POWER COOLING DEVELOPMENT

Development phases

- R&D phase
- Tests on module 0
- Tests on single VFE modules
- Development and test of module 0 prime system
- Final design

R&D Phase

- Modification of connector cooling: better conductance between water loop and connector
- Modification of power cooling: copper braids abandoned and cooling pipes directly brazed on the housing
- Phase completed: results presented at last ECAL week

Test on module 0 and on single blocks

- Presented by J. Cogan

Module 0’ system development

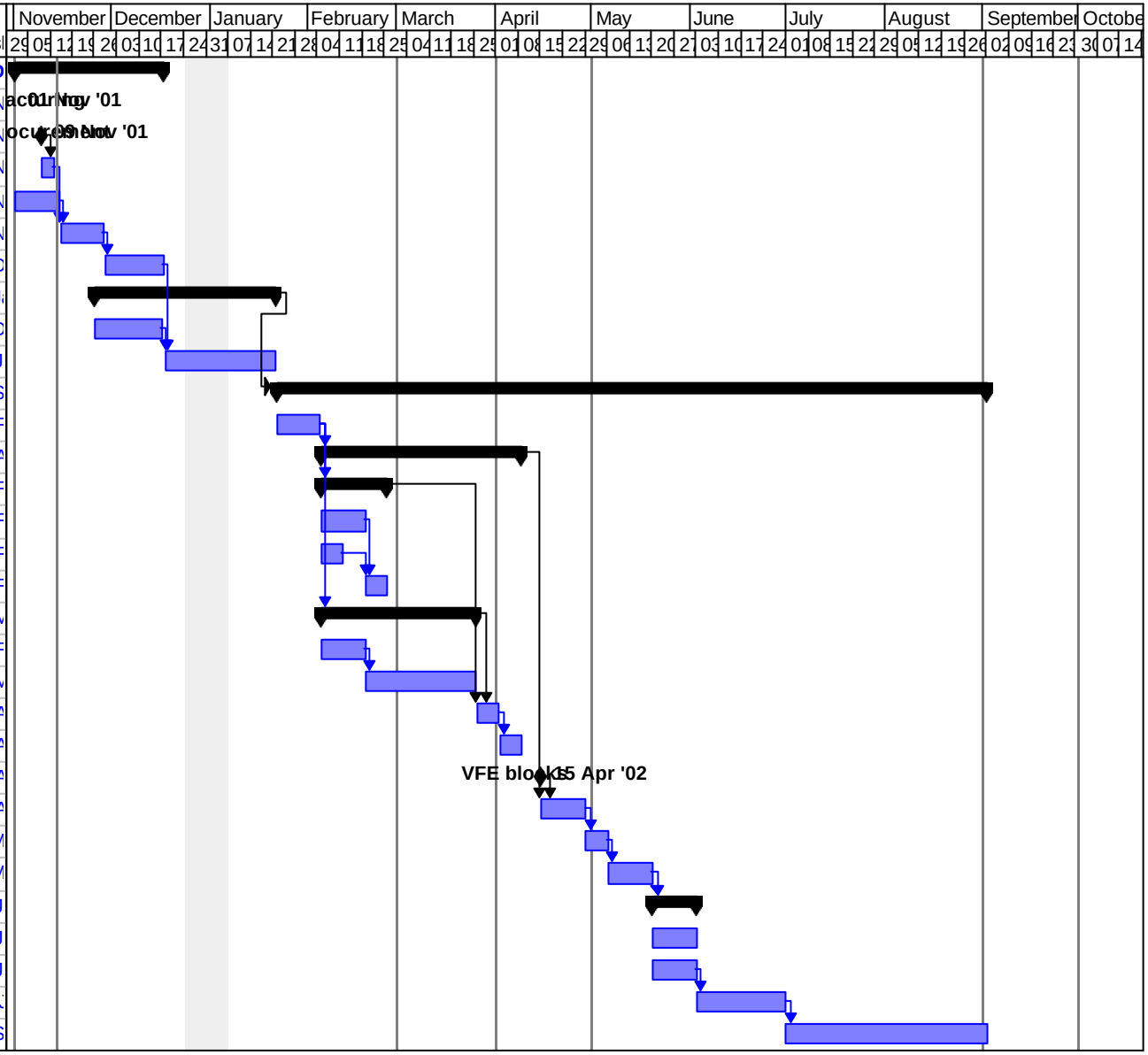
- The design depends on the tests results.
- Probably stamped copper plates
- Must fulfil the thermal specification.
- Different from the final one because the electronic cards will be different
- Foreseen nominal power capacity: 2.5 Watt/channel

Final Design

- Depends on
  - Module 0 prime test results
  - Final Electronic cards design

Cooling Schedule

ID	Task Name	Duratio	Star	Finis
1	Module 0 test	**6.6 w**	**01 N**	**17 D**
2	Panels manufacturing	0 dy	01 N	01 N
3	Gap Pad procurement	0 dy	09 N	09 N
4	Mounting	2 dy	09 N	13 N
5	Pump procurement	2 w	01 N	14 N
6	Tests	2 w	15 N	28 N
7	Test conclusion	1 w	29 N	17 D
8	Prototype card tests	**6.19 v**	**26 N**	**21 J**
9	Procurement	3 w	26 N	17 D
10	Mounting and tests	3 w	18 D	21 J
11	Module 0'	31.81	22 J	02 S
12	Design	2 w	22 J	04 F
13	Manufacturing	9 w	05 F	08 A
14	piping	3 w	05 F	25 F
15	procurement	2 w	05 F	18 F
16	Tool development	1 w	05 F	11 F
17	pipe forming	1 w	19 F	25 F
18	Copper plate	7 w	05 F	25 M
19	Procurement	2 w	05 F	18 F
20	stamping	5 w	19 F	25 M
21	Brazing	1 w	26 M	01 A
22	Leak checks	1 w	02 A	08 A
23	VFE blocks	0 w	15 A	15 A
24	VFE blocks and power cooli	2 w	15 A	29 A
25	Thermal tests	1 w	29 A	06 M
26	Module 0' tests	2 w	06 M	20 M
27	Transport to H4	2 w	20 M	03 J
28	Thermal cooling installatio	2 w	20 M	03 J
29	Module 0 prime installatio	2 w	20 M	03 J
30	Electronic tests	4 w	03 J	01 J
31	Calibration	9 w	01 J	02 S



Water cooling system needs

- M0 and M0’ tests:
  - 400 channels (2.5Watt/channel)
  - Regulation and Cooling loop
  - Bat 27 and H4
  - Available
- SM1 functional test
  - 1700 channels (2.5 Watt/channel)
  - Cooling loop only (20°C$\pm$2°C, 0.28 l/s)
  - Bat 27 only
  - To be developed

Water cooling system needs

- SM1 calibration
  - 1700 channels (2.5 Watt/channel)
  - Cooling loop (18°C±0.5°C, 0.28 l/s)
  - Regulation loop (18°C±0.05°C, 1.4 l/s)
  - H4 only
  - To be developed

Water cooling systems milestones

- M0 and M0’
  - 27 building: until 15 May 2002
  - H4: 1 June to 1 September 2002
- SM1 functional tests (build 27): from 1 February 2003
- SM1 calibration (H4): from 1 March 2003