



19-21 September

ESMATS

12th European Space Mechanisms And Tribology

Symposium 2007

Liverpool, UK

Second Announcement
and Preliminary Programme



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19th – 21st September 2007

Aims and Scope of the Symposium

The aims of the Symposium are

- to foster a dialogue between space mechanisms engineers on the design, development, testing, production and in-flight experience of spacecraft and payload mechanisms,
- to encourage personal contacts in the mechanisms and tribology community,
- to provide a networking opportunity for small and medium-sized companies and for the transfer of technology to and from space applications,
- to promote awareness that space opportunities afford sustainable industrial growth.

Format of the Symposium

The Symposium is organized on the basis of plenary and poster sessions. Visits to the Posters and Technical Exhibition (mechanisms hardware) will be announced by the session chairmen.

The Organisers

- <http://www.esa.int/>
- <http://www.cnes.fr/>
- <http://www.esrtechnology.com/>

The Sponsors

- <http://www.sula.co.uk/>
- <http://www.space.eads.net/>
- <http://www.astos.org.uk/>
- <http://www.ruag.com/ruag/>
- <http://www.sstd.rl.ac.uk/>
- <http://www.bnsc.gov.uk/>
- <http://space.epfl.ch/>
- <http://www.merseyside.org.uk/>

Symposium Information

All information is available on the ESMATS 2007 homepage: <http://www.esmats2007.co.uk>

Symposium Programme

Tuesday 18th September

12:00-19:00 Pre-registration at the Crowne Plaza Hotel,
Liverpool
(Exhibitors installation from 17.00)

Wednesday 19th September

08:30-09:30 Registration at the Crowne Plaza Hotel,
Lucerne
(Exhibitors installation until 09.00)

Opening Session

09:30-10:00 *Dr. E. Roberts (ESR Technology Ltd, UK)*
Mr. P. Kerhousse (ESA/ESTEC, NL)

10:00-10:30 Invited Speaker:
Dr. D. Williams (BNSC, UK)

10:30-10:45 Invited Speaker:
Mr. A. Borrien (CNES, FR)

10:45-11:15 Invited Speaker:
"LISA Pathfinder Mission & Challenges"
Pr. S. Vitale (University of Trento, I)

11:15-11:40 Coffee break

Session 1: Mechanism Components (1)

Chairman: F. Artigas (SENER, E)

11:40-12:00 Arc Phenomena in Space Environment and
Equipments (APSEE)

P.A. Maüslj, G. Feusier et al

12:00-12:20 Innovative Contactless Slip Ring

M. Privat and D. Schwander

12:20-12:40 Potentiometer Development Testing

R. Lenagan

12:40-13:00 Development of Strain Wave Gearing for
Space Applications

K. Ueura, Y. Kiyosawa et al

13:00-14:00 Lunch

Session 2: Pointing & Deployment Mechanisms (1)

Chairman: Ph. Guay (CNES, FR)

14:00-14:20 Root Cause Investigation on the SAD-LP
Solar Array Drive Mechanism

B. Wood, P.J. Schüngel et al

14:20-14:40 26kW Solar Array Drive Mechanism
Development

S. Bamford

14:40-15:00 High Temperature Tests of Antenna
Pointing Mechanism for BepiColombo
Mercury Planetary Orbiter (MPO)

J. Murer and R. Harper

- 15:00-15:20 Passive Magnetic Bearing Hinge
Ch. Martin
- 15:20-15:40 Study, Design and Component Testing of an Advanced Scan Mechanism
B. Heinrich, M.J.Anderson et al

15:40-16:20 **Poster session / Coffee break**

Session 3: Tribology (1)

Chairman: R. Seiler (ESA/Estec, NL)

- 16:20-16:40 The Tribological Characteristics of Dicronite
M.J. Anderson, M. Cropper et al
- 16:40-17:00 Self Lubricating Copper Composites for tribological applications at Medium Temperatures in Space
A. Merstallinger, M. Fink et al
- 17:00-17:20 An Initial Examination of Nano-Fullerene Coatings as Potential Space Lubricants
M. Cropper, E.W.Roberts et al
- 17:20-17:40 Dynamic Adhesion Measurement of the Grabbing Positioning and Release Mechanism for LISA Pathfinder
M. Benedetti, D. Bortoluzzi et al
- 17:40-18:00 Solid Lubrication of Ball Bearings Operating at High Temperature
M.R.Hampson, E.W.Roberts, et al
- 19:00-21:00 **Cocktail reception at Merseyside Maritime Museum**

Thursday 20th September

Session 4: Pointing & Deployment Mechanisms (2)

Chairman: M. Falkner (Austrian Aerospace, A)

