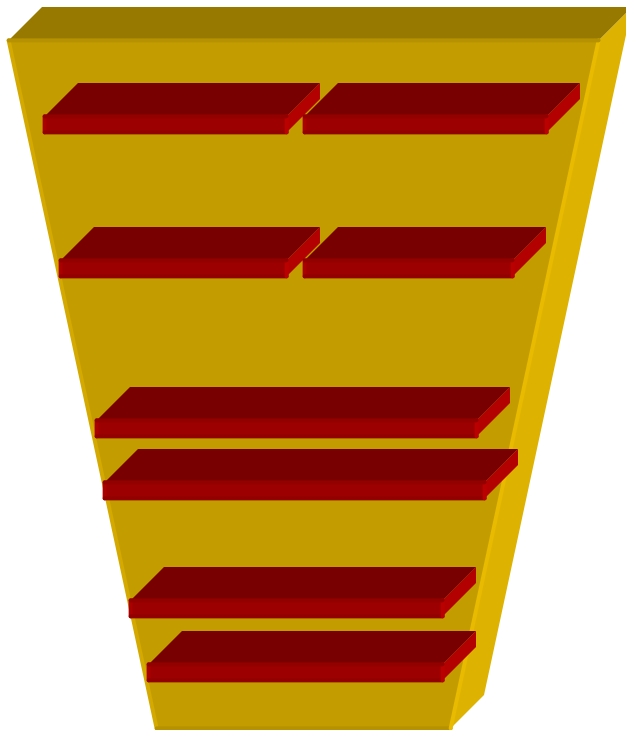


Overview

- 1.1 Production flow for Barrel
- 1.2 Production flow for Forward
- 2.1 Technical co-ordination for Barrel
- 2.2 Technical co-ordination for Forward
- 3.1 Progress in Barrel
- 3.2 Progress in Forward
- 4. Electronic system
- 5.1 Status of milestones in Barrel
- 5.2 Status of milestones in Forward
- 6.1 Installation schedule in Barrel
- 6.2 Installation schedule in Barrel
- 7.1 Items on the critical path in Barrel
- 7.2 Items on the critical path in Barrel
- 8. Availability of resources
- 9. Sub-system integration
- 10 Area of concern

