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XP: "Revealing the reason of LLD damage with" a potential impact on ITER Be tiles design"

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PPPL PRINCETON PLASMA PHYSICS LABORATORY

LLD-10 most probably was damaged by the Hiro currents

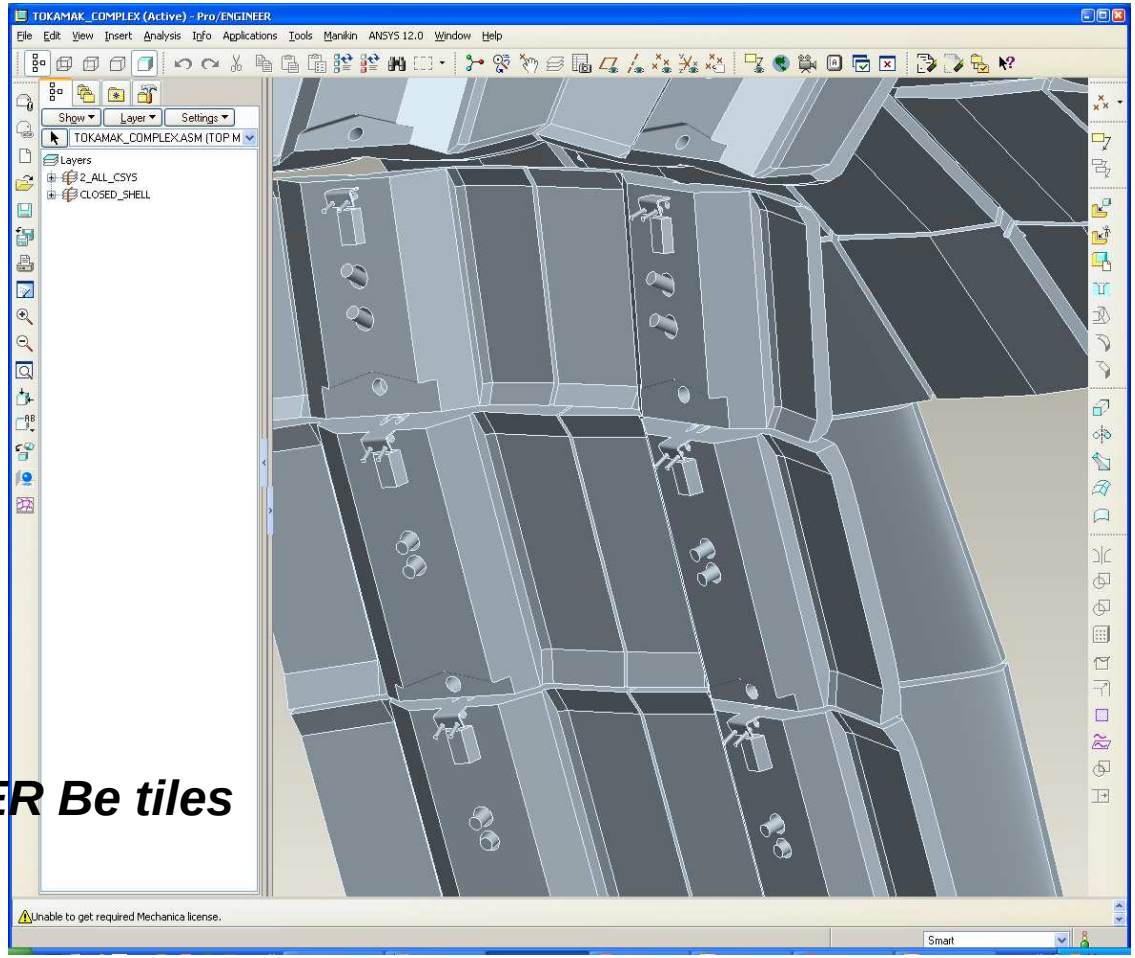
Liquid lithium divertor target system commissioned

Utilized in four LLD experimental proposals in three campaigns

LLD plate covered with lithium
Significant over-flow evident consistent with evaporating 2 x fill capacity

- Plasma surface heating raised the LLD surface temperature to ~ 200 - 250 °C.
- No significant moly surface damage or moly influx observed.
- Damage discovered after operations. Plasma disruptions caused mechanical support and arcing damages. Explains why electrical heaters failed. Air heater has worked well but the heating tubes were arc damaged.
- LLD plates being reinstalled with improvements in the mechanical support structure and grounding. No active heaters but will utilize plasma heating.

ITER Be tiles are designed at present identically with LLD-10



ITER Be tiles

If disruptions and Hiro currents are responsible for the damage of LLD on NSTX, the effect on Be tiles in ITER could be devastating.

We propose to make the LLD installation design consistent with the following guidance.

1. *Make several ground points for each LLD sector.*
2. *Arrange the value of the resistance of grounding at a minimal level (TBD) tolerable for the OH solenoid performance and PF-Coil control of equilibrium.*

Implementation of these guidance's in FY11 campaign and then confirmation of our guess about the reason of LLD damage will allow to make specific recommendations for designing Be tiles in ITER, thus, giving NSTX an opportunity to make a unique contribution to the ITER project.