Fanout status

Como/Trieste group

The BaBar manufacturer: the CERN PCB workshop

- *Responsible of the whole BaBar production → at the time, 6 months for the production with a cost of 400CHF for the small pieces and 600CHF for the long ones*
- *The control was performed by INFN-Ts with a dedicated tree at the end of the fanout on the ASIC side (the tree was cut after the test) → shorts were cured with a probe for silicon detectors while open lines were just indicated (a maximum nr of open lines was set to accept the fanout)*
- *The material was UPILEX (produced by UBE) with the following features:*
  - *50um of upilex*
  - *150nm of Cr*
  - *4.5um of copper*
  - *150nm of Cr*
  - *1.5um of amorphous gold*

New solutions can be tested (Al on upilex or similar) but time and money are needed

- *Test of a new material (the BaBar one has to be ordered) → 50um polyammide + 5um of copper directly deposited on the substrate (no Cr)*
- *Automatic optical check of the fanout → ok with lines of 25um; in the region where they are 16um it has to be manual*

Money and time schedule

MONEY

- Long pieces → for the first 50, **150CHF/piece**
- Small pieces → **50CHF/piece**
- All pieces → **gold plated (1.5um amorphous gold) and optically checked**

TIME SCHEDULE

- **50 pieces per month**

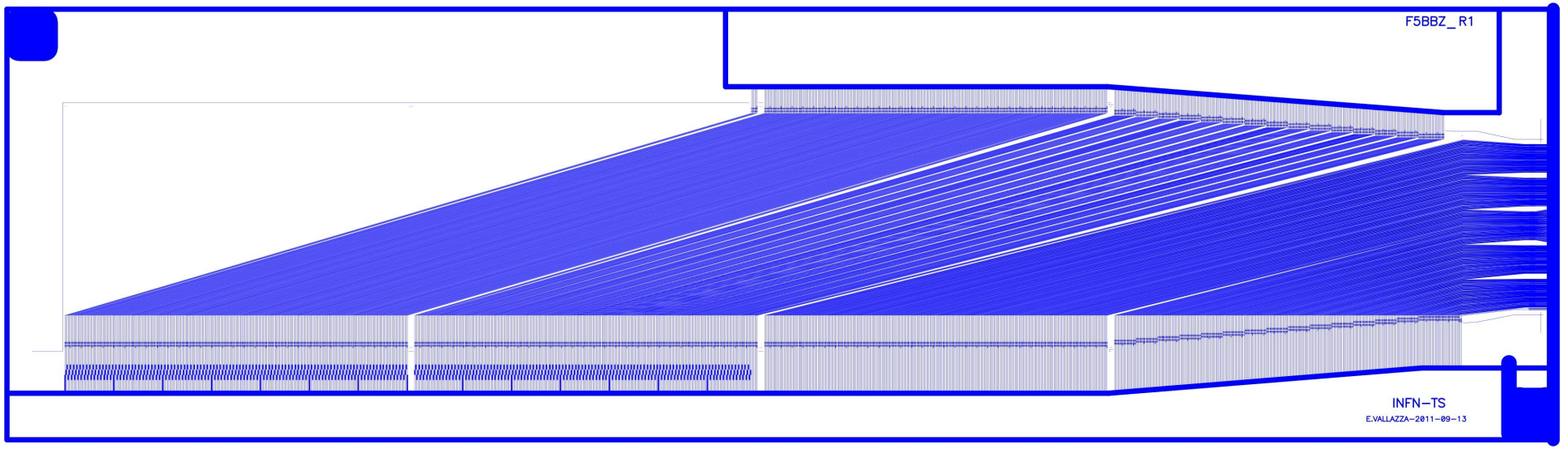
With this cost and schedule, we can think of replacing the ones with open lines

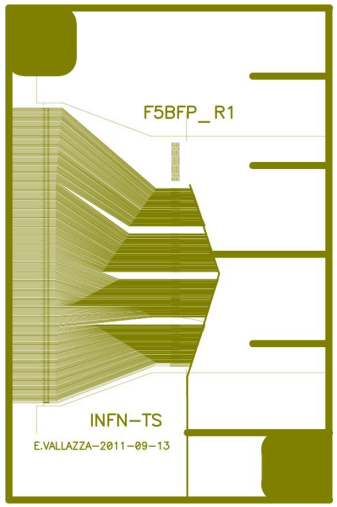
Shorts can be cured, already done in BaBar

Today the check is manual but they are working to make it automatical

They have already tested the whole production chain on two different designs and are going to produce 5 per type to test the repeatibility (→ we can use them for bonding tests)

Samples manufactured at CERN





Fanout - Status

- *No problems for the phi – only longer fanouts*
- *Extension of coverage creates different problems on inner (1,2,3) and outer (4a,4b,5a,5b) layers z fanouts*
- *Inner layer status is summarized in the table:*

N. Strip BB/det	N. ASIC Channels	Pitch SB mm	N. Strip SB/det	N. Channels SB	Missing Ch SB
411	896	0.1	524	1048	152
441	896	0.1	644	1288	392
426	1280	0.1	630	1890	610

Inner layer z fanouts- Possible solutions (1)

- *Pairing of the strips at smaller angle*
- *(Slight) increase of pitch if needed*
- *At the extreme, use 2x ganging and decrease the pitch*

Module	Pitch SB mm	N. Strip SB	N. Channels SB	End space paired mm	Paired strip max angle (mrad)	Paired strip max angle (deg)
Layer 1 Z	0.10	524	1048	30.40	0.40	23.20
Layer 2 Z	0.10	644	1288	78.40	0.65	37.04
Layer 3 Z	0.10	630	1890	122.00	0.69	39.77
Layer 1 Z	0.100	524	1048	30.40	0.40	23.20
Layer 2 Z	0.115	560	1120	51.52	0.46	26.60
Layer 3 Z	0.115	547	1641	83.03	0.49	28.24

Inner layer z fanouts- Possible solutions (2)

- *Decrease the pitch and gang 2x the strips: probably too critical on layer 1*

Module	Pitch SB mm	N. Strip SB	N. Channels SB	Surplus Ch SB
Layer 1 Z Gang 2	0.06	872	1744	48
Layer 2 Z Gang 2	0.075	858	1716	76
Layer 3 Z Gang 2	0.075	839	2517	43

Fanout – Outer layer 5bz

- *Option 1: slight increase of pitch and pairing the half outer barrel: with the present width the angle of ganging connection is very small*
- *Option 2: go to 3x ganging*

Module	Barrel Length BB(z) mm	N. Strip Barrel BB	N. ASIC Channels (2x)	Used Ch BB	Barrel Length SB(z) mm	Pitch SB mm	N. Strip Barrel SB	N. Channels SB	Max angle paired (mrad)	Max angle paired (deg)
Layer 5 bz – Wide pitch+ pairing +Gang2	67.55	316	1280	1266	79.5	0.236	331	1276	0.74	42.17
Layer 5 bz – Gang 3	67.55	316	1280	1266	79.5	0.2	391	1897		