1.1 Production flow (Barrel)

One barrel sector60 sectors



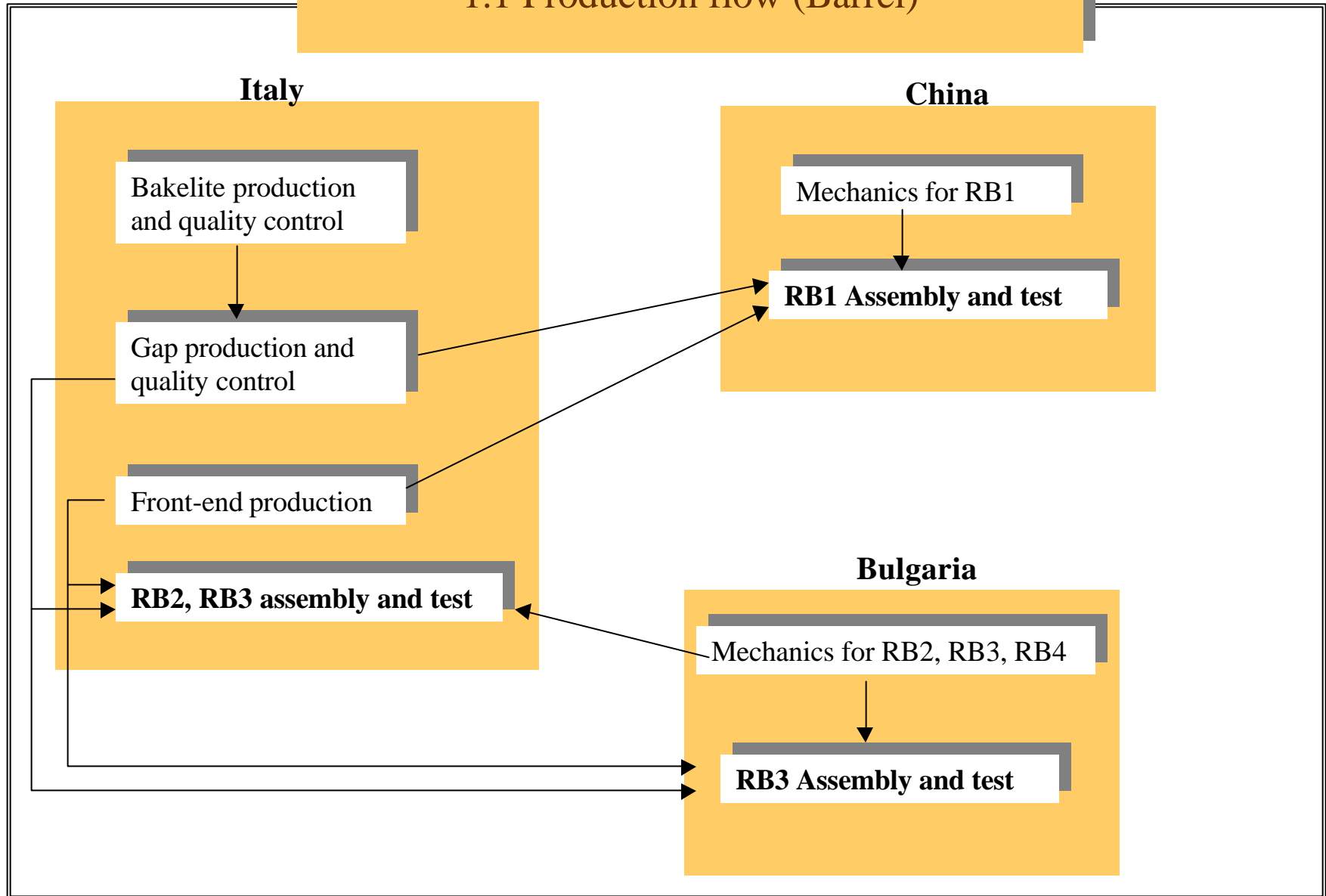
RB4 120 chambers

RB3 120 chambers

RB2 120 chambers

RB1 120 chambers

1.1 Production flow (Barrel)



1.2 Production flow (Forward)

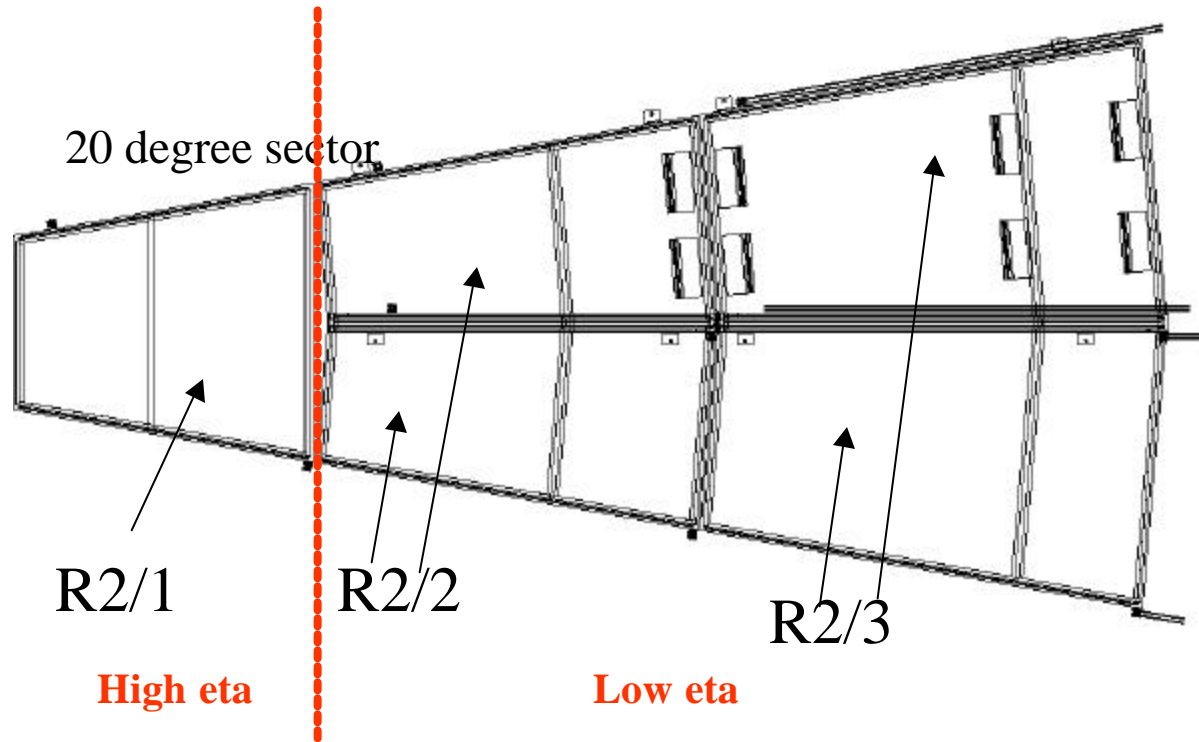
	RE 1/1	RE 1/2	RE 1/3	RE 2/1	RE 2/2	RE 2/3	RE 3/1	RE 3/2	RE 3/3	RE 4/1	RE 4/2	RE 4/3
No. of chambers	36*2	36*2	36*2	18*2	36*2	36*2	18*2	36*2	36*2	18*2	36*2	36*

