

Temperature and cooling of VXD

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IHEP

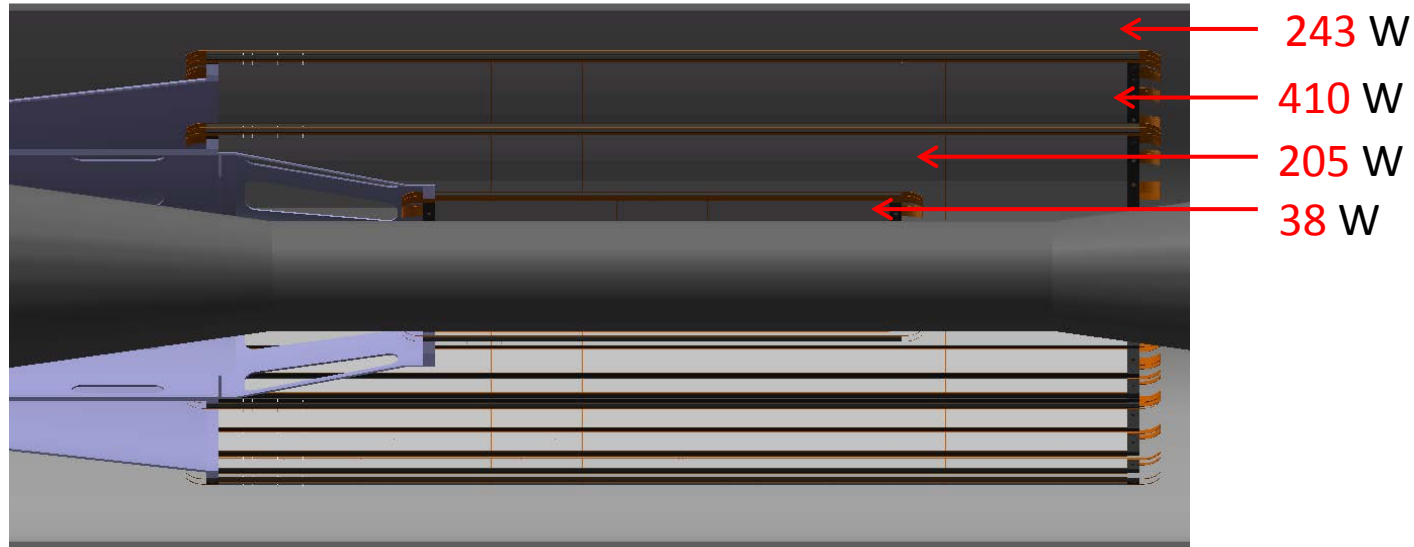
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Heat generation of VXD

Power dissipation:

Final goal: $\leq 50 \text{ mW/cm}^2$. (air cooling)

Current (short term) goal: $\leq 200 \text{ mW/cm}^2$. (air cooling)



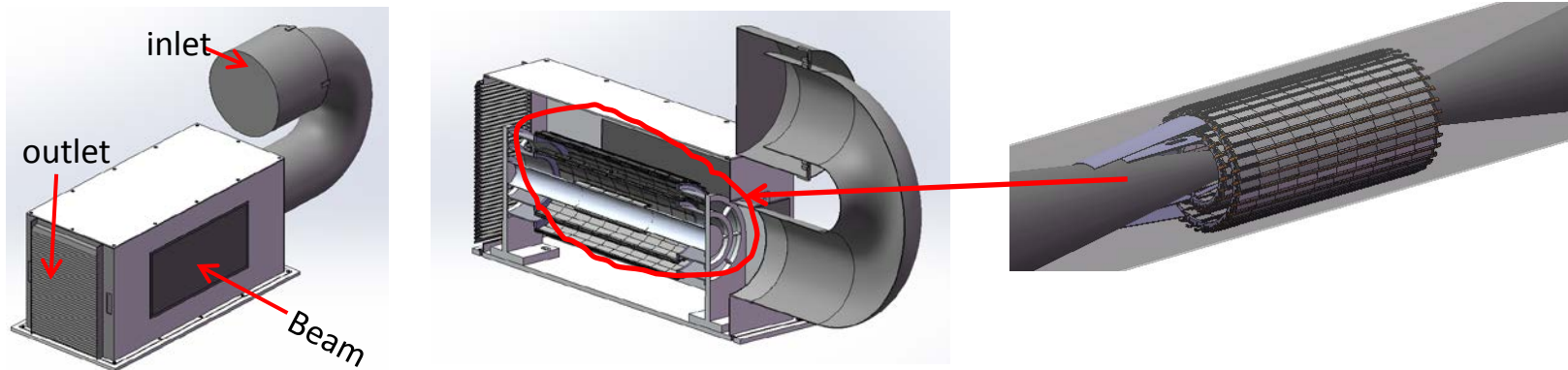
With 200 mW/cm^2 dissipation, the total heat generation is about 900 W, the preliminary calculation of air volume is about $5 \text{ m}^3/\text{minute}$.

