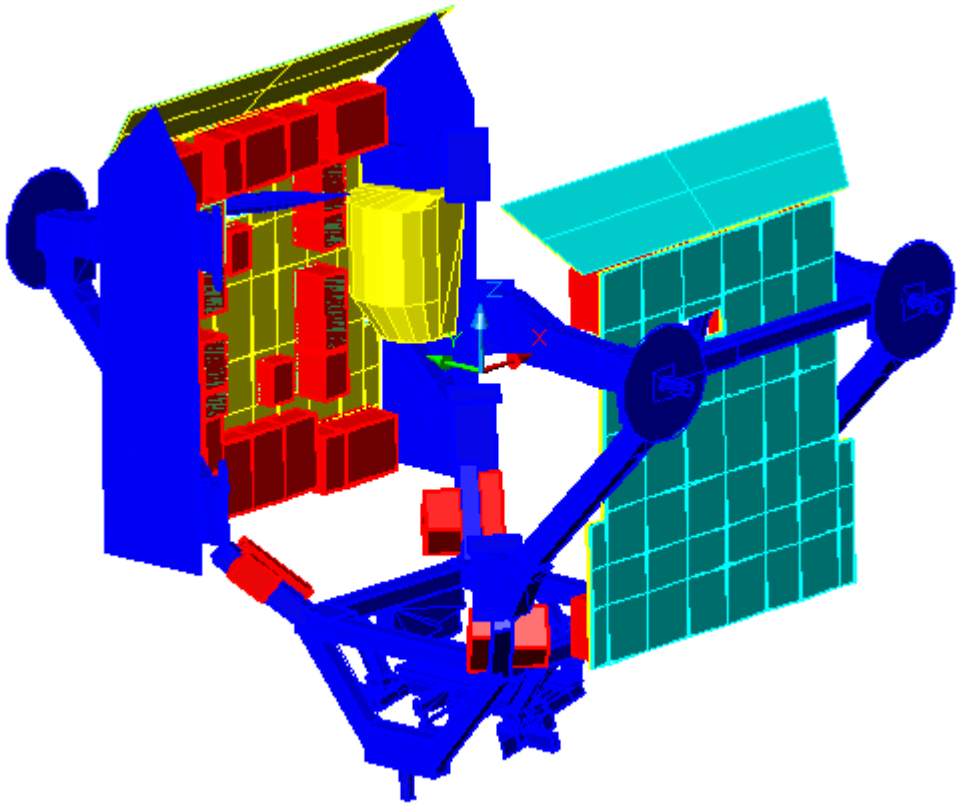
AMS02
Electronic Crates

M. Cova

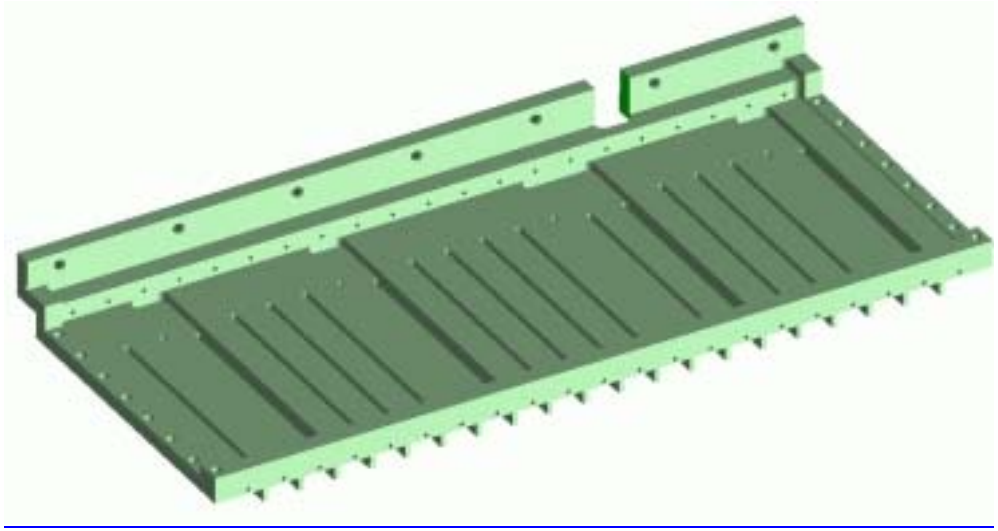
Subsystem overview

Positioned on RAM and WAKE radiators



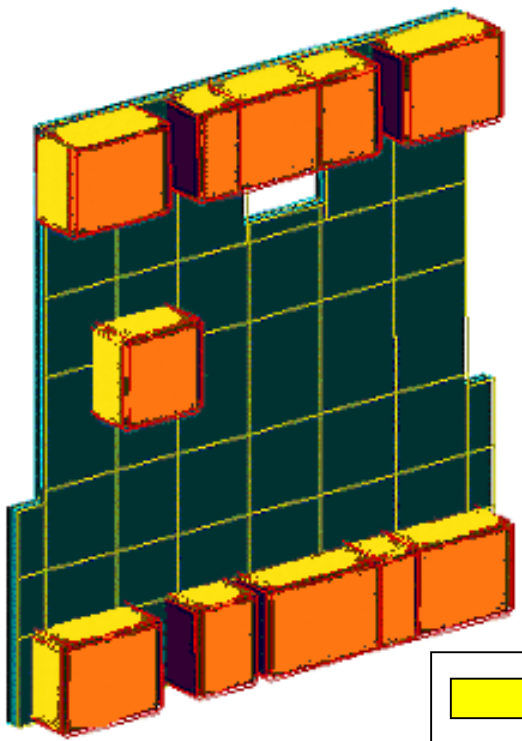
Thermal Control Concept

1. Heat from boards to radiator
2. SIGRAFLEX at crate/radiator interface for thermal/EMI purposes (cho-therm tested so far)
3. Variable thickness
4. Cables slots

