

# PA Task Force Discussion

7<sup>th</sup> VXD Workshop - Prague Jan. 23<sup>th</sup> 2015



G. Rizzo

G. Rizzo for the Pisa Belle2 SVD-Group  
Universita' & INFN Pisa



VXD Workshop -Jan. 23 2015

# Introduction

- Last 2 months important to understand many details: some problems probably solved & new discovered.
  - Lesson learnt: writing specs helps to discover new potential problems!
  - Detailed summary of PA issues presented by Koji on Tue.
  - Today short discussion can cover only most urgent issues that need decisions.
1. PA-Flex
  2. Updates on PA0 & Origami


# PA-Flex

- PA-Flex mass production can start on Feb 2<sup>nd</sup>
- Before that we need:
  1. to converge on final specs document
    - Pad size thresholds (width from bonding tests & length)
    - Details on how the Tokai-Denshi will deal with the samples rejected by our pad size measurements, and eventual optimization of the process during mass-production (etching!).
  2. Sign-off procedure: Who should sign off these specs ? System leaders and QCG should indicate names.
  3. Circulate the specs within SVD (not only PATask Force)
  4. Final Specs translated in Japanese should be agreed by Tokai
- Talks with updates on bonding results from sites at this meeting to decide if pad width > 30 um ok
- Pad length > 100 um ok?

# PA delivery schedule

ver. 20150109 by Tokai Denshi

Need to be delivered in May to wait for the budget open in the beg. of 2015 fiscal year.



Type	#required	11-Mar	17-Mar	24-Mar	30-Mar	3-Apr	7-Apr	10-Apr	14-Apr	#delivery
PA0	10	10								10
3PF1	30	10	10					10		30
3PF2	30	10	10					10		30
3PB1	30	10	10					10		30
3PB2	30	10	10					10		30
PA1	200		40	20	20	20	20	40	40	200
PA2	200		40	20	20	20	20	40	40	200
PF1	100	20		20	20	20	20			100
PF2	100	20		20	20	20	20			100
PB1	100	20		20	20	20	20			100
PB2	100	20		20	20	20	20			100
										930

- Assumed the production start on Feb. 2
- Not final in terms of payment and contract
- # pieces in batch may change
  - To wait for budget open in the beginning of JFY
  - To pay more with 2014 budget
    - KEK and support from IPMU

Still discussing

- Time for pad size measurement (@IPMU) + shipment to sites not included (+ 2weeks?)
- Some of the pieces could be rejected after pad size measurement

# PAO & Origami

- PAO test production @ Taiyo can start as soon as we sign-off the production drawings produced by Taiyo & circulated on Tue.
  - Markus or someone else can carefully check them? When?
- PAO test production @ Tokai-Denshi (single layer) ready to start if we sign-off on production drawing
  - Markus already checked them? Someone else?
- PAO specs document should be written
  - First version by the end of B2GM
  - Need to be signed-off before mass production, but a preliminary version is probably ok before the test production starts (no need to be agreed by companies before that)
- ORIGAMI specs document almost final
- New shrinking problem should be investigated and consequences should be evaluated with issues related to that included in the specs document. Needed before PAO/ORIGAMI assembly starts.
- A few comments in next slides on preliminary schedule presented by Koji, that needs to be rediscussed with Taiyo/Repic.

## Origami+PAO production + assembly (incomplete) schedule

- H/C-shape gluing work at REPIC is not yet agreed / decided.
  - REPIC proposes to do by them before APV gluing/bonding for safety of connectors
  - Has been done at KEK by Tsuboyama-san and Sasaki-san after delivery from REPIC
- Electrical test and Origami +Z bending are not included yet in the schedule**

