

# HIGH-SPEED CRAFT: HUMAN FACTORS, SHOCK MITIGATION AND BOAT DESIGN

*A symposium and workshop to address legislative, performance and injury issues*

Organised by Human Sciences & Engineering Ltd

February 21<sup>st</sup> and 22<sup>nd</sup> 2005.

## Objectives of symposium and workshop:

In today's high-speed world there is an increasing requirement for marine craft to operate at faster speeds. This may increase efficiency but also exacerbates a number of potential problems. When operating high speed craft (HSC) in poor sea conditions, there is an increase in the shock and vibration (S&V) that the crew/passengers and craft are subjected to. For the humans on board, this results in an uncomfortable ride; reduced physical, cognitive and psychomotor performance; and the risk of acute and chronic musculoskeletal injuries. For the craft there is the risk of damage to the hull and equipment. In 2006 new EU legislation for vibration at work will reduce the levels that employees can be exposed to. It is recognised that marine and aviation transport will be unable to meet these limits and so waivers may be required. At the same time the employee's exposure will need to be quantified, mitigation techniques implemented where possible, and an employee health surveillance programme implemented.

As the human should be considered in any systems solution proposed to enhance HSC performance, the interaction between the craft and the crew/passengers must be understood. There is currently a dearth of information on the design/modelling of planning craft hulls (compared to displacement craft) and how the subsequent motion is translated to the humans embarked on the craft. This Symposium and Workshop will examine these issues, identify and document the current state-of-the-art of these and identify ways forward for enhancing performance, reducing the potential risk of injury and addressing the implementation of the impending EU vibration legislation.

The Symposium and Workshop will bring together an international group of end-users, operators, manufacturers, designers, academics and legislative bodies. The objectives of the meeting are:

- Highlight the human factors limitations of HSC operations
- Outline the proposed EU vibration-at-work legislation
- Highlight current planning craft modelling techniques
- Highlight current research being undertaken
- Identify and document current and potential shock mitigation technologies/techniques
- Produce consensus statements on the following topics:
  - Shock and vibration measurement and analysis techniques specific to HSC to allow valid comparisons of data collected from different sources.
  - The implementation of the EU vibration at work legislation for HSC
  - Motion-induced-fatigue/performance degradation experienced on HSC and its assessment techniques.
  - Modelling of the risk of injury from shock and vibration
- Identify a roadmap for future research to enhance HSC operational performance, reduce the risk of injury to personnel, and address the implementation of new legislation
- Establish personal links between researchers in different institutes/laboratories to enhance cooperative and collaborative working
- Identify methods for facilitating future collaboration/cooperation between organisations/agencies
- Disseminate the outputs of the meeting (presentations, consensus statements, etc.) via appropriate channels

The Symposium and Workshop are supported by:



## HIGH-SPEED CRAFT: HUMAN FACTORS, SHOCK MITIGATION AND BOAT DESIGN

Symposium (21<sup>st</sup> February 2005): The Lifeboat College, Room 4

Time	PRESENTATION	Speaker
0900-0910	Introduction	Dr Trevor Dobbins <i>Human Sciences &amp; Engineering Ltd</i>
0910-0930	Been there - done that	Jon Hill <i>RM Poole</i>
0930-0950	Human factors issues	Dr Trevor Dobbins <i>Human Sciences &amp; Engineering Ltd</i>
0950-1030	Shock mitigation in the US	Dr Ron Peterson <i>NSWC-Panama City</i>
1030-1100	<i>Break</i>	
1100-1120	HSC related injury's	Dr Bob Bridger <i>Institute of Naval Medicine</i>
1120-1140	HSC biomechanics	Dr Dale Bass <i>University of Virginia</i>
1140-1200	HSC suspension seat design	Dr Johan Ullman <i>Ullman Design</i>
1200-1220	EU vibration directive	Dr Tom Gunston <i>QinetiQ; Centre for Human Sciences</i>
1220-1230	General questions	Dr Trevor Dobbins <i>Human Sciences &amp; Engineering Ltd</i>
1230-1330	<i>Lunch</i>	
1330-1350	Modelling HSC hulls & seats	Dr Simon Rees <i>Frazer-Nash Consultancy Ltd</i>
1350-1410	Integrated HSC design	Prof Bob Cripps <i>Royal National Lifeboat Institution</i>
1410-1430	A HSC manufacturers perspective	Dr Andrew Humphries <i>VT Halmatic</i>
1430-1450	EPSRC HSC project	Prof Ajit Shenoj <i>Southampton University</i>
1450-1630	Break-out sessions ( <i>including break</i> ); Rooms 2a, 2b, 3a & 4	
	<ul style="list-style-type: none"><li>• End-user requirements</li><li>• Manufacturers needs</li><li>• Human factors design standards</li><li>• The EU vibration directive</li><li>• Current vs. future craft design</li></ul>	
1630-1700	Break-out session feedback	
1700-1730	Open discussions/questions	Dr Trevor Dobbins <i>Human Sciences &amp; Engineering Ltd</i>
1730-1745	Symposium conclusions and workshop briefing for next day	
1830-1900	Bladerunner ( <i>in Auditorium</i> )	Lorne Campbell <i>Lorne Campbell Design.</i>
1900-	<i>Dinner in the Auditorium (Sea Side)</i>	