- 09:00-09:20 The Design and Development of a Multi Element Telescopic Boom
M. Humphries, A. Haslehurst et al
- 09:20-09:40 Adjustable Sub-reflector Mechanisms
C. Composizo, J. Maria Arroyo et al
- 09:40-10:00 Hydraulic Actuator for the LISA Pathfinder Caging Mechanism
M. Biserni, S. Caselli et al
- 10:00-10:20 Development of a Piezo Actuated Release Mechanism for LISA Pathfinder
I. Köker, S. Durrant et al
- 10:20-11:30 Extended **Poster session / Coffee break**

Session 5: Instrument Mechanisms (1)

Chairman: J. Sprunck (Lockheed Martin, USA)

- 11:30-11:50 JWST NIRSpec Cryogenic Light Shield Mechanism
R. Sharma, K. Hale
- 11:50-12:10 Breadboard Testing for the JWST NIRSpec Grating and Filter Wheels
K. Weidlich, M.M.Ellenrieder et al
- 12:10-12:30 The Cryogenic Refocussing Mechanism for JWST NIRSpec
G. Mondello, M. Di Giampietro et al

12:30-12:50 Design and Qualification of the Cryogenic Cover Mechanism for JWST MIRI
U.Langer, A.Neukom et al

12:50-14:00 Lunch

Session 6: Tribology (2)

Chairman: Ph. Vergne (INSA Lyon, FR)

14:00-14:20 Effect of Ceramic Ball and Hybrid Stainless Steel Bearing/Wheel Combinations on the Lifetime of a Precision Translation Stage for the SIM Flight Project
C.J. Lo, K. Klein et al

14:20-14:40 Recent Developments in Performance & Lifetesting of Self-Lubricating Bearings for Long-Life Applications
S.D. Lewis, M.J. Anderson et al

14:40-15:00 Bearing Lifetimes of Two Fluid lubricants in Oscillatory Motion at Elevated Temperatures in Ultrahigh Vacuum
J.F. Braza, M.J. Jansen et al

15:00-15:20 Impact of Cage Design on Ball Bearing Torque Behaviour
G. Munro, R.B. Watters et al

15:20-15:40 Use of Cumulative Degradation Factor Prediction and Life Test Result of the Thruster Gimbal Assembly Actuator (TGA) for the Dawn Flight Project
C.J. Lo, J.R. Brophy et al

15:40-16:20 **Poster session / Coffee break**

Session 7: Mechanism Components (2)

Chairman: E. Sawyer (Rutherford Appleton Lab., UK)

16:20–16:40 High Precision Duplex Bearing with Thermal Off-load Device for the NIRSpec Wheels
C. Neugebauer and M. Falkner

16:40–17:00 Lessons Learned on the Use of Wave Springs in Space Mechanisms.
R. Nalbandian

17:00–17:20 Ultra-Light Self-Motorized Mechanism for Deployment of Light Weight Reflector Antennae and Appendages
C.Boesch, C.Pereira et al

17:20–17:40 Evaluation of Piezoceramic Actuators
L. Cadiergues, Ph. Baviere et al

17:40-18:10 **Invited Speaker**

Jorge Vago (Exploration Missions Scientist, ESA/Estec, NL)

19:00-19:30 Coaches depart from Crowne Plaza for St George's Hall

20:00 **Welcoming Reception & Symposium Dinner at St George's Hall**

(please advise the local organiser as soon as possible if you have any special dietary requirements)

Friday 23 September

Session 8: Exploration Mechanisms

Chairman: P.A. Maüsli (Ruag Aerospace, CH)

- 09:00-09:20 Ultra-Light Dust Wiper Mechanism for Mars
R. Cabás, D. Fernández et al
- 09:20-09:40 Linear Electro-Mechanic Actuators (EMA) for the International Berthing and Docking Mechanism (IBDM)
E. Urgoiti, E. Hurtado et al
- 09:40-10:00 Lessons Learned from the IBDM Latching System Pre-developments
D. Vrancken, K. De Vriendt et al
- 10:00-10:20 Mole Carried Sensor Package
R. Gelmi, M. Izzo et al
- 10:20-10:50 **Poster session / Coffee break**

Session 9: Instrument Mechanisms (2)

Chairman: C. Garcia Marirrodriaga (ESA/Estec, NL)

- 10:50-11:10 The Design and Qualification of the Piezo Actuated Optical Delay Line for LISA Pathfinder
R. Le Letty, F. Barillot et al
- 11:10-11:30 Development of a Breadboard Cryogenic Optical Delay Line for DARWIN
T.C. van den Dool, W.L.M. Gielesen et al

11:30-11:50 Parameter Estimation of Electromechanical Systems
S. Schwarz and H. Langenbach

11:50-12:10 Shutter Mechanism for the Pleiades High Resolution Instrument
J.A. Andión and R. López

12:10-12:30 Conclusions - Closing remarks

12:30-13:30 Lunch

In the afternoon a technical visit is planned to ESTL, ESR Technology Ltd. (note places are very limited for this visit)

