First Technology Safety Systems

Design Freeze Status

FLEX-PLI-GTR Development
Instrumentation and Electrical Design

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FTSS Europe
Comments addressed from Design Freeze meeting
February 20th 2008, JARI, Tsukuba, Japan
Update February 29th, 2008
Introduction
Introduction
<table>
<thead>
<tr>
<th>Channel</th>
<th>Purpose</th>
<th>Standard</th>
<th>Option</th>
<th>DAS</th>
<th>Priority</th>
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<td>Femur moment 1, 2 and 3</td>
<td>Calibration</td>
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<td>Lab</td>
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</table>
Strain Gauges and Wiring

- Kyowa KFRP-2-350-C1
- Uni-axial, 2mm length, 350 Ohm
- Base size 5x10mm
- Kyowa: please check the JARI specs
- Open issues:
  - Wires type selection
  - Adhesive selection
  - How to fix leads and bridge resistors
Packaging ligament elongation stringpots

Space Age Control
150 series
19*19*10mm
49G acceleration
38mm stroke
2xLH & 2xRH pull
Bronze wire guides
Single axis accelerometer
x-direction for certification

- Mounted behind Nylon Impact Cover
- Threaded metal inserts to enable thread repair
- Measurement specialties M62, Endevco 7264, Kyowa?
Packaging Connectors & Wiring

Develop wire count in co-operation with DAS application
Wiring Diagram Tibia 51 pin

Connectors and wiring may need to be tailored DAS specific

Standard optional channel capacity

6-12 ch. Analog
To DAS

4ch 3ch 3ch S S 6-12ch

Options

MCL ACL

Potentio-meters

51pin

Connector block T

Strain gauges full bridge
Connectors and wiring may need to be tailored DAS specific.
Connectors agreed

**single channel**

- Omnetics: www.omnetics.com
- Male and female connector pins protected
- Plastic circular design
- Plastic housing, screw strain relief
- Repair by hand soldering possible and need epoxy potting for strain relief
- Can be done trained staff

**multi channel**

- AirBorn: www.airborn.com
- Male and female connector pins protected
- Military spec. Nano D type
- High conductor density
- Spacing 0.025 inch = 0.64mm
- Metal housing, screw strain relief
- Cables pre wired by manufacturer by crimping and potting
- Repair by splitting the cable and a pig tail connector

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Plastic Circulars

Series MCS (Female)
Page 26 and 27
Cables agreed

- Cables will influence free flight motion
- How much is highly dependent on test set up wire routing
- Wire gauge is a trade off:
  - thinner wires will easily damage
  - Thicker wires/cables will influence free flight accuracy
- We have to route 50 wires out, without compromising flexibility, the common practice is to use several smaller cables instead of a large one
- We propose three 21 conductor cables, each of which has a diameter of 4 mm
- MSC Cable sample was send to JARI and agreed during the meeting
Detail Design Issues

• Detail design wire count and connectors in collaboration with DAS application
• Optimized wire routing and wire lengths
  – Allow for motion and stretching of wires
  – Wire clamping provisions
• Mark bone for assembly position reference
• Rounded edges in wire route
• Colour coded cables
• PCB design of standard features
• Wiring diagrams
Schedule, future activities, etc.

- Inform FLEX-TEG members development status end February
- Drawings February 22nd – mid April
- 6th FLEX-PLI-TEG meeting, March 31st Germany
- Prototype Manufacturing 1st April – 28st July
- Prototype Testing and calibration 29 July- End September
- GTR prototype Delivery End September 2008
Design frozen!