SIMPACK ANALYSIS AT LAND ROVER

Bob Thurman
LICENSES

• Used SIMPACK for 4 years.
• Currently 2 licenses in Land Rover held by Chassis Design Analysis.
• Are investigating further uses.
CHASSIS DESIGN ANALYSIS
(D. BOON)

Strength & Durability
IDEAS

Handling
ADAMS

Vibration & Comfort
SIMPACK
WHY USE SIMPACK?

• Solver much quicker than ADAMS.
• Solver more robust than ADAMS.
  – ADAMS can suffer from numerical instability.
• The addition of flexible bodies is straightforward.
WHY USE ADAMS?

• Many people trained.
• Customised analysis processes.
• Group standard handling tool.
USERS

• SPENCER SALTER
  – ssalter6@landrover.com
  – *44 1926 646353

• BOB THURMAN
  – bthurman@landrover.com
  – *44 1926 646659
ANALYSIS PROCESS

CUSTOMER REQUIREMENTS

OBJECTIVE VIBRATION TARGETS

VIBRATION ANALYSIS

OBJECTIVE TEST

SIGN OFF
ANALYSES COVERED

• RIDE.
• TIP IN/ TIP OUT.
• SHUDDER.
• IDLE.
• SHIMMY (NIBBLE).
+ GENERATE LOADS.
MODEL TYPES

• Generally use a full vehicle model with all suspension components modelled.
• Successfully using flexible bodies.
MODEL LAYOUT
BRIDGE JUMP

Landrover, Bob Thurman
IDIOT START
FLEXIBLE BODIES

• STRAIGHTFORWARD
• FILE SIZE 1.5 Mbytes
• ACCURATE
## ACCURACY

### EXISTING CHASSIS FRAME

<table>
<thead>
<tr>
<th>Torsion Rate</th>
<th>1st Bend</th>
<th>1st Torsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured</td>
<td>2769</td>
<td>22</td>
</tr>
<tr>
<td>SIMPACK</td>
<td>2725</td>
<td>22.66</td>
</tr>
<tr>
<td>% Difference</td>
<td>-1.6</td>
<td>-3.0</td>
</tr>
</tbody>
</table>
RESPONSE AT LH SEAT RAIL VERTICAL TO SINGLE INPUT AT TYRE

Graph showing the response at LH seat rail vertical to single input at tyre, with acceleration in m/s^2 RMS plotted against frequency in Hz. The graph compares flexible body and rigid body responses.

Landrover, Bob Thurman
THE FUTURE

- MODELLING ELECTRONIC CONTROL, LINKING TO SIMULINK.
- IMPROVED MODELLING OF ELASTOMERS.
- OUTPUT LOW FREQUENCY NOISE FILE TO PLAY THROUGH SPEAKERS.