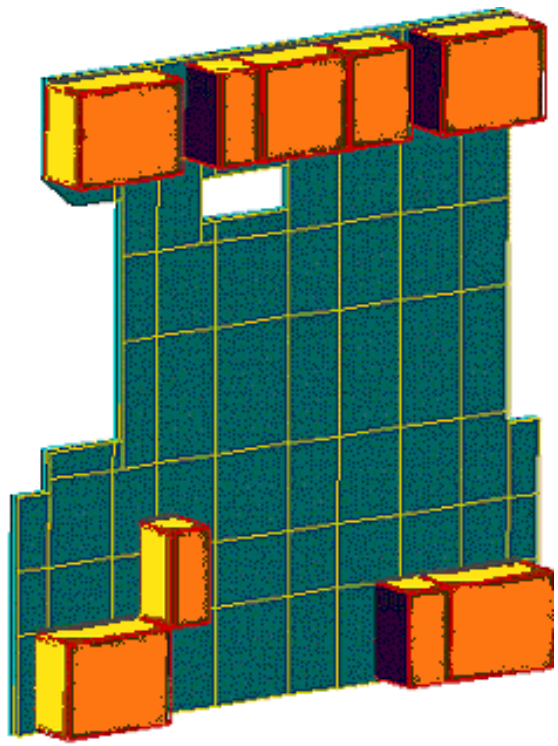


MLI

RAM



WAKE



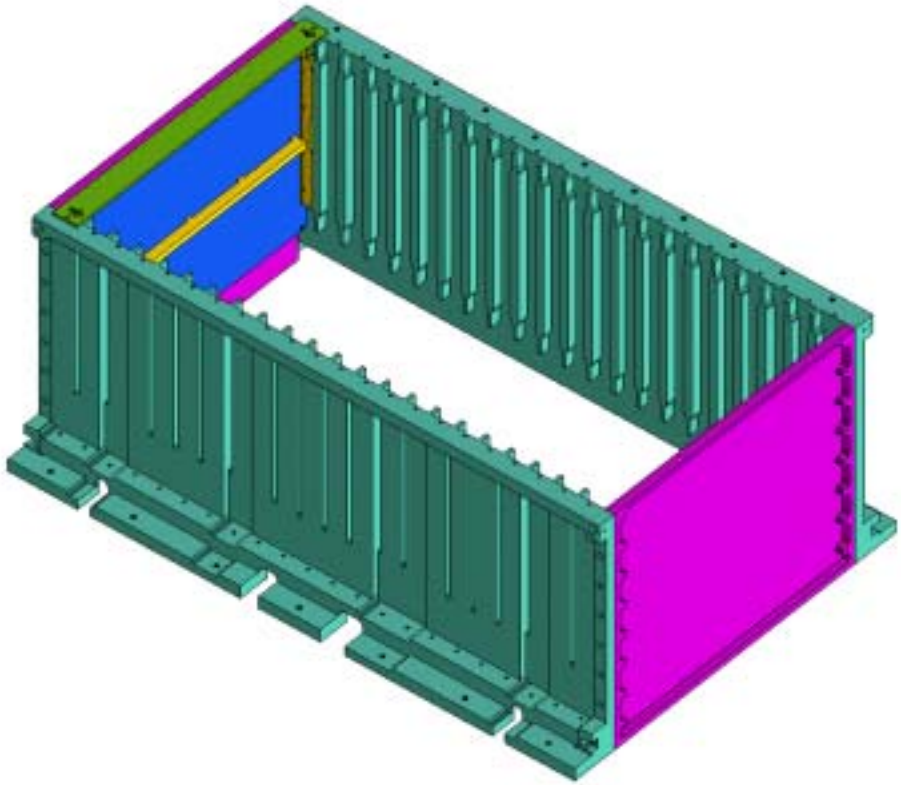
MLI
Cables (Beta Cloth, TBC)
White Paint

Requirements

- TRP: radiator I/F on the box side (foot)
- Operative range

  [-20ºC;+50ºC]
- Non operative range

  [-40ºC;+80ºC]



