Quench test, TCSG jaw thermomechanical response

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Outline

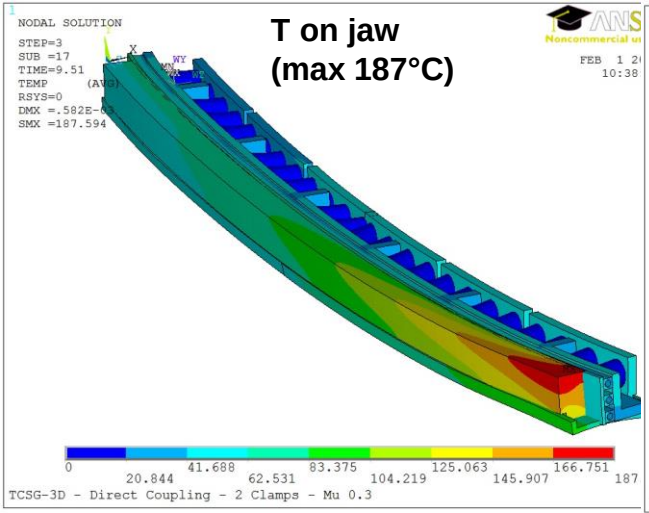
1. Recall of 2013 quench test thermomechanical simulations
2. Some words on 2024 quench test

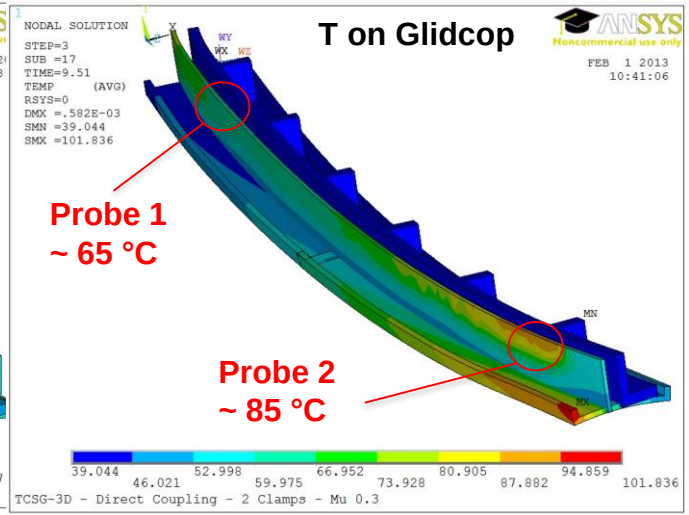
Quench tests 2013

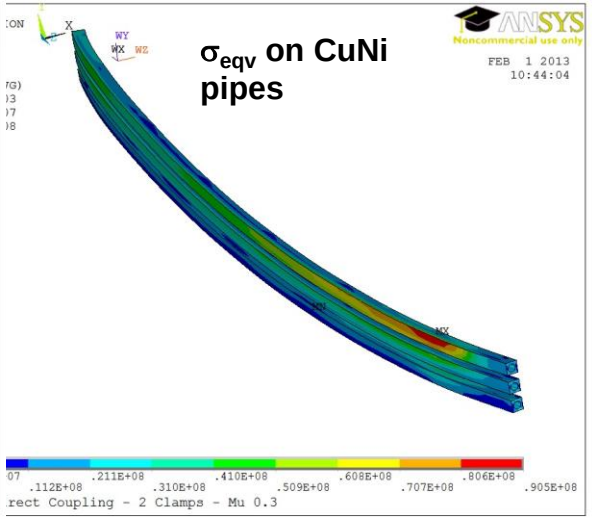
- In 2013, we studied the response of a TCSG collimator under 100 kW power applied constantly for 10s (→ 1 MJ on the full collimator)
- This roughly corresponds to **45 kW on each jaw** (450 MJ)
- The adopted FLUKA maps came from energy deposition calculations obtained by F. Cerutti in 2009 at 3.5 TeV

Quench tests 2013

- Stress-wise results were acceptable, **without big margins** (90 MPa on cooling pipes whose elastic limit is 120 MPa, EDMS 1250584)
- Tmax on CFC 187°C; temperature on in-jaw thermal probes: 65°C & 85°C







Quench tests 2024

	Quench test 2013	Quench test 2024
Power on single jaw	45 kW	30 kW
Loading time	10s (constant power)	~ few s of ramp + 10s constant power?
Energy on jaw	450 kJ	~350 kJ?

- For the figures reported above, the **2024 loading case appears less severe**, thermomechanically, than the 2013 case
- Apart from the usual caveat on the different energy distributions (3.5 TeV vs. 7 TeV, etc.), for the figures above I would expect the in-jaw **thermal probes reaching ~60°C** (especially if loading ramp will be longer than few seconds)

Thank you for your attention
Questions?

Backup slides