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Workshop (22<sup>nd</sup> February 2005): The Lifeboat College, Rooms 2a, 2b, 3a & 4c

### Time WORKSHOP

0900-0915 Arrive & coffee.

0915-1200 Workshops start:

### Workshop leader

Session A. Modelling HSC hydrodynamics  
(Room 3a)

Dr Simon Rees  
*Fraser-Nash Consultancy*

Session B. Measurement of S&V in HSC  
(Room 2a)

Dr Sharon Holmes & Dr Tom Gunston  
*QinetiQ; Centre for Human Sciences*

Session C. Measuring fatigue and performance  
(Room 2b)

Dr Trevor Dobbins  
*Human Sciences & Engineering Ltd*

Session D. Modelling/predicting injury  
(Room 4c)

Dr Ron Peterson  
*NSWC-Panama City*

1200-1300 *Lunch in the Slipway Bar*

Reporting way forward (Slipway Bar):

1300-1310 Workshop a.

1310-1320 Workshop b.

1320-1330 Workshop c.

1330-1340 Workshop d.

1340-1400 Future work & collaboration/cooperation

1400-1700 EPSRC/Industry meeting (Room 3a)

### INFORMATION COLLATION

Conference committee (plus additional delegates) will collate information gathered from the symposium and workshop.

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## DELEGATE LIST:

	<b>Name</b>	<b>Organisation</b>	<b>Location</b>	<b>Role</b>
1.	Dr Trevor Dobbins	HS&E	Chichester, UK	Sci
2.	Dr Ron Peterson	US NSWC-PC,	Panama City, FL, USA	Eng
3.	Dr Dale Bass	Univ. of Virginia	Charlottesville, VA, USA	Sci
4.	Jenny Speirs	US NSWC-Carderock	Norfolk, VA, USA	NavArch
5.	Dr Tim Coats	US NSWC-Carderock	Norfolk, VA, USA	Eng
6.	Prof Bob Cripps	RNLI,	Poole, UK	Eng/User
7.	Prof Ajit Shenoi	Southampton Univ.	Southampton, UK	Sci
8.	Dr Dominic Hudson	Southampton Univ.	Southampton, UK	Sci
9.	Dr Weibo Wang	Southampton Univ.	Southampton, UK	Sci
10.	Prof Bob Allen	Southampton Univ. ISVR	Southampton, UK	Sci
11.	Dr Rosemary Dyson	Univ. Coll. Chichester	Chichester, UK	Sci
12.	Dr Sharon Holmes	QQ CHS,	Farnborough, UK	Sci
13.	Dr Tom Gunston	QQ CHS,	Farnborough, UK	Sci
14.	Steve Myers	QQ CHS	Farnborough, UK	Sci
15.	Paul Crossland	QQ FST,	Gosport, UK	Sci
16.	Dr Simon Rees	Frazer-Nash	Bristol, UK	Eng
17.	Dr Andrew Humphries	VT Halmatic,	Portsmouth, UK	NavArch/Eng
18.	Stephen Phillips	SeaSpeed	Chichester, UK	NavArch
19.	Dan Hook	SeaSpeed	Chichester, UK	NavArch
20.	Lorne Campbell	Lorne Campbell Design	Poole, UK	NavArch
21.	John Guille	Navatek	Hawaii, USA	NavArch
22.	Chris Hodge	Chris Hodge TRD Ltd		
23.	Henry Gracia	Chris Hodge TRD Ltd		
24.	Dr Bob Bridger	Inst. Naval Medicine	Gosport, UK	Sci
25.	Tony Springall	DPA Sea Tech. Group	Bristol, UK	Sci
26.	Colin Corbridge	DSTL	Portsmouth, UK	
27.	Jon Hill	RM	RM Poole, UK	User
28.	Paul Brereton	UK HSE	Bootle, UK	Legislator
29.	Andrew Sillitoe	UK MCA	Southampton, UK	Legislator
30.	Dr Johan Ullman	Ullman Design	Gothenburg, Sweden	Sci/Med
31.	Peter van Terwisga	NL MOD	NL	
32.	Dr Jelte Bos	TNO Human Factors	Soesterberg, NL	
33.	Chuck Calvano	ONR-Global	London, UK	

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