

Cathode Production Status

CMS Week February 25th 2003

A. Benvenuti

INFN Bologna

- Cathode production at Protvino is progressing well.
- 200 cathodes/plotters/day is the Standard production rate.
- Production was slowed by lack of packing material (spacers).
- I-beam/cathode accounting is problematic:

724 MB2, 1630 MB3, 2887 Phi

not accounted for (includes ~900 bad extrusions +
500 to be recycled)

➡ ~3800 Missing (bookkeeping problem ?)

➡ Problem for production schedule

- Documentation of QC tests is non existent. It is important to do a visual inspection on as many cathodes as feasible and to keep track of cathode failures.

Cathodes Required for the Entire DT Construction (with 19 Spares)

| Assembly Site | Phi SL | Theta SL | Chimneys | | Cathodes Required | | |
|---------------|--------|----------|----------|-------|-------------------|-------|-------|
| | | | Phi | Theta | Phi | Theta | Chim. |
| Aachen | 146 | 62 | 4 | 2 | 29200 | 14772 | 800 |
| CIEMAT | 146 | 62 | 4 | 2 | 35332 | 14772 | 968 |
| Legnaro | 164 | 62 | 8 | 2 | 49320 | 14772 | 2320 |
| Torino | 64 | 0 | 2 | 0 | 24704 | 0 | 772 |
| Total | 520 | 186 | 18 | 6 | 138556 | 44316 | 4860 |

MB4/8,12 produced in Legnaro

Grand Total = 187 732 cathodes

Planned Shipments up to Spring 2004

| Nr | Date | PHI | MB1 | MB2 | MB3 | CUT | Boxes | Cathodes | Cumulative |
|-------|----------|-----|-----|-----|-----|-----|-------|----------|------------|
| 0 | Bologna | 9 | 1 | 3 | 3 | 0 | 16 | 14431 | 14431 |
| 1 | 04/07/01 | 3 | 1 | 0 | 0 | 0 | 4 | 3645 | 18076 |
| 2 | 30/11/01 | 9 | 1 | 0 | 0 | 0 | 10 | 9115 | 27191 |
| 3 | 19/04/02 | 9 | 2 | 1 | 0 | 0 | 12 | 11174 | 38635 |
| 4 | 06/06/02 | 9 | 1 | 1 | 1 | 0 | 12 | 11275 | 49640 |
| 5 | 29/08/02 | 7 | 1 | 1 | 3 | 0 | 12 | 10906 | 60546 |
| 6 | 06/12/02 | 7 | 2 | 2 | 1 | 0 | 12 | 11316 | 71862 |
| 7 | 07/02/03 | 8 | 1 | 2 | 1 | 0 | 12 | 11316 | 83178 |
| 8 | xx/02/03 | 11 | 1 | 0 | 0 | 0 | 12 | 11316 | 94494 |
| 9 | 25/04/03 | 8 | 1 | 1 | 2 | 0 | 12 | 11316 | 105810 |
| 10 | 08/07/03 | 10 | 1 | 1 | 0 | 0 | 12 | 11316 | 117126 |
| 11 | 08/08/03 | 9 | 1 | 1 | 1 | 0 | 12 | 11316 | 128442 |
| 12 | 09/09/03 | 7 | 0 | 0 | 0 | 5 | 12 | 11316 | 139758 |
| 13 | 28/10/03 | 9 | 1 | 1 | 1 | 0 | 12 | 11316 | 151074 |
| 14 | 09/12/03 | 9 | 1 | 1 | 1 | 0 | 12 | 11316 | 162390 |
| 15 | 15/01/04 | 11 | 0 | 0 | 1 | 0 | 12 | 11316 | 173706 |
| 16 | 04/03/04 | 12 | 0 | 0 | 0 | 0 | 12 | 11316 | 185022 |
| Total | | 147 | 16 | 15 | 15 | 5 | 198 | 185022 | |