Station 1

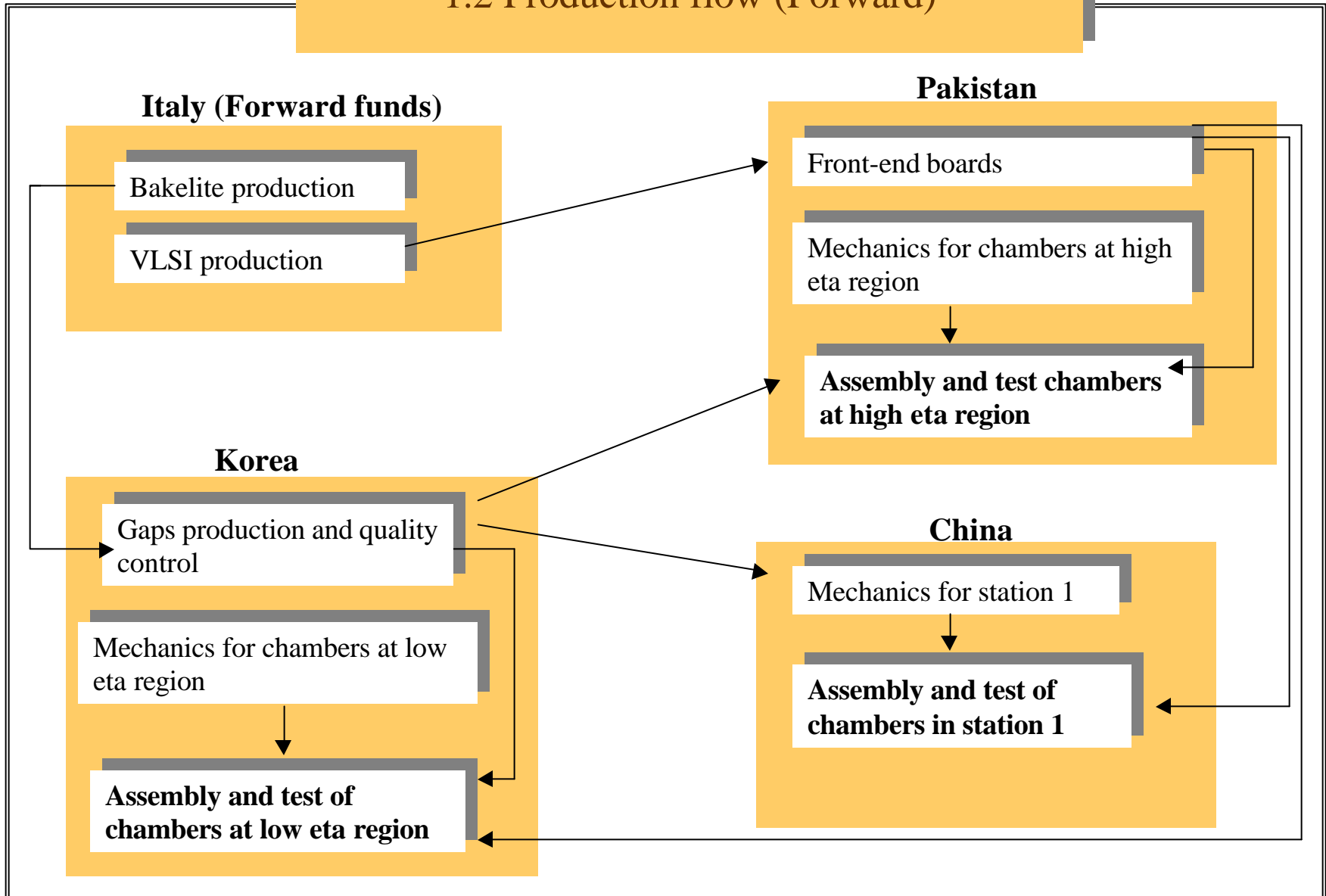
Station 2

Station 3

Station 4



1.2 Production flow (Forward)



2.1 Technical co-ordination (Barrel)

The major technical co-ordination responsibility is assigned to the Bari group:

Overall	<i>G. Iaselli</i>
VLSI	<i>F. Loddo</i>
FE boards	<i>A. Ranieri</i>
Mechanics	<i>A. Clemente,</i>
Integration	<i>A. Ranieri/A. Clemente</i>
Assembly and test	<i>S. Nuzzo/ A. Colaleo</i>
Data base	<i>M. Abbrescia/G. Zito</i>
Test beam	<i>A. Colaleo</i>

Moreover:

Bakelite	<i>P. Vitulo/G. Belli (Pavia)</i>
VLSI quality control	<i>P. Vitulo/Torre (Pavia)</i>
FE boards quality control	<i>P. Vitulo/Torre (Pavia)</i>
RB1 mechanics	<i>Ye (PU)</i>
RB2, RB3, RB4 mechanics	<i>V. Genchev/L. Litov (Sofia)</i>
RB1 assembly and test	<i>Y. Ye (PU)</i>
RB3 assembly and test	<i>V. Genchev/L. Litov (Sofia)</i>

2.2 Technical co-ordination (Forwad)

The major technical co-ordination responsibility is now assigned to the CMS RPC co-ordinator with the help of local co-ordinators

Overall	<i>G. Iaselli, S.J. Park, H.Horani, Y.Ye</i>
Bakelite	<i>P. Vitulo/G. Belli (Pavia)</i>
Gaps	<i>Korea</i>
VLSI	<i>F. Loddo (Bari)</i>
FE boards	<i>Pakistan</i>
Mechanics	<i>Korea/Pakistan</i>
Integration	<i>Korea/Pakistan</i>

Moreover:

RB1 mechanics	<i>Y. Ye (PU)</i>
RB2, RB3, RB4 mechanics	<i>V. Genchev/L. Litov (Sofia)</i>
RB1 assembly and test	<i>Y. Ye (PU)</i>
RB3 assembly and test	<i>V. Genchev/L. Litov (Sofia)</i>

3.1 Progress in the barrel

Bakelite production and quality control established

First gaps from final production line ready and under test

Front-end board design ready

Tenders for VLSI, PCB and kapton connectors starting

Design of the mechanical encasing ready

Production of mechanics should start in Bulgaria and China in a couple of months

Design of the mechanical supports to DT ready

3.1 Progress in the barrel Italy



LHCC Review, October 2000

Resistive Plate Chambers

3.1 Progress in the barrel Bulgaria

3.1 Progress in the barrel China

3.2 Progress in the forward

Extensive R&D carried on
in the last few months

Many gaps built in Korea

Gaps production line in
preparation

Design of the mechanical
encasing at the final iteration

Final definition of the
design by December

New front-end board design and kapton design

Home built chambers with close to final
details tested at GIF

3.2 Progress in the forward Pakistan

Pakistan Production Site Status

- Building ready end of October 2000.
 - Cost PKR 5 million (~ 100 kUSD)
- Mechanical Workshop
 - Lathes (2, Milling (1), Drilling, Fitter benches
 - Cost PKR 2 million (~ 40 kUSD)

Schedule and Planning

- Total of 432 chambers for RE2/3/4.
- 10 deg. Chamber, covering low eta region.
- 10% contingency. Total number of chambers 475.
- One chamber per day.
- For all chambers required assembly time is:
X + 104 weeks “X” is the start time.

3.2 Progress in the forward Pakistan

Assembly Plans

- Input Quality Assurance: (Gaps)
 - Visual Inspection
 - Dimensional Check
 - Gas Leak
 - Leakage Current
- Assembly Stages:
 - Sandwich
 - Services + Mechanics
 - Mounting of FEB and initial testing

Chamber Testing

- Gas System in place
 - 10 channels, 4 gases, digital mass flow meters, Cost (13.5 kCHF)
- Gases are ordered (R134, Iso-butane, SF6)
 - Cost (20 kCHF), available 15.10.2000
- DAQ and HV system from CAEN
 - Cost (100 kUSD) *yet to be ordered.*
- Slow Control Monitoring. Software and hardware has been ordered.
 - Cost 30 kCHF

3.2 Progress in the forward Pakistan

Electronics (FEBs)

- We have identified a company which can:
 - manufacture four layer PCBs
 - populate SMDs
 - test the FEBs
- Once the design of FEBs is finalized:
 - For complete production 9 months are needed.
 - About 15,000 ASICs will be required for the full endcap RPC system.