Correlated model

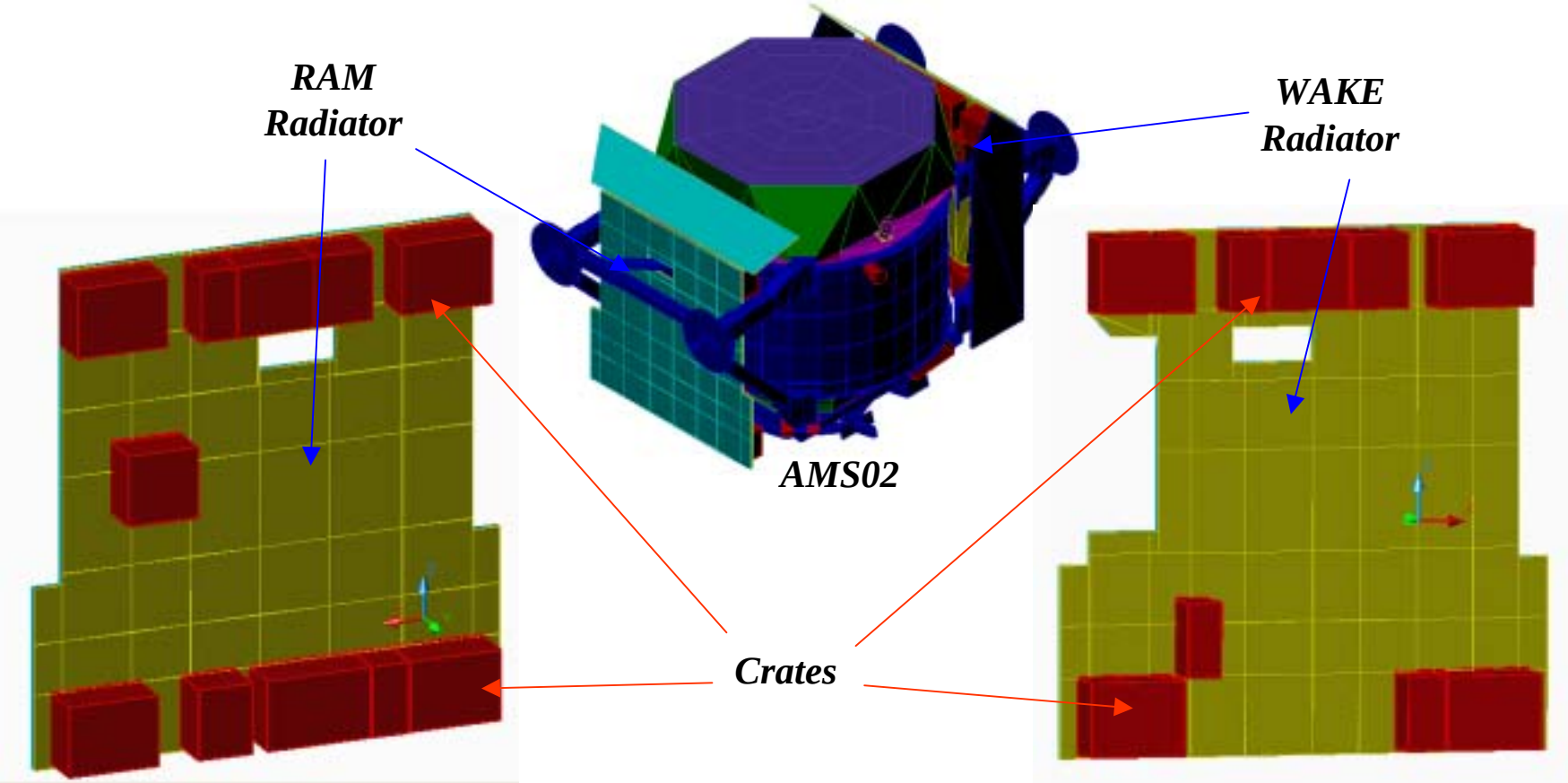
- QM J crate test (January 2003)
- Correlation (April 2003)
- QM J, JT and JPD test (September 2003)

→Average difference between test and analysis results:

