

## DCLL design changes and near term **action items** draft(May 11, 2006)

1. Optimize the number of design channels per pass as a function of helium  $T_{\text{bulk}}$ . (i.e. possibly with 8 to 5 channels per pass with a total of 70 channels).

**(Advantages: optimize h and lower  $\Delta P$ )**

Design to FS  $T_{\text{max}} < 550$  C, MID-WALL  $T_{\text{max}} < 520$  C.

2. Helium counter flows both come from the bottom of the module, parallel flow with the PbLi also entering from the bottom.
3. He  $T_{\text{in}} = 350$  C for all cases,  $T_{\text{out}}$  TBD
4. First wall to be 1-side roughened, with approximations:  
 $h_{2-D} = 2h_{\text{smooth}}$ ,  $f_{2-D} = 7/4f_{\text{smooth}}$   
 $h_r = h_{\text{selected grain size}}$ , and  $f_r = (f_{\text{selected grain size}} + 3f_{\text{smooth}})/4$

**Greg with EXCEL model to evaluate the following cases:**

### 1. DEMO

(with DEMO parameters, 1.66 m high, 2 m wide module, assume 50/50:PbLi/He split in power deposition, consider both sand grain and 2-D one-sided roughening.)

### 2. DT

(with ITER-DT parameters and module dimensions, assume 50/50:PbLi/He split in power deposition)

3. HH, and iterate with Sergey on the one channel model (also include a case for smooth wall channels)

**Mo and Paul to develop new configuration details**

**Q: Should the He routing be symmetric? Top and bottom to middle, or middle to top and bottom? Or once thru?**

**Other consideration per Mohamed Abdou**

**How about a quarter module DCLL?**

## **Fabrication of DCLL module**

### **1. Inclusion of 1-sided heat transfer enhancement for the FW fabrication consideration?**

**It is a challenging request, but not necessary mandatory for the HH-phase module.**

### **2. Fabrication method: HIP and/or investment casting.**

- **Discussion focused on the FW U-shape channel design.**
- **HIP is a more mature in the EU and Japan for FW fabrication, technical challenges remain to be resolved and technical details are not available to the US at present. The US is behind on this.**
- **Investment casting is routinely used fabrication technology in other high tech. applications and some relevant experience with casting ferritic steel exists. DCLL development plan is shown.**
- **Concerns and suggestions:**
  - Phasing of the options to match the budget support (tightness of schedule a concern)?**
  - Pros and cons on collaboration and purchasing our components from foreign supplier (detailed technical specifications required)**
  - Alternate FW designs, round tubes?**
- **In the near term, could just the HIP and Casting tasks be supported by the existing material budget?**