		Taiyo	REPIC		
		Origam FPC	Saiden Reflow soldering	Hayashi Watchworks APV gluing + wire bonding	Hayashi Watchworks H/C-shape gluing
weeks					
batch0 -z 6 ce 4 +z 2	1	Batch0 12 pcs			
	2				
	3				
	4				
	5		12 pcs		
	6				
	7				
	8			12 pcs	12 pcs
	9				
	10				
Mass reproduction  1 batch = -z 16 ce 22 -z 9	1	Reproduction 141 pcs			
	2				
	3				
	4				
	5		Batch1 47 pcs		
	6				
	7			47 pcs	47 pcs
	8				
	9		Batch2 47 pcs		
	10				
	11			47 pcs	47 pcs
	12				
	13		Batch3 47 pcs		
	14				
	15			47 pcs	47 pcs
	16				
	17				
	18				

- Increase number of PAO from test production (now only 10 requested) to allow they can be used for evaluation AND batch 0
- Reduce time for batch 0 PAO/Origami assembly (all pieces already produced)
- Explore if we can use in Batch 0 also PAO from Tokai-Denshi on single layer.

# Preliminary schedule....

## Input of Discussion :

### Taiyo PA0 + Origami Possible Schedule

2015 Jan	<ul style="list-style-type: none"><li>• PA0 new design evaluation</li></ul>	1-2 weeks
	<ul style="list-style-type: none"><li>• PA0 test production</li></ul>	2 weeks
	<ul style="list-style-type: none"><li>• Evaluation of PA0 sample</li></ul>	2 weeks
2015 Feb	<ul style="list-style-type: none"><li>– Crack-free</li><li>– no shorts</li><li>– Bonding pad lengths, bias hole effective size</li><li>– Stress test</li></ul>	
	<ul style="list-style-type: none"><li>• Sign-off the final specification of PA0 + Origami reproduction</li></ul>	1-2 weeks
2015 Mar	accompanied by <ul style="list-style-type: none"><li>– Electrical test condition with minimum probe traces</li><li>– Origami +z bending method</li><li>– H/C-shape gluing specification update</li></ul>	
2015 June	<ul style="list-style-type: none"><li>• Origami+PA0 batch0 production</li></ul>	3 months
2015 July	<ul style="list-style-type: none"><li>• Evaluation of batch0 Origami</li></ul>	1 months
2015 Oct-Dec.	<ul style="list-style-type: none"><li>• Mass reproduction (3 batches)</li></ul>	3-5 months
	Assumed electrical test 2 weeks	contingency of a few weeks