– Hot case: 0.8°C

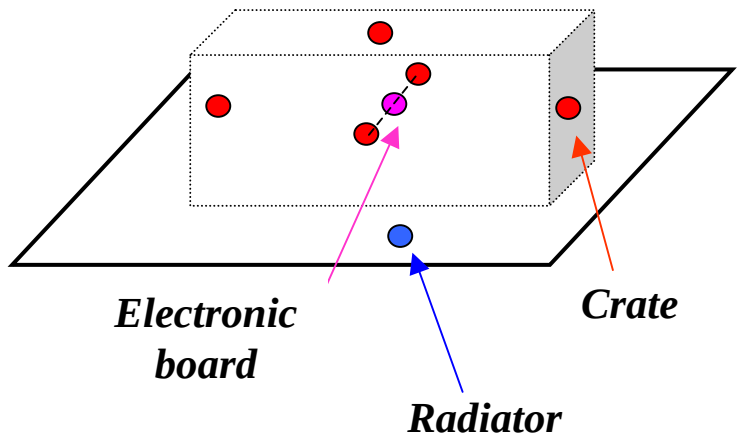
– Cold case: 0.7°C

Crates reduced model

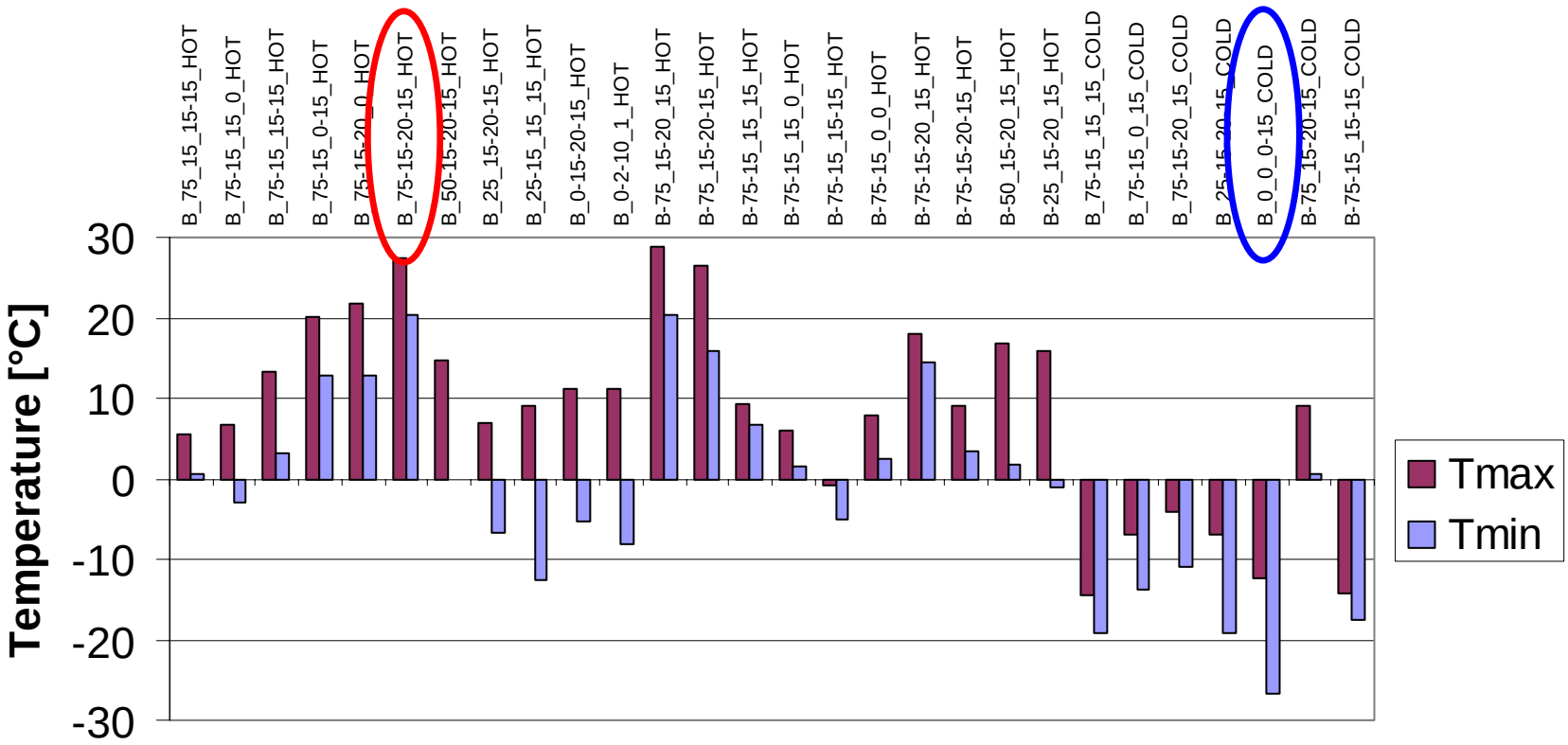


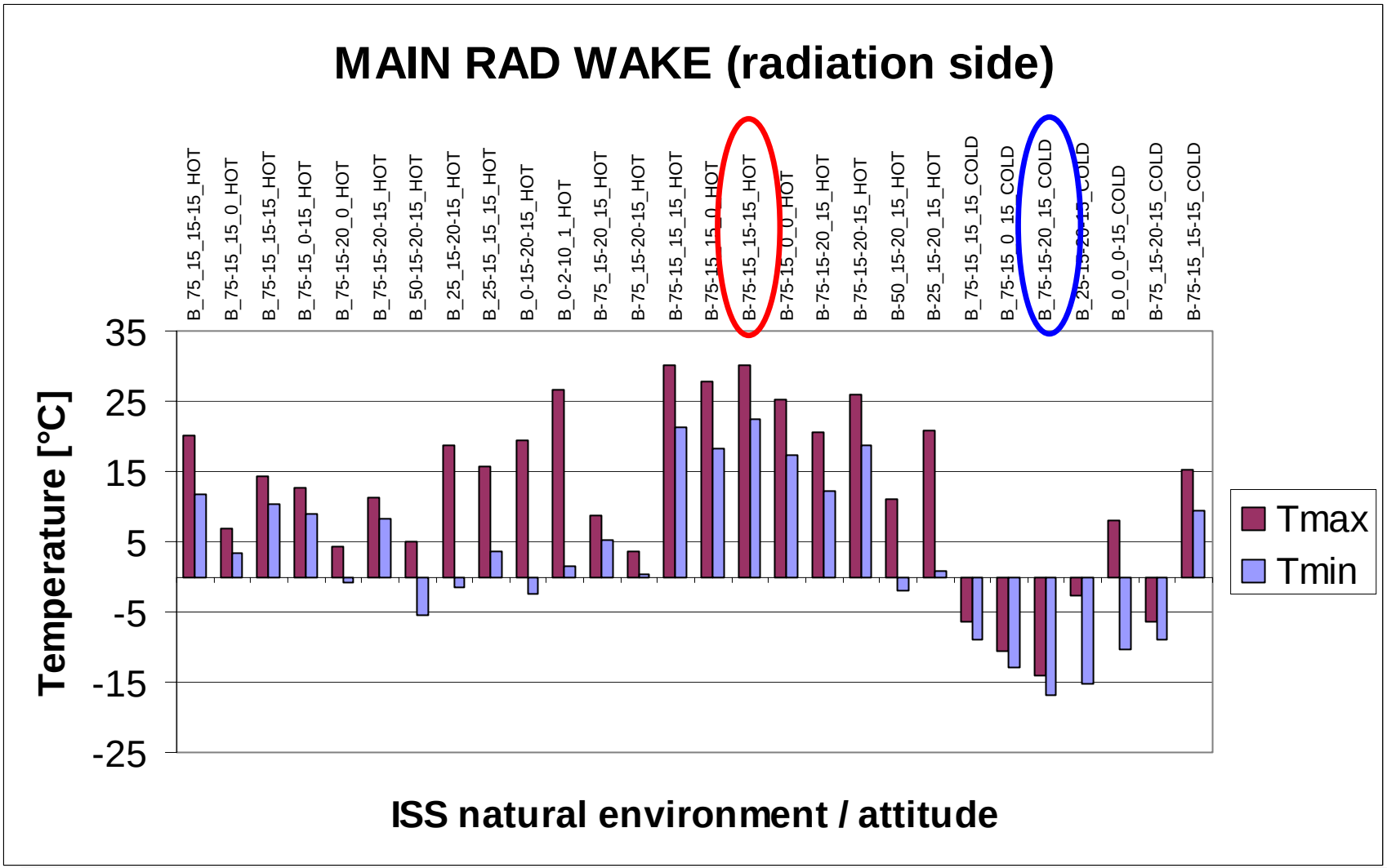
Crates reduced model

- 6 nodes each crate
- 1 node for electronic
  5 nodes for the walls
- I/F data to be used in the detailed model