Concerns

- Following items can affect the schedule and planning:
 - Delivery of gaps from Korea.
 - Supply of ASICs for FEBs from Italy.
 - Strips from Korea.
 - HV Connector design and production.
- Clear definitions of responsibilities:
 - Gas and gas pipes
 - Cooling
 - Connection to linkboards
 - LV, HV supply systems

3.2 Progress in the forward KODEL, Korea

Status of the Gap Production Tools

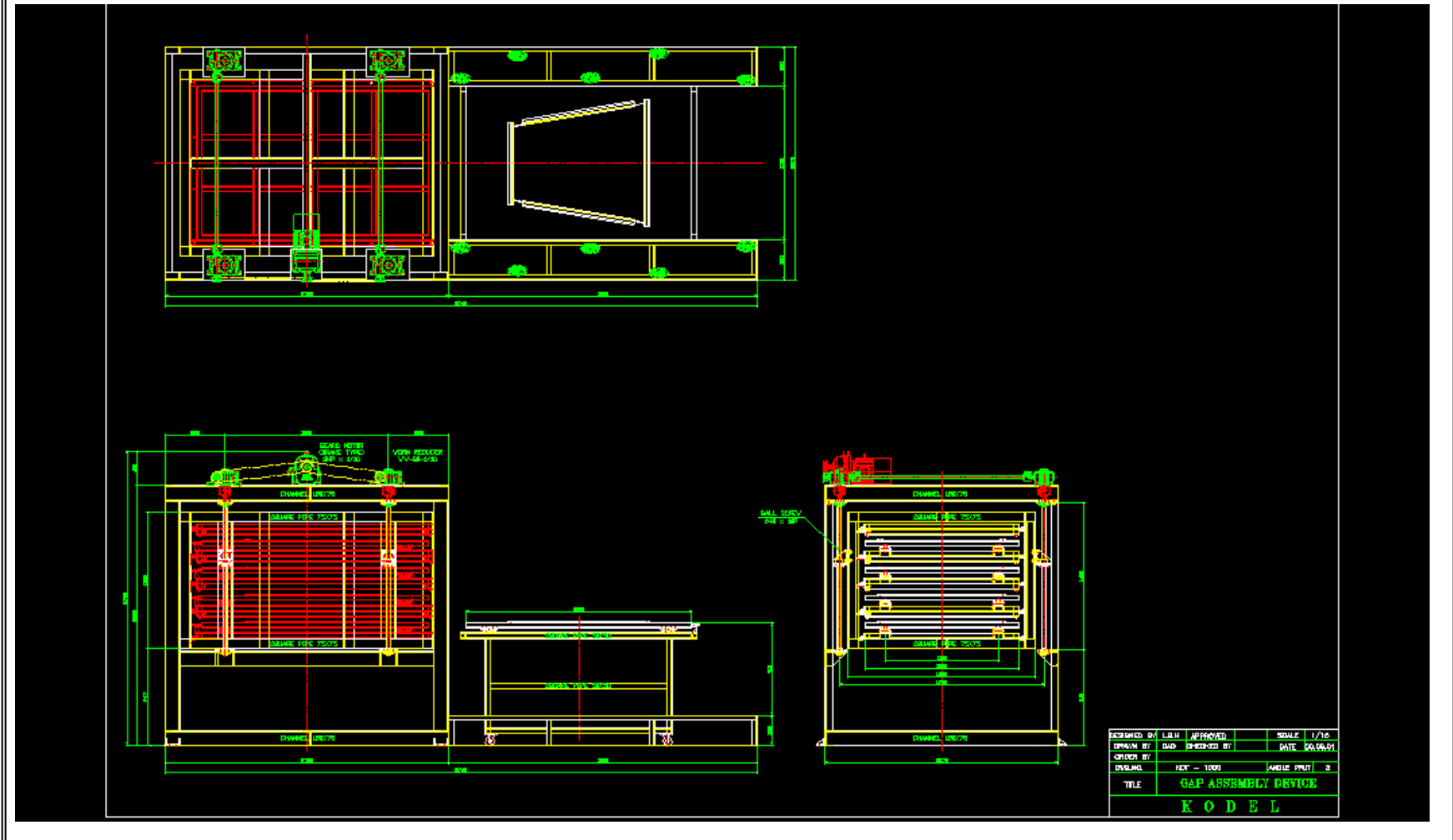
- Prototype facilities prepared
 - 1) Glue dispensing tools
 - 2) Silk screen facility for graphite coating
 - 3) Mylar and copper sheet coating facility

