

Isis Rebuild

Why...

Because we had a bad day

19th Jan 2011
James Cook JC055



<http://noc.ac.uk>

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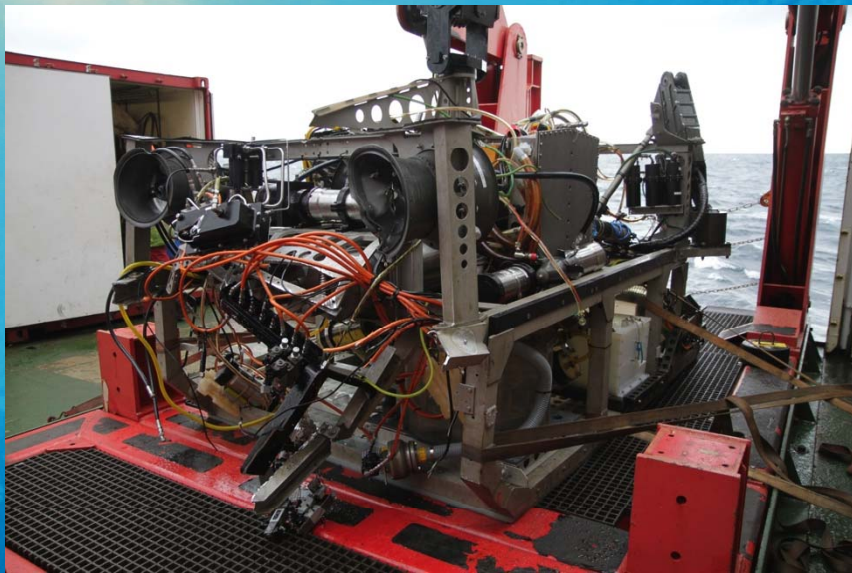
19th Jan 2011
James Cook JC055



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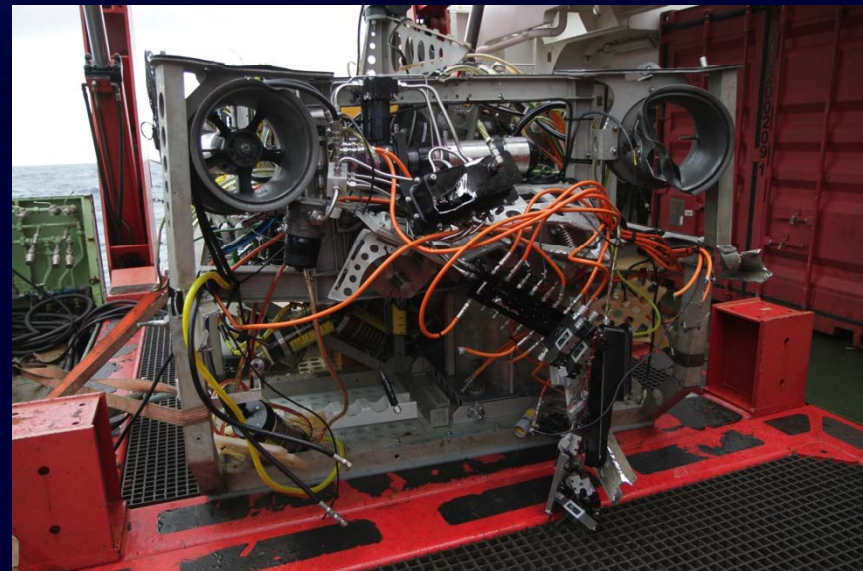
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Port Side Foam Pack



Stbd Side Foam Pack



Isis Rebuild



Budget and Costs:

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Direct Vehicle Replacement:

- Lost Equipment Value: £234,590.00
- Repair Costs: £251,530.00

Total Cost: £486,120.00

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Budget Vehicle Replacement:

- Reducing costs by using some existing spares.
 - Thrusters, Thruster Pods, Lights, and cameras.
- Reducing some capability
- Such as:
 - Swath
 - 2nd HD Camera
 - Homer Master