Posters

Miniature Mechanisms

- P01** Solar Array Panel Self-Contained Deployment System
A. Skullestad
- P02** Piezo Based Long Travel Actuators in Special Environmental Conditions
K.-D. Muller, H. Marth et al
- P03** Preliminary Development of Actuators for a Bearing Active Preload System (BAPS)
S.D. Lewis, G. Munro et al
- P04** High Precision Micro Positioning Systems Used in UHV
D. Reinhard

Payload Mechanisms

- P05** A High Accuracy Four Position Tilt Mechanism
F. Tahmasebi and D. Jones
- P06** Development of the Lid Opening Mechanism "LOM"
B. Schmid, P. Flueli et al
- P07** Antenna Deployment and Pointing Mechanism
Alain Gossant
- P08** SEPTA41EV - A Fully Integrated SADA
S. Michaud, J. Rabin et al
- P09** Telescopic Boom Development for Space Applications
O. Carrion, V. Pires et al
- P10** MATLAB Modelling of the High Power SADM
John Shiell
- P11** IBDM – International Berthing Docking Mechanism
D. Vrancken, K. De Vriendt et al

Mechanism Components

- P12** Electrically Powered Separation Devices
B. Little
- P13** Development of a High Performance Angular Sensor for Space Applications
M. Kiryuu, Y. Karasawa et al

- P14** New Motor Bonded Assembly
B. Bonduelle, C. Casteras et al
- P15** Rare Earth Permanent Magnets for Cryogenic Space Applications
S. Scheithauer, T. Junginger et al
- P16** Low Induced Shock Actuator Release Mechanism for Satellite and Launcher Platforms
G. Robert and A. Chartier
- P17** Doing More With Less: Innovative, New Lightweight Harmonic Drive Component Sets
P. Bourlier, Dr I Schäfer et al

Tribology

- P18** Tribological Behaviour of PEEK Composites in Vacuum Environment
G. Theiler and T. Gradt
- P19** Health assessment of MoS₂ lubrication after long-term storage
M. Iwaki, S. Obara et al

SYMPOSIUM INFORMATION

Proceedings

Each participant will be given a handout copy of the Proceedings as hardcopy and a CDROM on the first day of the Symposium.

Language

The working language will be English.

Symposium Fee

The registration fee is GBP 300 + 17.5% VAT. It includes access to all presentations, poster and exhibition area, proceedings, lunches, coffee breaks, cocktail reception, Symposium dinner and buses to the industrial visit and the Symposium dinner.

Registration

The simplest way is to register and pay online at <http://www.esmats2007.co.uk/>

If you cannot register online, payment can be made by money transfer or purchase order and invoice. Please note that payment must be in Pounds Sterling, must include VAT at 17.5% and must be received and processed prior to the event

Catering

Lunch will be a buffet served in the area next to the Auditorium. Coffee breaks will be held in the poster and exhibition area.

Poster Display Space

Posters will be displayed throughout the three days of the Symposium. Poster sessions are planned during the coffee breaks to stimulate discussion and exchanges between participants. Authors of poster presentations will have the possibility to set up their posters on the afternoon before the Symposium and on the morning of the first day of the Symposium.

Exhibition Space

Throughout the Symposium there will be a mechanisms hardware exhibition with demonstrations in the main lobby of the Auditorium.

All of the exhibition stand spaces available for the symposium have now been allocated. This was done (as advised on the website) on a 'first come first served' basis. Those exhibitors who have already reserved their stands will be contacted shortly with detailed instructions.

Venue

The Symposium will be held in the Crowne Plaza Hotel located in the heart of the Liverpool waterfront, a World Heritage Site

Liverpool is a city known throughout the world as rich in music, art, culture and sport. European Capital of Culture in 2008, Liverpool celebrates its 800th anniversary as a city in 2007 and has been recognised by UNESCO as a World Heritage Site. It has good air, road and rail links, as well as excellent venues and attractions

Two airports are convenient for the venue; Liverpool's John Lennon Airport is approximately 8 miles from the city centre and Manchester International Airport is a 35 mile (55km) road journey or 1 hr 10 minutes by train.

Taxis and hire cars are available from both Liverpool and Manchester Airports. Public transport links to Liverpool are frequent. MerseyTravel operates regular bus services between Liverpool Airport and the city centre; there is a bus stop on this route directly outside the Crowne Plaza Hotel. Liverpool's Lime Street Rail Station is only 20 minutes walk from the venue

Delegates are requested to make use of public transport or taxis where possible. Car parking at the Crowne Plaza is limited, as is everywhere around Albert Docks. All of the venues are within easy walking distance of the hotel. A free bus transfer will be provided from the Crowne Plaza Hotel to St. George's Hall for delegates attending the symposium dinner.

For more information, visit www.esmats2007.co.uk

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