CAE-IF : R3S and Pilot #3
RESULTS SUMMARY

JM Crepel, CITRAN/AFNeT
March 12, 2019
R3S scope

• Same simple test suite than R1S:
  • Beam modeled with rod, bar, shell or solid elements
  • Lumped and/or distributed applied forces

• But process extended to the FEA round trip:
  • Focused on input data regeneration in CAE solver format
  • The rerun sequence will be executed by the LOTAR EAS_WG
    and is not due by the participants

• In addition to R1S:
  • New statistics added
  • FEA validation properties to be assigned
    Postponed
R3S schedule and milestones

• Kickoff : PDES/LOTAR meeting
• Conf call every 3 weeks

• Re-run trials
  • From Oct, 31 to Nov, 28 - Feb 28, 2019

Extended by 2.5 months

3 trial loops
CAE-IF R3S : round trip process focusing on input translated data

- Input FEA data (original)
- Input STEP (native)
- Input STEP (target)
- Input FEA data (regenerated)
- Output FEA data (rerun)
- Output FEA data (original)

Statistics check
Input/ native statistics
Input target statistics

Actual : Visual check

Visual check (sampled)
STEP translation results

- SFA : RAS

- EDM check : 3 remaining errors
  - uniqueness rules violations (ATS1, ATS2, ATS3, ATS4)
    - -> dummy nodes v/ nodes name attribute
  - WHERE rule violations (ATS2, ATS3, ATS4)
    - -> FEA_PARAMETRIC_POINT
  - unset mandatory attributes (ATS4)
    - -> VOLUME_3D_ELEMENT_LOCATION_POINT_VARIABLE_VALUES

  Being fixed soon

  Under investigation
R3S statistics

- 100% passed (unless metadata and VP)
- No more error captured

Need to further analyze Nastran regenerated files
# Nastran regenerated files

<table>
<thead>
<tr>
<th>From STEP</th>
<th>Regenerated by</th>
<th>ATS1</th>
<th>ATS2</th>
<th>ATS3</th>
<th>ATS4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-run completed</td>
<td>A</td>
<td>-›A</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-›B</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>B</td>
<td>-›A</td>
<td>ok</td>
<td>ok</td>
<td><strong>Bad prop_id management</strong></td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td>-›B</td>
<td>ok</td>
<td>ok</td>
<td>Ok</td>
<td>ok</td>
</tr>
</tbody>
</table>

| Equivalent results | A | -›A | ok | ok | PLOAD2 Sign error | ok |
| |  | -›B | ok | ok | ok | Fixed field issue |
| B | -›A | ok | ok | ---- | ok | Fixed field issue |
CAE-IF R3S : Nastran regenerated files statistics

<table>
<thead>
<tr>
<th></th>
<th>ATS1</th>
<th>ATS2</th>
<th>ATS3</th>
<th>ATS4</th>
<th>% passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-run completed</td>
<td>4/4</td>
<td>4/4</td>
<td>3/4</td>
<td>4/4</td>
<td>94%</td>
</tr>
<tr>
<td>Results OK</td>
<td>4/4</td>
<td>4/4</td>
<td>2/3</td>
<td>2/4</td>
<td>75%</td>
</tr>
</tbody>
</table>

Remaining issues

- Critical (not equivalent model)
  - Formatting issues : Fixed field management
  - Element property id management
  - Surface loads orientation

- Non critical (equivalent model)
  - Title and load case identifiers
  - Element numbering
  - Element property numbering

- To be considered later
  - Multi coordinate system management
  - Output request (PBAR : location of stress recovery)

Conclusions

- Critical issues being fixed soon
- Big improvement thanks to extension of R3S
- Efficient cooperation between participants
- Further items to be addressed in future test rounds
R3S : lessons learnt

- AP209 EXPRESS Schema corrected
- Calculation of resultant moment fixed
- Opened discussion on :
  - « equivalent FEA model »
  - Titles and identifiers translation
  - Output request : point location for stress recovery
R3S results: conclusion

• General
  • Big improvement since last offsite meeting in Darmstadt
  • Very efficient cooperation between participants

• Statistics
  • Metadata (title & other ids) and FEA validation properties have been postponed to R4S
  • All other statistics are OK. Calculation of resultant moment has been fixed.

• Still some (minor) syntax issues in the STEP files for 1 participant

• Regeneration of Nastran files
  • 75% round trip processed with correct results regeneration
  • Remaining critical issues identified will be fixed quickly
  • But still further items to be addressed

On track for the Live Demo @ NAFEMS WC19 → Task will be monitored task by EAS_WG
LOTAR Offsite meetings
WS@Jacksonville
WS@Darmstadt
WS@Asheville
WS@Toulouse
WS@Atlanta

LOTAR EAS
pilot study #3
initial
TM
actual
pilot study #4
Actual planning (tentative)

NAFEMS WC - Live demo

CAE-IF
CAE-IF meetings
KO
CC
CC
CC
TM
CC
CC

CAE-IF Round tests
Fall CAE round test #3
M1
M2
M3
M4
M5

Spring CAE round test #4
M1
M2
M3
M4
M5

Milestones
R3S Kickoff meeting
R3S Technical meeting
R4S Kickoff meeting
R4S Technical meeting

End of development

Live Demo preparation
Pilot study #4
NAFEMS WC19

Milestones
Fall CAE round test #3
Spring CAE round test #4

CAE-IF
Hand Over

Hand Over

Test suite and relevant Rec Pract. Release
M2/initial STEP files and native Stats due
M3/release of checked STEP files for testing
M4/initial target stats due
M5/preliminary results available

CAE-IF / EAS master planning and concurrent tasks