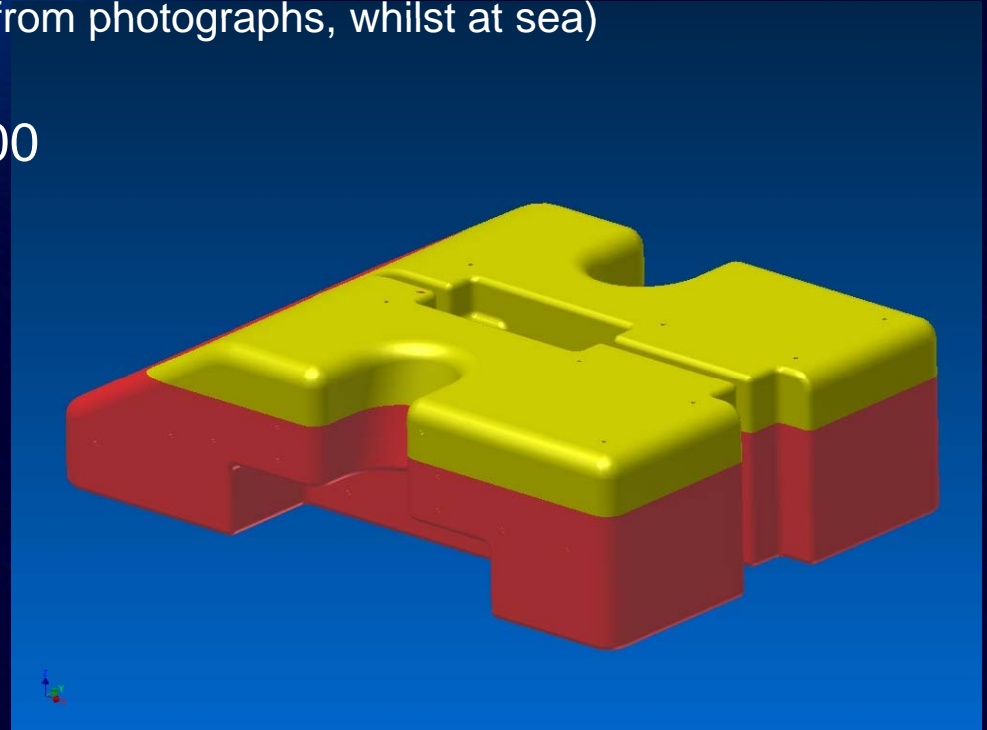
Total Budget Repair Cost:

£200,000.00

Foam Pack:

- Damage sustained:
 - Port Side severely shattered and not repairable.
 - Stbd Side relatively intact and repairable.
- Estimate costs: £53,000.00 (taken from photographs, whilst at sea)
- Costs after evaluation: £168,661.00

Problem!!!!



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Foam Pack:

Options to reduce cost:

1. Use a cheaper higher density foam (DS34) and increase foam pack size with the addition of a front brow.
2. Use a cheaper higher density foam and increase foam pack size to the rear of the vehicle.
3. Use a cheaper higher density foam and increase the height of the foam pack from the underside.
4. Replace both port and stbd side foam packs with a low density foam, but with a depth rating of 5000m max.

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Foam Pack:

Summary:

- Return the Isis ROV to full depth capability of 6500m.
- Maintain the essential scientific payload of 90kg.
- Negate risks associated with making design modifications (affecting tilt, list and center of buoyancy), which would be associated with other cheaper materials.

Outcome:

Additional funds acquired. 😊

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Foam Pack:

Current Status:

- Foam pack ordered.
- Manufacturing in progress.
- Pressure testing early March
- Delivery expected end Mid March 2012.