- 2. Prototype facilities currently being constructed
 - 1) Gap storage facility
 - 2) Bakelite storage facility
 - 3) Gap assembly facilities
 - * Gap assembly tables : 5 optical tables
 - * Glue hardening storage shelf with uniform pressurization tubes
 - * Gap & spacer jigs (need the final gas gap design results)

- **First set of the prototype facilities -> End of Oct. 2000**

3.2 Progress in the forward KODEL, Korea

Gap Assembly Facility



3.2 Progress in the forward KODEL, Korea

Silk Screen Facility



3.2 Progress in the forward KODEL, Korea

Schedule for the Production of Gas gaps

1. Debugging of the prototype facilities
 - 1) Nov. 1, 00 – Feb. 28, 01 :
 - * Mechanical tests
 - * Production of 1 set of gaps for RE1/1, RE2/1, RE2/2, each
 - * Review of the facility designs
 - * Debugging
2. Mar. 1, 01 – Aug. 31 : Construction of the main facilities
3. Real productions
 - 1) Mar. 1, 01 – Aug. 31, 01 : First 20 sets of gas gaps
(with one set of facilities)
 - 2) Sep. 1, 01 – Dec. 31, 01 : 40 sets of gaps (with two sets of facilities)
 - 3) Jan. 3, 02 – Dec. 31, 02 : 500 sets of gaps
 - 4) Jan. 3, 03 – ? : 400 sets of gaps

3.2 Progress in the forward KODEL, Korea

Status of the Assembly Site for Highest eta Stations

Common area for the assembly and gap production

- > Reduction of the cost
- > Safety reason

Facilities in preparation

- 1) Assembly tables : 5
- 2) DAQ system for 256 channel read-out

Facilities prepared

- 1) Assembly area
- 2) Basic machining tools & assembly tables
- 3) Testing lab. Equipped with DAQ system
- 4) 6 channel gas feeding facility

Production schedule

- 1) Mar. 1, 00 – Sep. 30, 00 : first 8 RPCs for RE2/1 and RE1/1
- 2) Oct. 1, 00 – Jan. 31, 02 : 20 RPCs
- 3) Feb. 1, 02 – Dec. 31, 02 : 100 RPCs
- 4) Jan. 1, 02 - ? : 80 RPCs