Prototype supporting and cooling box

The conceptual design of this box is air cooled and light tight.

Application:

- Assembly of the support structure of VXD prototype and cooling test。
- Final beam line testing VXD

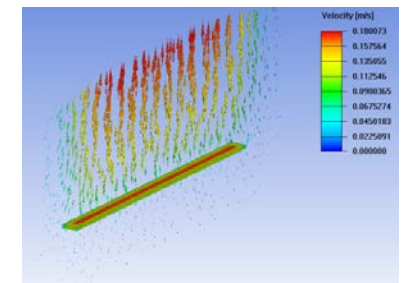
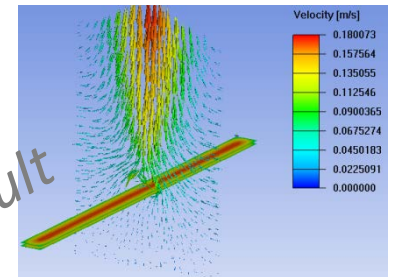
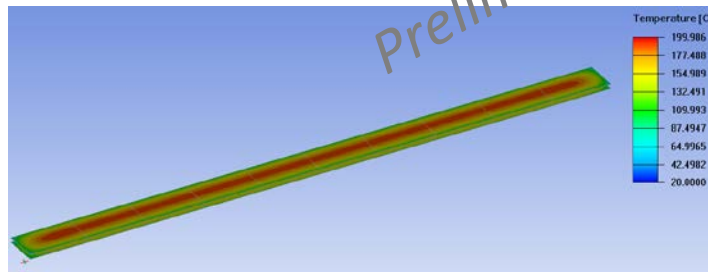
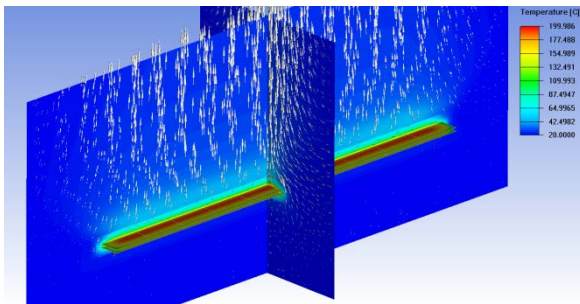
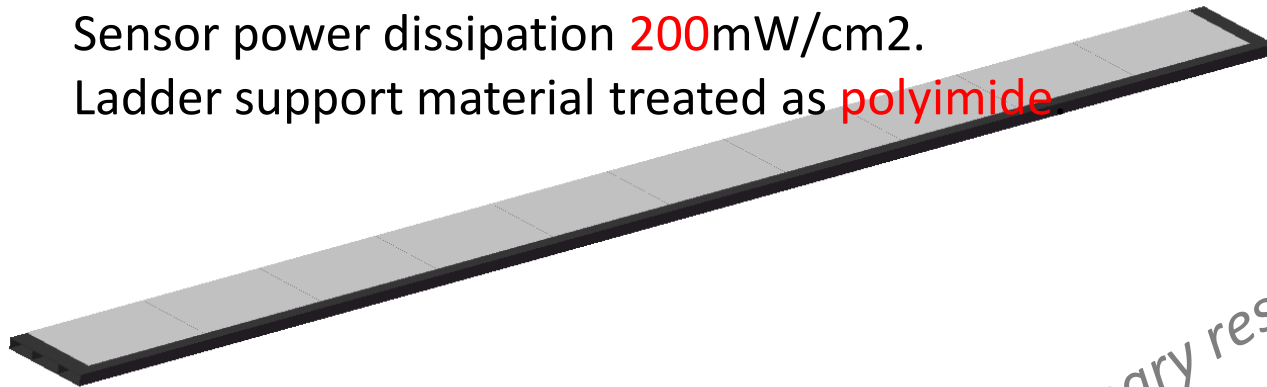