New Port Side Block



Repaired Starboard
Side Block

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Frame:

- Slight re-design to improve stiffness.
- Improvements to ease manufacture and to reduce cost.
- Modifications to incorporate European sizes and materials.
- Frame design re-modeled for stress analysis.
 - 100kN applied to lift point
- Physical load test and die penetrant of welds following manufacture.
 - 68,670N (7T) applied to lift point. (providing an excess of 5T swl on a 1.25 fos)

Isis Modified Frame Design



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A: Static Structural (ANSYS)

Equivalent Stress

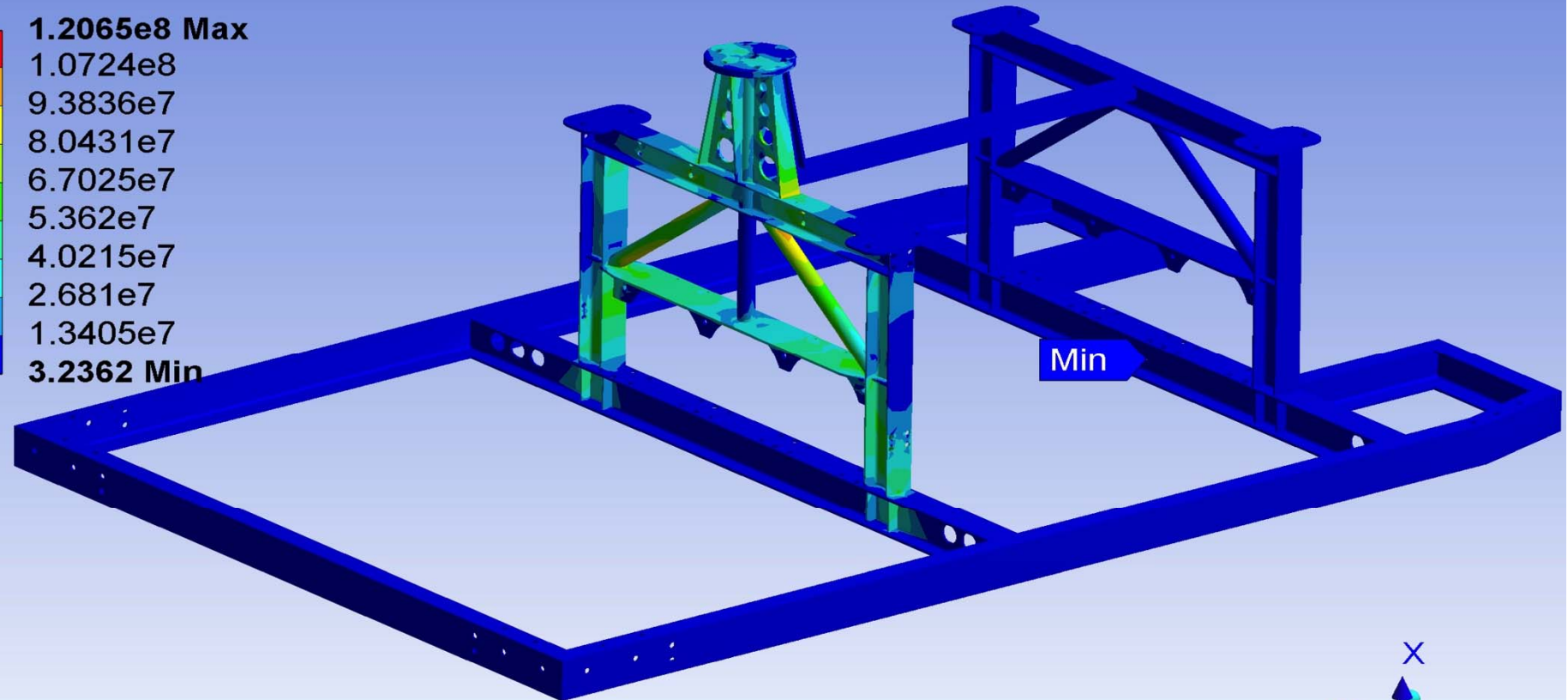
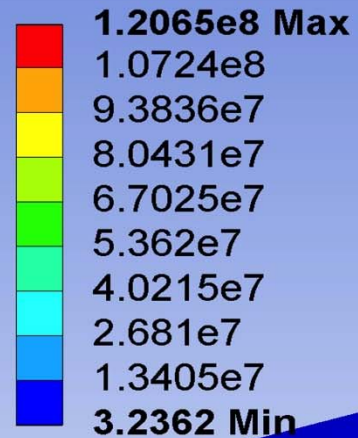
Type: Equivalent (von-Mises) Stress