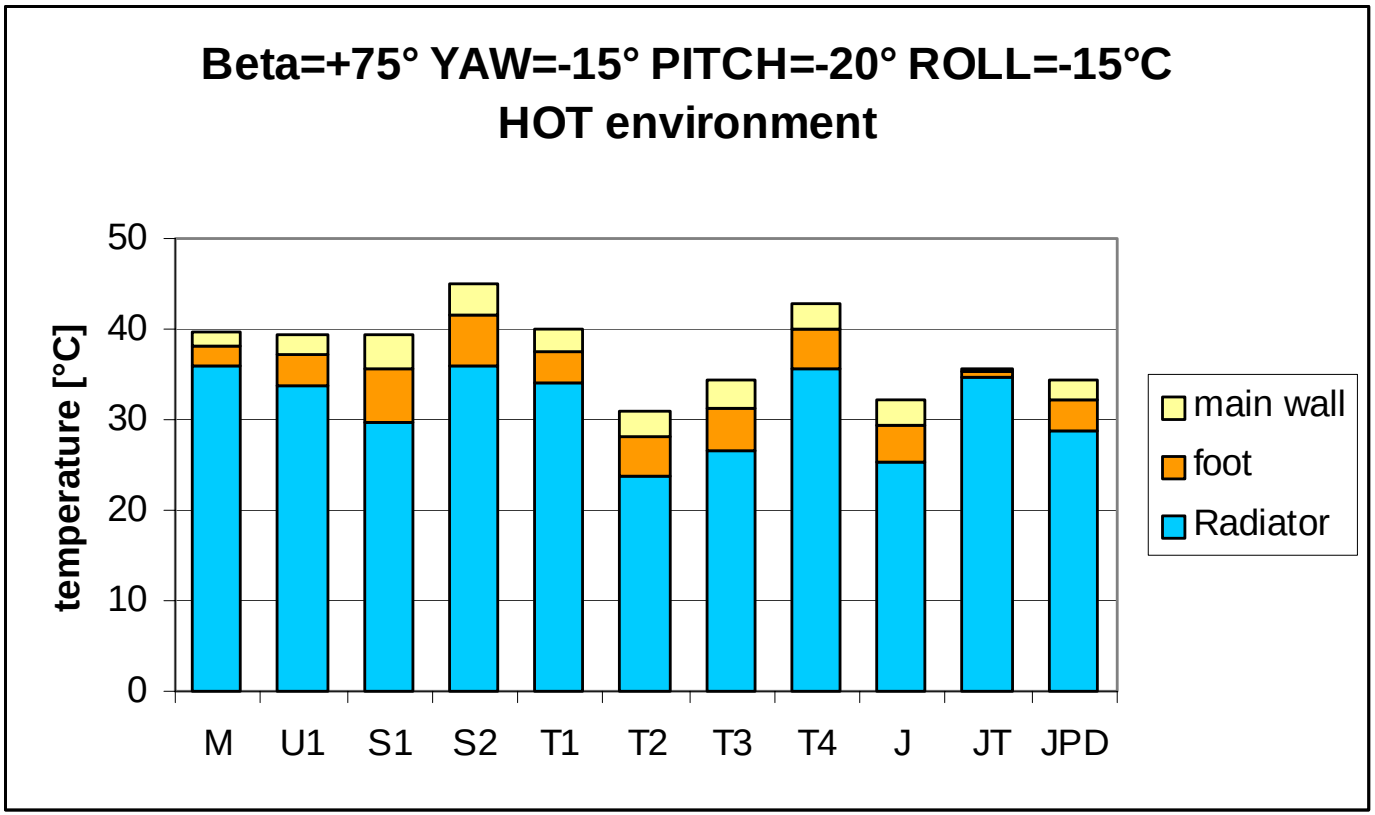


MAIN RAD RAM (radiation side)

