style-type: none"> <li>• <b>Operational Scheduling and Costing</b></li> <li>• <b>Maintenance Scheduling and “Health Care”</b></li> <li>• <b>Logistics Support Resources:</b> <ul style="list-style-type: none"> <li>○ <b>Personnel Planning, Scheduling and Training</b></li> <li>○ <b>Material demands and locations</b></li> <li>○ <b>Facilities planning and utilisation</b></li> <li>○ <b>Spare Parts predictions and ordering</b></li> </ul> </li> </ul> <p>are presented and illustrated with numerous examples related to defence, aerospace, transportation, motorsport, manufacturing and other industries, to illustrate how numerous operational, maintenance and support options could be evaluated at almost no extra cost and time in comparison to in-service recalls and modifications.</p>
1300 -1400	<b>Lunch and Departure</b>



All prices are in GB Pounds		Before 25th April 2012			After 26th April 2012		
Package	Price	VAT	Total	Price	VAT	Total	
Participant for 3 Days	695.00	139.00	834.00	795.00	159.00	954.00	
Participant per Day	275.00	55.00	330.00	325.00	65.00	390.00	
Presenter on the day of presentation	Free			Free			
Presenter for 3 Days	325.00	65.00	390.00	395.00	79.00	474.00	
Retired participants for 3 Days	195.00	39.00	234.00	195.00	39.00	234.00	
Congress Proceedings on CD	175.00	35.00	210.00	225.00	45.00	270.00	
MIRCE Akademy Members	645.00	129.00	774.00	745.00	149.00	894.00	
MIRCE Akademy Fellows	625.00	125.00	750.00	725.00	145.00	870.00	
MIRCE Akademy Students	595.00	119.00	714.00	695.00	139.00	834.00	
Partners Programme for 3 Days	195.00	39.00	234.00	245.00	49.00	294.00	
Congress Dinner only	75.00	15.00	90.00	75.00	15.00	90.00	
B&B at Woodbury Park Hotel - single	Rooms are		75.00	Rooms are		75.00	
B&B at Woodbury Park Hotel - double	guaranteed		95.00	not guaranteed		95.00	

## About the Venue

Woodbury Park is a magnificent 500 acre complex set among rolling hills above the South West English coastline, only a few 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 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.

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 this country'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.

**Woodbury Park, Exeter, EX5 1JJ, UK**

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[enquiries@woodburypark.co.uk](mailto:enquiries@woodburypark.co.uk)

[www.woodburypark.co.uk](http://www.woodburypark.co.uk)

## About the MIRCE Akademy

**The MIRCE Akademy is an independent research and education institution, established in 1999** by Dr J. Knezevic, to engage in scientific, educational, training, literary and professional endeavours for **Managing In-service Reliability, Cost and Effectiveness, MIRCE**, based on the scientific principles of Mirce Mechanics. Our contribution to humanity is the body of unique knowledge that is essential for creating, managing and maintaining systems that deliver maximum functionality, with least possible investment in resources and impact on environment, while maximising economic and social benefit to the society.



*MIRCE Akademy is a division of Mirce Science Limited, which is a private company registered in England and Wales. Company Reg. No. 3675242. Registered Office, Woodbury Park, Exeter, EX5 1JJ, UK. MIRCE is a trademark registered in the United Kingdom under No. 2338979 in respect of printed training materials, books, education, training, scientific research and consultancy in the name of Mirce Science.*



# 1<sup>st</sup> World Congress of Mirce Mechanics 28-30 May 2012

## Registration Form

Email: [quest@mirceakademy.com](mailto:quest@mirceakademy.com)

Phone: +44 (0) 1395 233 856

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

Web site: [www.mirceakademy.com](http://www.mirceakademy.com)

THIS FORM MAY BE COPIED

Please select appropriate level of service and corresponding fee.

Group discounts are available please contact us.

### The Symposium Fees includes:

- Attendance
- Congress Papers and Supporting Materials
- Lunches and Light Refreshments
- Gala Dinner on 28<sup>th</sup> May
- Visit to Nigel Mansell World of Racing
- Fish & Chips Event

### Value Added Tax (VAT)

Unless special exemption exists, under UK Customs and Excise regulations delegates from all countries are required to pay UK VAT @ 20 % 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 \_\_\_\_\_

Tel \_\_\_\_\_ Fax \_\_\_\_\_

E-mail \_\_\_\_\_

Special requirements Yes  No

Please specify \_\_\_\_\_  
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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 \_\_\_\_\_

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Please Charge credit card £ \_\_\_\_\_

Visa  MasterCard  Amex

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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.