Unit: Pa

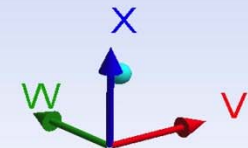
Time: 1

16/11/2011 16:52

100kN force applied to lift point



0.000 0.500 1.000 (m)



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Frame:

Current Status:

- Suppliers identified and quotations received.
- Approx cost £12,000.00 ex VAT.
- Manufacturing complete.
- Ready for bead blast and heat treatment.
- Problems with heat treatment identified.
- Delivery expected mid March 2012.

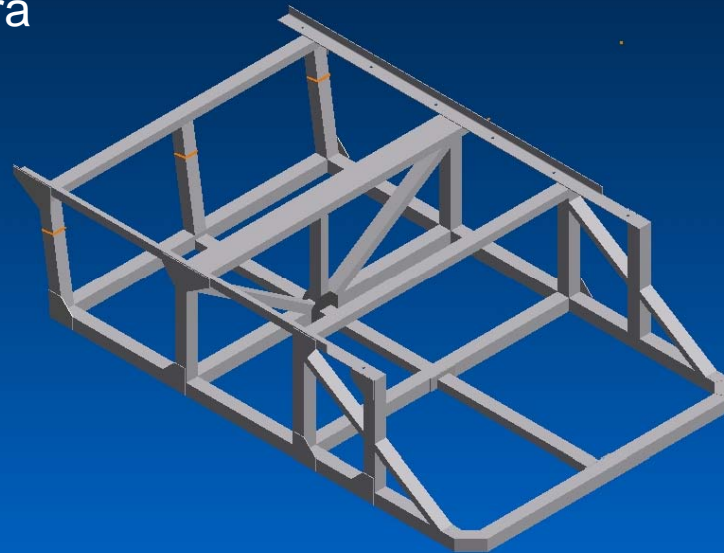


Frame complete
and ready for bead
blasting

Unfortunately centre
section may need to
be removed for heat
treatment

Tool Sled:

- Slight Redesign.
 - Modified centre beam so as to sit directly below centre beam of the frame, allowing better load transfer from the lift point.
 - Stiffer rear section, achieved with the removal of dog leg rear uprights.
 - Additional rear beam to supply extra support to the rear of the vehicle frame.
- Limitations:
 - Due to time restraints and money, minimal redesign has taken place on the frame and tool sled.



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Tool Sled:

Current Status:

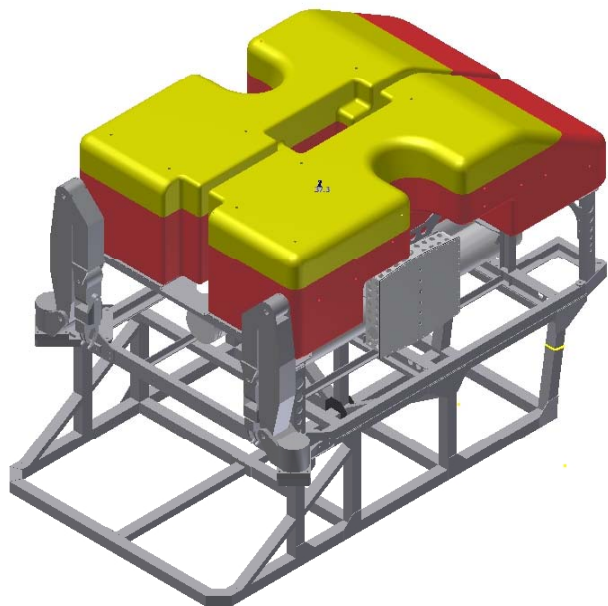
- Suppliers identified and quotations received.
- Approx cost £3,000.00 ex VAT.
- Manufacturing complete.
- Bead blasting imminent.
- Delivery expected end Feb 2012.