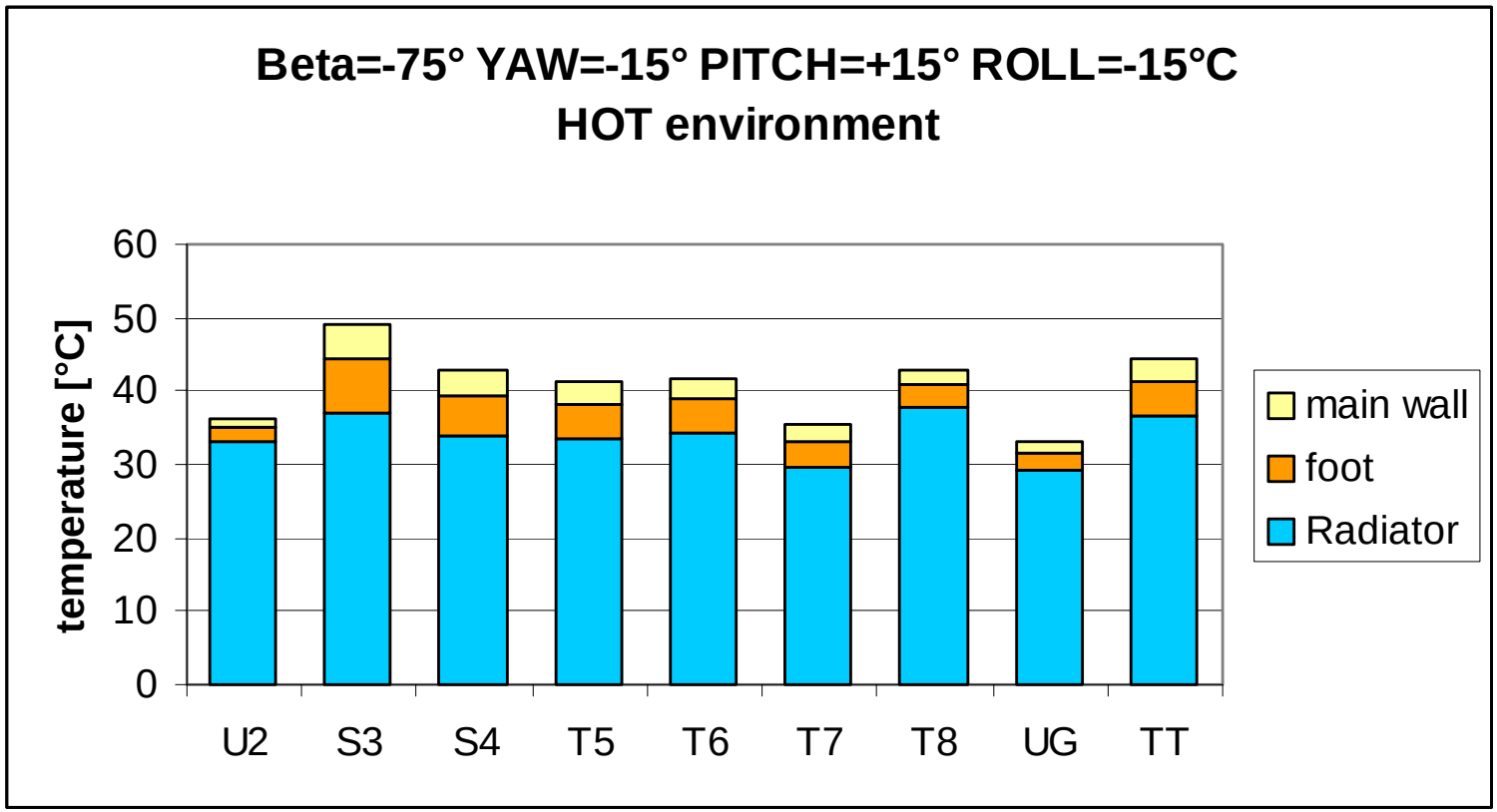



MAIN RAD WAKE (radiation side)
B_75_15_15-15_HOT
B_75-15_15_0_HOT
B_75-15_15-15_HOT
B_75-15_0-15_HOT
B_75-15-20_0_HOT
B_75-15-20-15_HOT
B_50-15-20-15_HOT
B_25_15-20-15_HOT
B_25-15_15_15_HOT
B_0-15-20-15_HOT
B_0-2-10_1_HOT
B-75_15-20_15_HOT
B-75_15-20-15_HOT
B-75-15_15_15_HOT
B-75-15_15_0_HOT
B-75-15_15-15_HOT
B-75-15_0_0_HOT
B-75-15-20_15_HOT
B-75-15-20-15_HOT
B-50_15-20_15_HOT
B-25_15-20_15_HOT
B_75-15_15_15_COLD
B_75-15_0_15_COLD
B_75-15-20_15_COLD
B_25-15-20-15_COLD
B_0_0_0-15_COLD
B-75_15-20-15_COLD
B-75-15_15-15_COLD
35
25
15
5
-5
-15
-25
Temperature [°C]
Tmax
Tmin
ISS natural environment / attitude

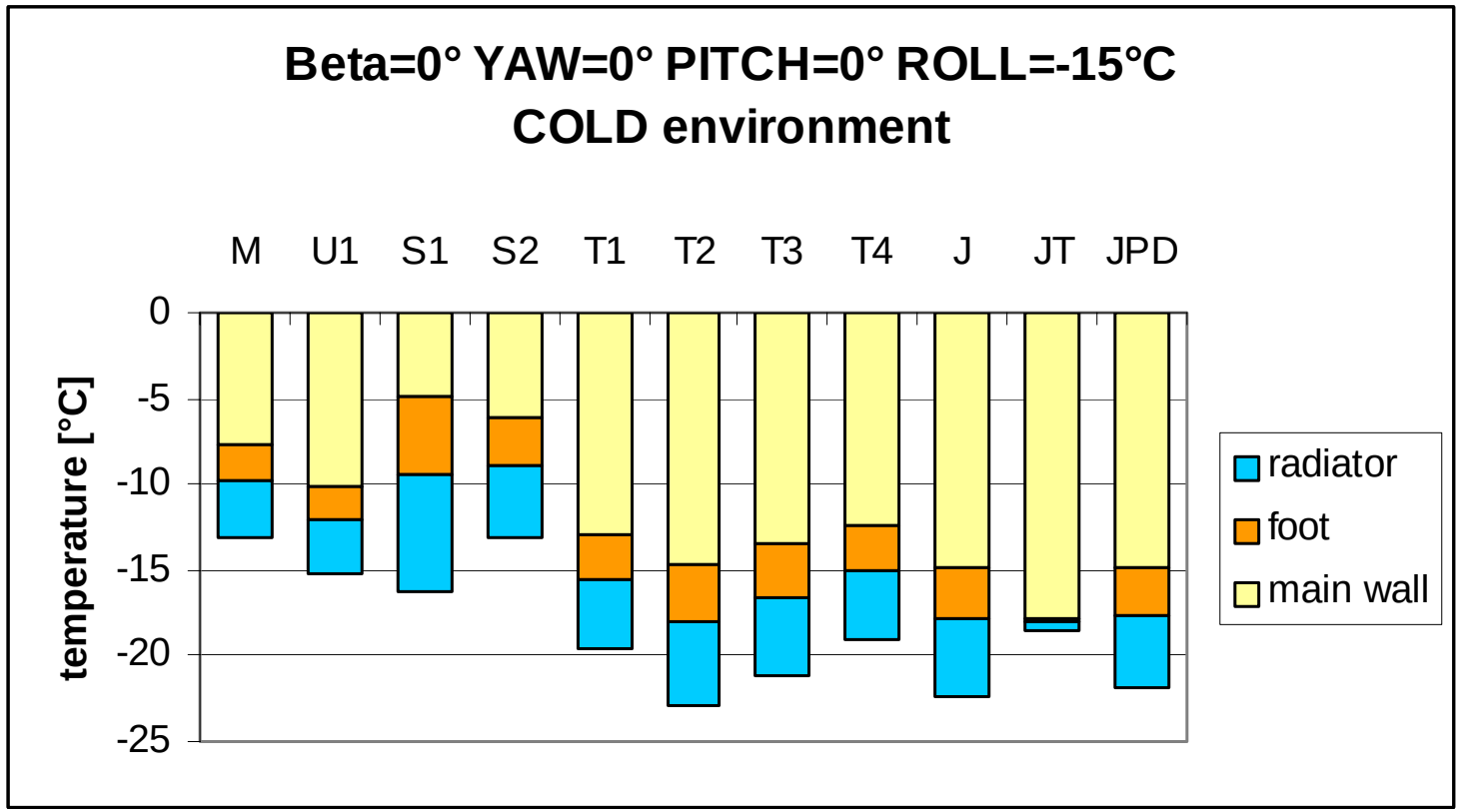
Analysis results
-worst hot case for RAM radiator-