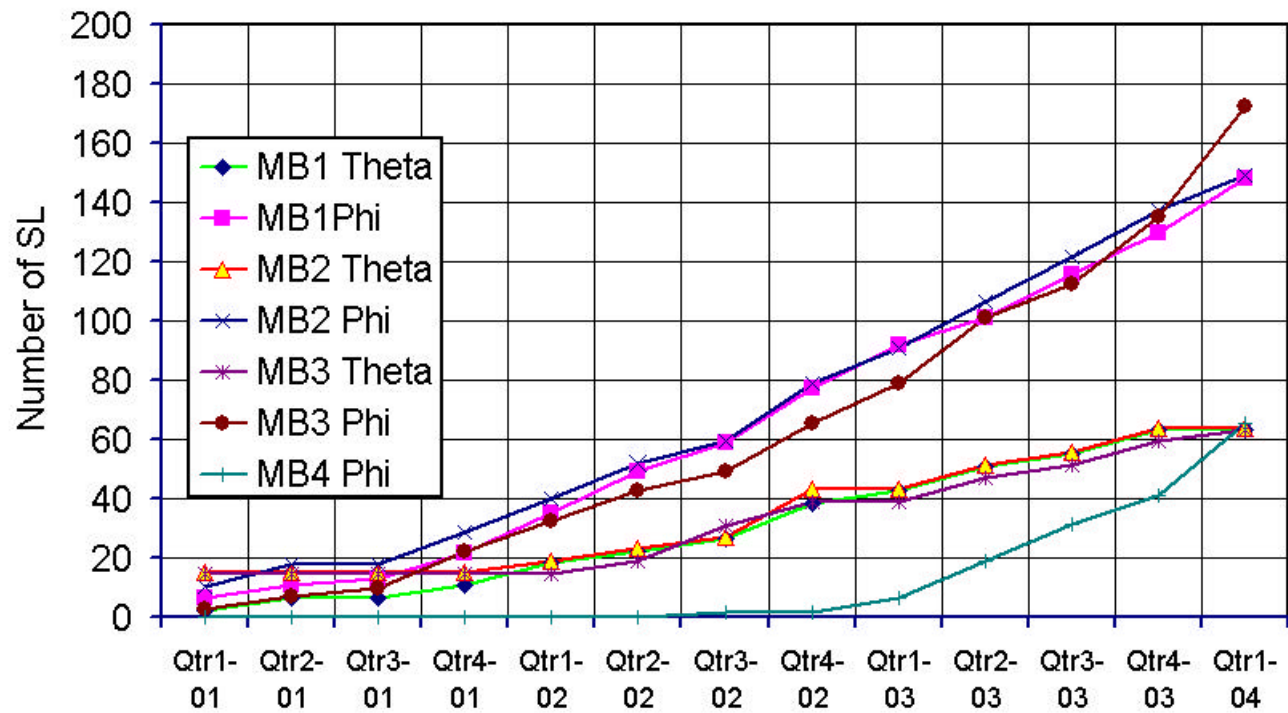
Chimney



**187 732 Required +
Spares**

One Shipment = 12 boxes with 943 Cathodes
 Shipment 8 in transit;
 Shipment 9: 1 MB2 and 5 Phi Boxes ready on 19/02/03

Delivered Cathodes as Number of SuperLayers



➔ Almost finished by Spring of 2004

Cathode Inventory at Assembly Sites

| | Aachen | | CIEMAT | | Legnaro | |
|----------------------|---------------|--------|---------------|--------|----------------|--------|
| | \ominus | Φ | \ominus | Φ | \ominus | Φ |
| Sent to Sites | 8019 | 13625 | 8202 | 16331 | 8128 | 17024 |
| Received | 8064 | 13621 | | | 8009 | 16758 |
| Pre-production Tests | 30 | 200 | | | 232 | 290 |
| Over Pressure Test | 0 | 200 | | | 0 | 290 |
| Bad Layers | 58 | 100 | | | 58 | 145 |
| Waste | 125 | 50 | | | 118 | 265 |
| Total Missing | 213 | 550 | | | 408 | 990 |
| Cathodes Used | 5336 | 8000 | | | 5336 | 12760 |
| % Lost | 3.43 | 1.88 | | | 3.30 | 3.21 |

- Difference “Sent – Received” included in “waste” category
- %Lost = (Bad Layers + Waste) / Used



Improve bookkeeping
 Reduce cathode loss:
 1 Cathode costs 4 to 5 Eu

| Grand Total | Aachen | | CIEMAT | | Legnaro | | Torino |
|---------------------------------------|-----------|------------|------------|------------|-----------|------------|-----------|
| | ⊖ | Φ | ⊖ | Φ | ⊖ | Φ | Φ |
| Ship. Nr. 8 xx-Feb. 03 94904 Boxes | 1 9905 | 1 18340 | 1 10088 | 2 21989 | 2 9071 | 3 22682 | 2 2419 |
| Nr. of SL | 42 | 91 | 43 | 90 | 39 | 78 | 6 |
| Wasted Cathodes 2161 | 213 | 550 | 0 | 0 | 408 | 990 | |
| 182872 Required Standard | 14772 | 29200 | 14772 | 35332 | 14772 | 49320 | 24704 |
| 4860 Required Chimney | 0 | 800 | 0 | 968 | 0 | 2320 | 772 |
| 5014 Total Chimneys | 0 | 828 | 0 | 989 | 0 | 2392 | 805 |

Cathode production should be completed well ahead of the chambers:

- Cathode should be stored in a cool area
- Use early boxes first. **Protective bags not used before February 2002**
- Do not leave cathodes exposed to air for a long time, they attract smog
- Once cathode production is stopped, the assembly site must be cleared. Must plan for cathode requirements beyond foreseeable spares

➡ Move Second Plotter and both dishes to CERN ???

I-beam Lengths and Shipments for the Second
15 ton Extrusion

Ordered last October

| Length (mm) | Quantity | Boxes | Weight (kg) | Ready date |
|----------------|----------|-------|----------------|---------------|
| 2386 | 13860 | 15 | 3736.9 | 30/01/03 |
| 2045 | 5544 | 6 | 1281.1 | 30/01/03 |
| 3028 | 3696 | 4 | 1264.6 | 30/05/03 |
| 2386 | 9240 | 10 | 2491.3 | 30/05/03 |
| 1996 | 4620 | 5 | 1042.0 | 30/05/03 |
| 2508 | 924 | 1 | 261.9 | 30/09/03 |
| 2386 | 18480 | 20 | 4982.5 | 30/09/03 |
| Total | 56364 | | 15060.3 | |



This ~fulfills the I-beam production
(apart for spares)