4.1 Electronic system

ESR for VLSI and PCB held on the 13th September

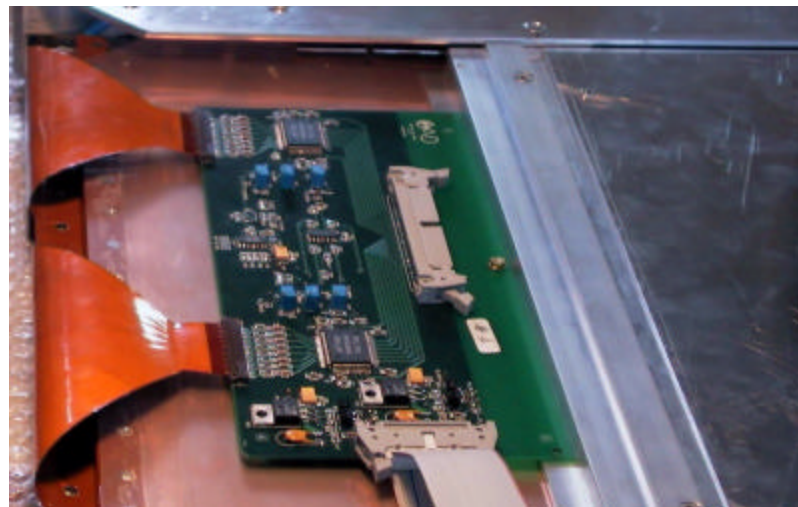
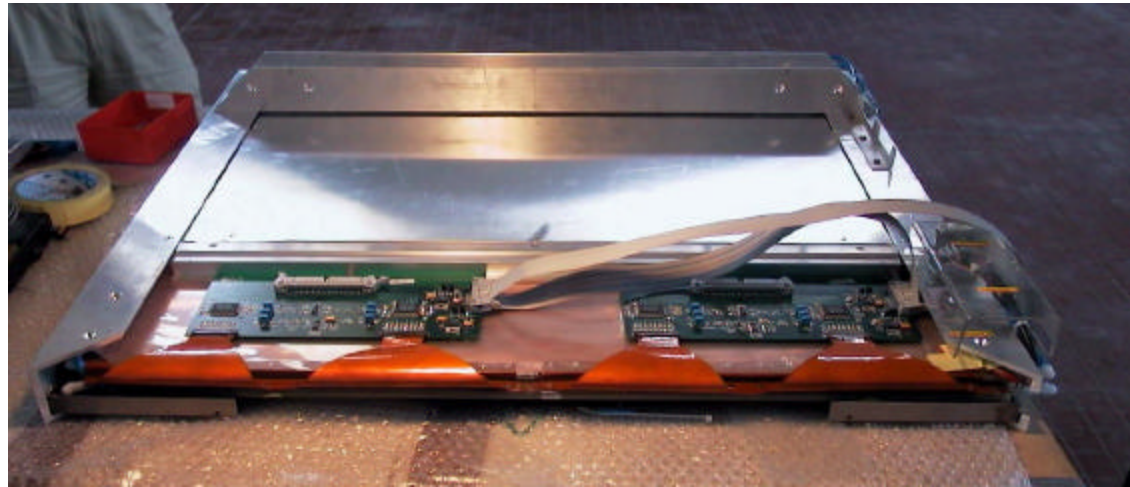
- **Front End Chip Specifications**
- **Tools for automatic tests**
- **Test of low volume production**

- **Front End Board Layout**
- **Board components**
- **Latch-up protection**
- **Slow control interface**
- **Kapton design**
- **Irradiation test**
- **Production plans**

ESR documentation available at:

http://cmsdoc.cern.ch/cms/archives/00/MU_ESR/main.html

4.2 Electronic system

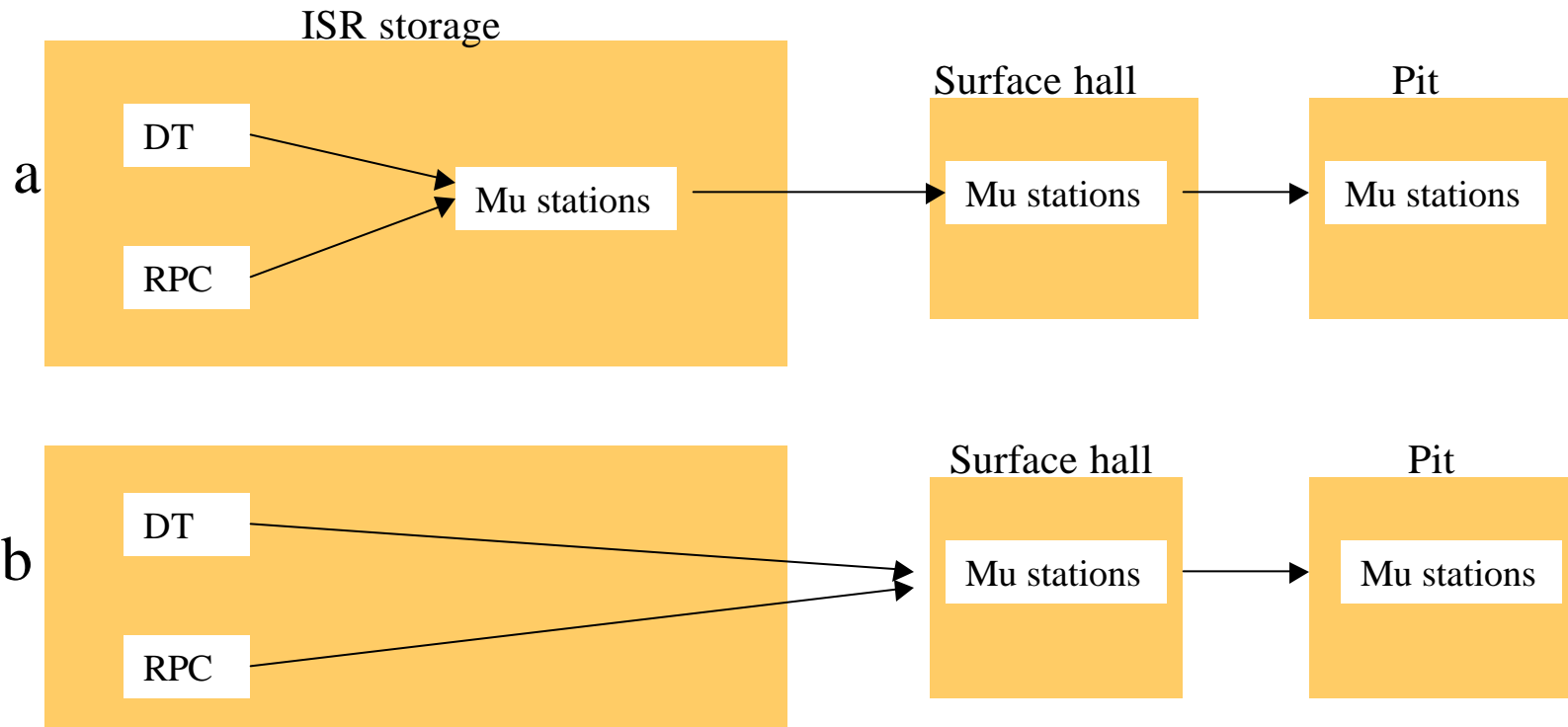


5.1 Status of milestones Barrel

5.2 Status of milestones Forward

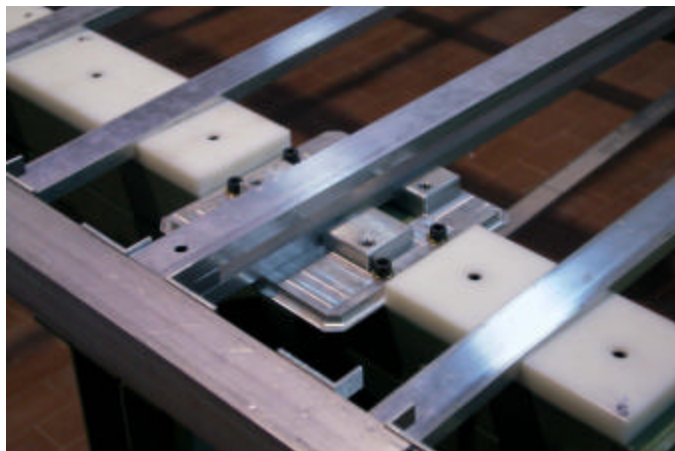
6.1 Installation schedule Barrel

The RB installation schedule will be adapted to the DT schedule



Scheme "b" should be preferred whenever possible

6.1 Installation schedule Barrel



6.2 Installation schedule Forward

The RE installation schedule in plane 1 should be adapted to the CSC schedule

The RE installation schedule in plane 2,3,4 has some flexibility with respect to CSC

Detailed schedule estimate is premature

7.1 Items on the critical path Barrel

VLSI procurement could be late for the first wheel due to producers over-commitments.
Estimated deliver time is 1 year + 6/8 months for tender procedure.

Start soon a second pre-production (it goes faster).

Assembly of RB1s in China could not be effective for the first wheel.

Assembly of RB3s in Bulgaria subject to full assignment of budget in 2001.

Open a second assembly line in Italy or at CERN. Pavia could be a candidate for this option. Negotiations under way

Detector integration and services not fully defined

Improve the effort. Help from CERN

7.2 Items on the critical path Forward

The FW project is one more that one year behind the BL one

Difficult to define item on the critical path before the design is complete and the schedule understood

EDR in January 2001

Barrel know-out can help a lot

8. Availability of resources

HV system and services system underestimated in CORE. Resources for these items non fully allocated by funding

Improve R&D to define the system architecture and cost

Funding responsibilities for forward bakelite and forward VLSI not yet defined.

CMS management

Very limited budget for the forward R&D

9. Sub-system integration Barrel/Forward

Connection to link board: define link board position and cable routes

Ground scheme very preliminary

Cooling system: workshop in November

RE1 integration scheme to be better defined

10. Areas of concern

Barrel groups are small with no strong administrative support. Technical staff below threshold (by 30%)

Forward groups have limited contact among themselves. Most of the work so far has been done at CERN. Improve the home laboratories capabilities.

Transport of large gaps (Barrel) from Italy to PU and transport of chambers from PU to CERN may be costly and painful

BL and FW Integration schemes unsatisfactory. Work needed. Help from CERN needed