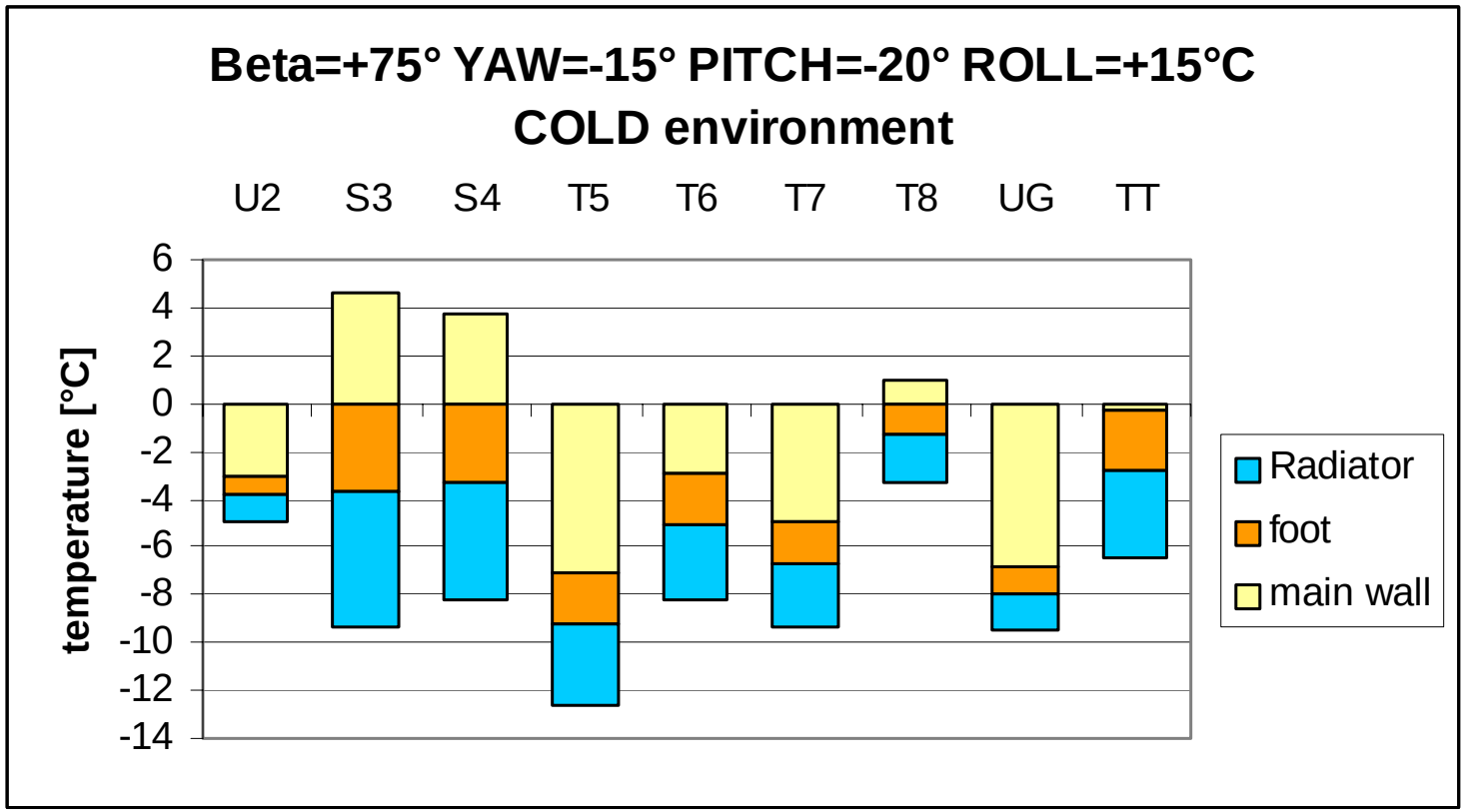
Analysis results
-worst hot case for WAKE radiator-



Analysis results
-worst cold case for RAM radiator-



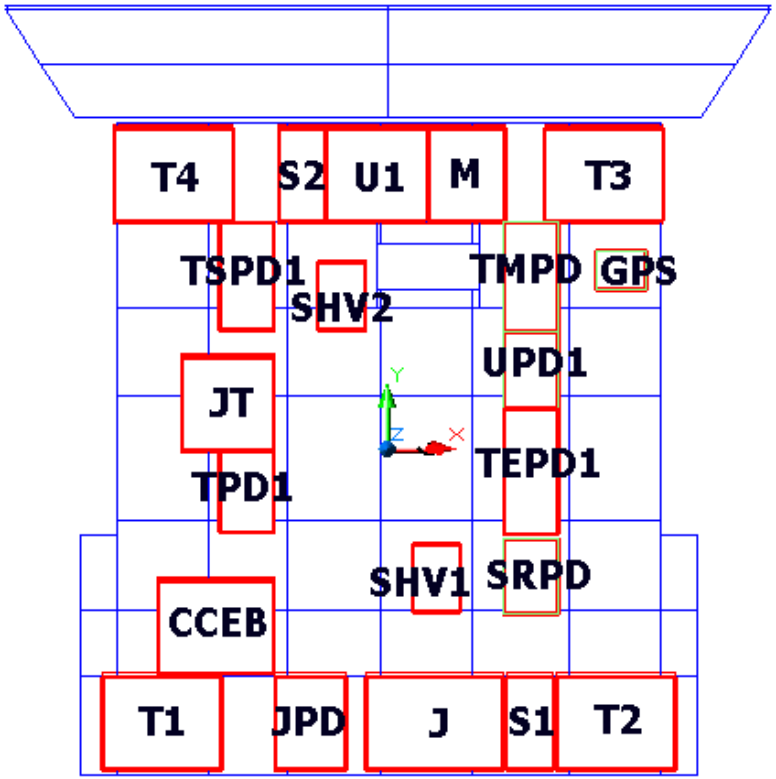
Analysis results
-worst cold case for WAKE radiator-