Tool Sled complete
and ready for bead
blasting

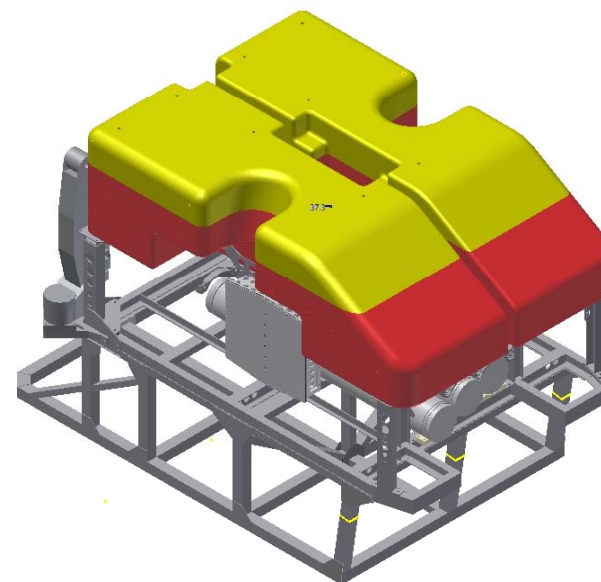
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New Look Isis



Unfortunately:

- To the untrained eye. Not a lot of difference.



Current state of the Isis Rebuild

ROV hanger, NOC



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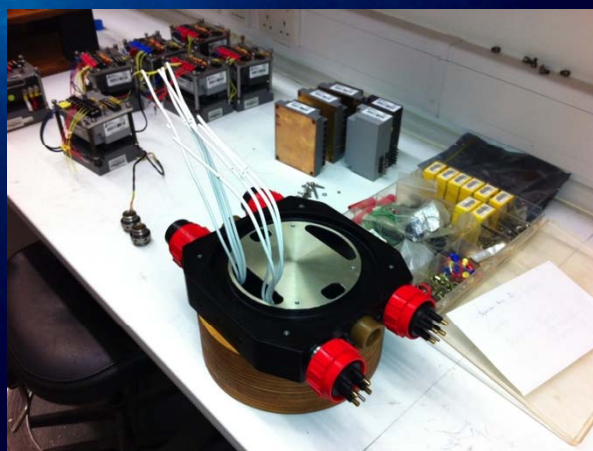
Motors

Housings

- All existing motors used
- Stripped and tested



Thruster Assy



Pods





Isis titanium pressure tubes

• Pressure tested to 10,000psi



High and low power electronics



End cap with pucks removed



End cap assemblies

Hydraulic System



New valves

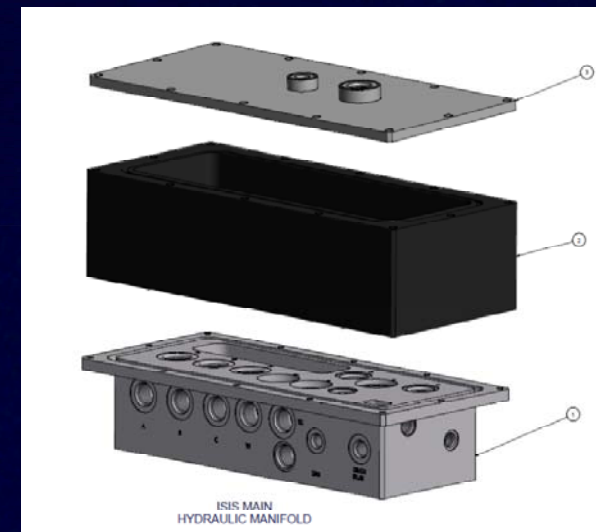


Damaged 8 function valve pack



Damaged main hyd valve pack

Modified and re-modeled valve pack



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Schedule / Timescale:

- Full build trials cruise onboard the RRS James Cook
 - Planned for Mid August 2012
- First science cruise (Antarctic).
 - Provisionally Planned for End Nov to Dec 2012