The cooling of VXD will start with simplified calculation and analysis then forward to simulation of fully integrated up to date support, also with different heat generation levels.

Single outer ladder cooling by natural air convection

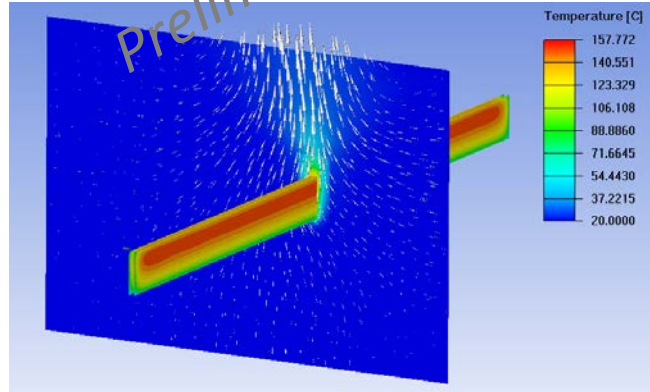
Cooling analysis just started with a very simple static thermal analysis to anticipate the temperature without compressed air cooling .

Case1. A outer layer Ladder **in horizontal** direction.
Sensor power dissipation **200mW/cm²**.
Ladder support material treated as **polyimide**

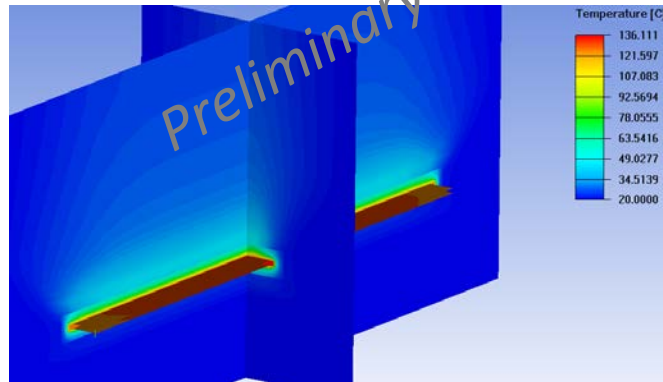


Preliminary result

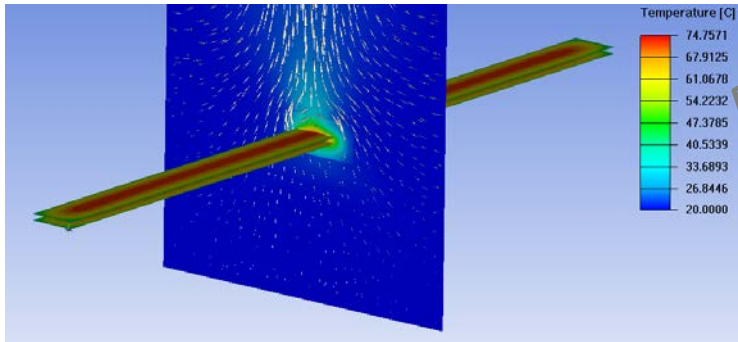
Case2. Sensor power dissipation 200mW/cm², Ladder in vertical direction, polyimide.



Ca3. Sensor power dissipation 200mW/cm², Ladder in vertical direction
Ladder support material Aluminum alloy.



Case4. Sensor in power dissipation 50mW/cm², Ladder in horizontal direction, polyimide .



Case5. Sensor power dissipation 50mW/cm², Ladder in vertical direction, polyimide.