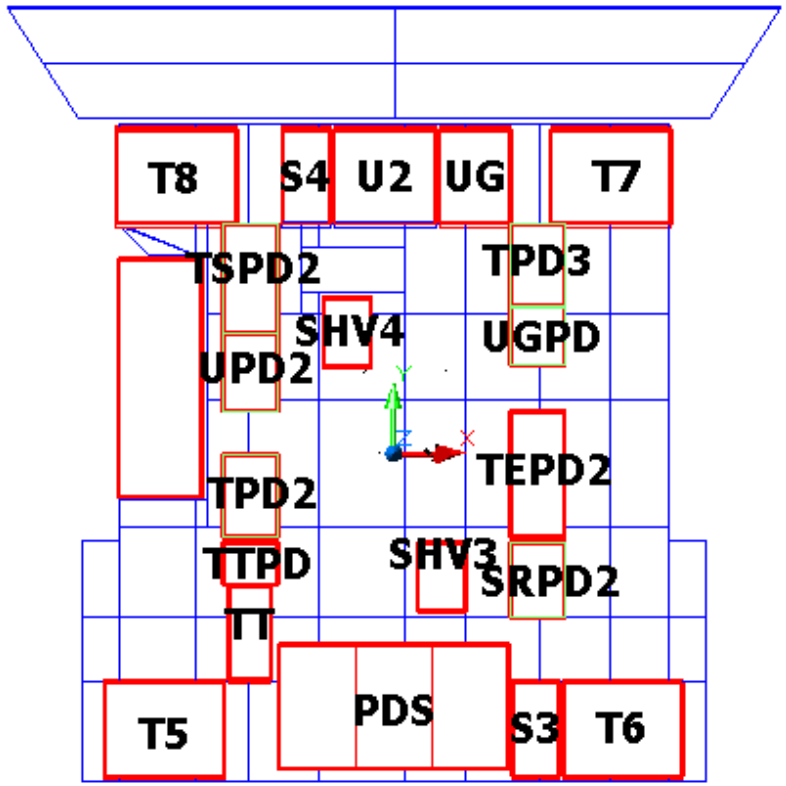
Conclusions

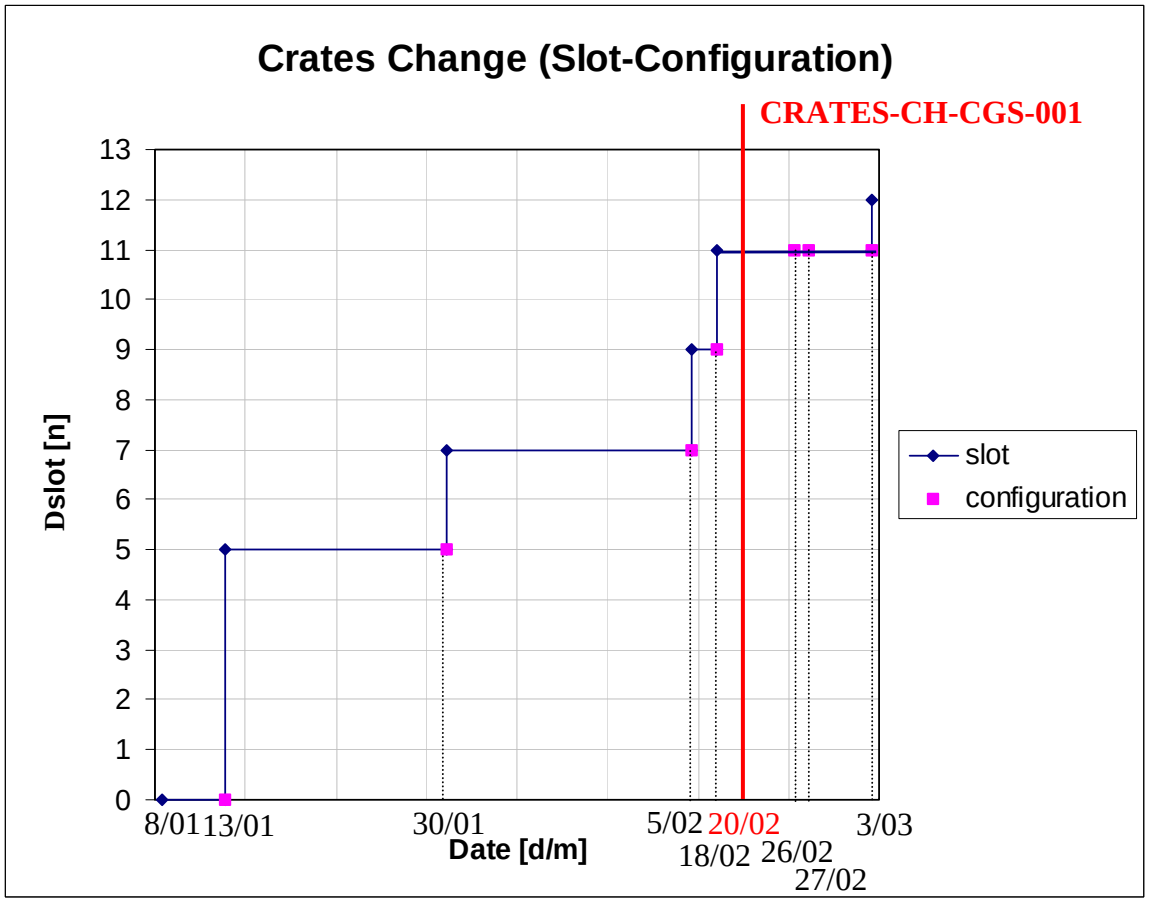
- Detailed Model:
  - correlation obtained between analysis and test results
- Reduced Model:
  - Positive margins for hot (more than 5°C) and cold worst cases (more than 3°C)

AMS 02 –Thermal Control System Design



RAM



WAKE

CRATES CHANGE 2004