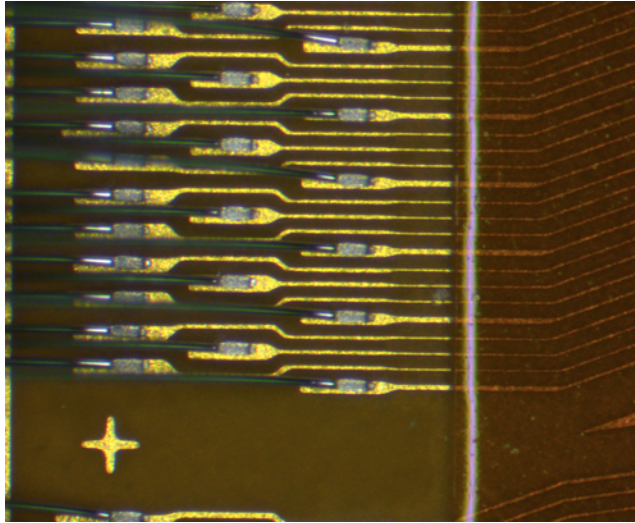
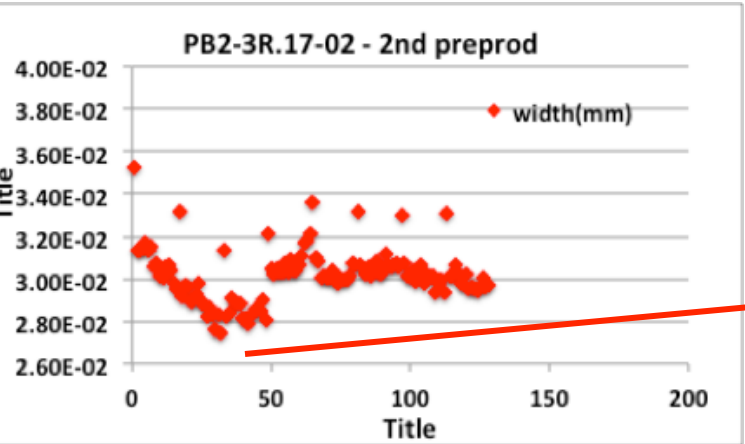
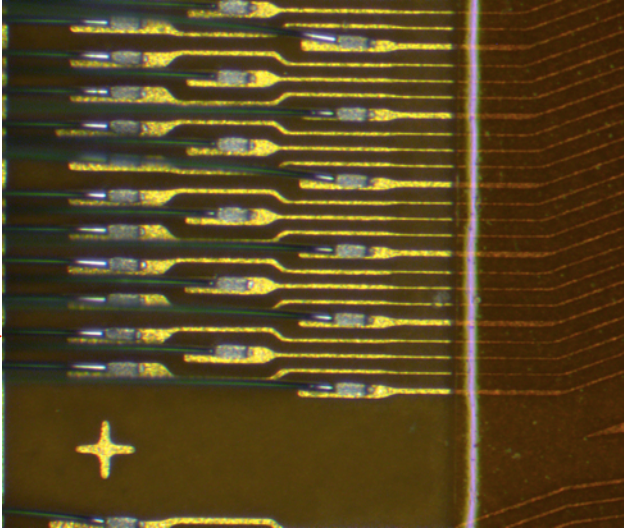
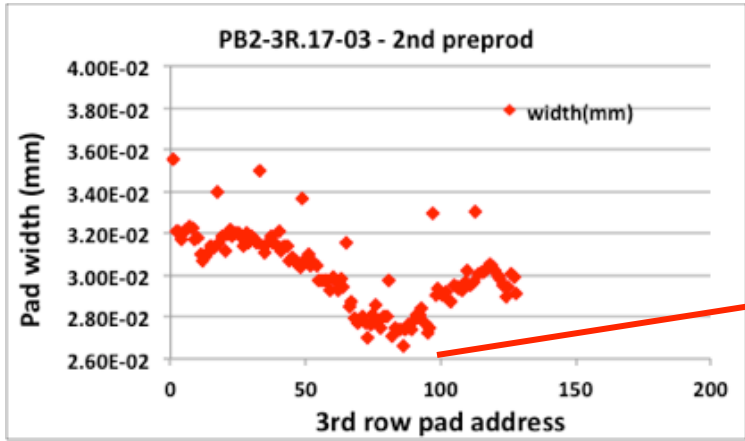
# PA-Flex bonding test results in Pisa

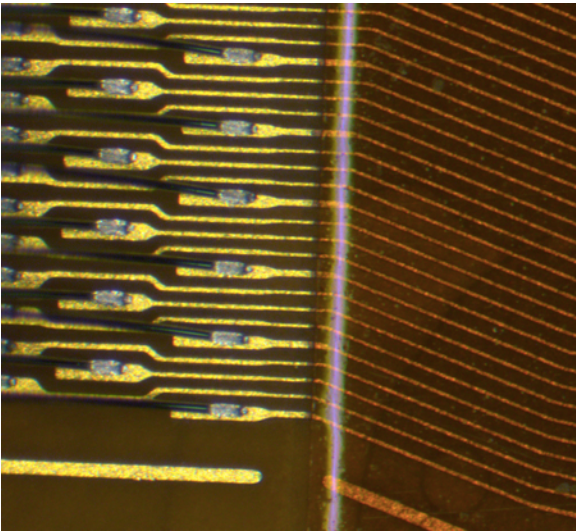
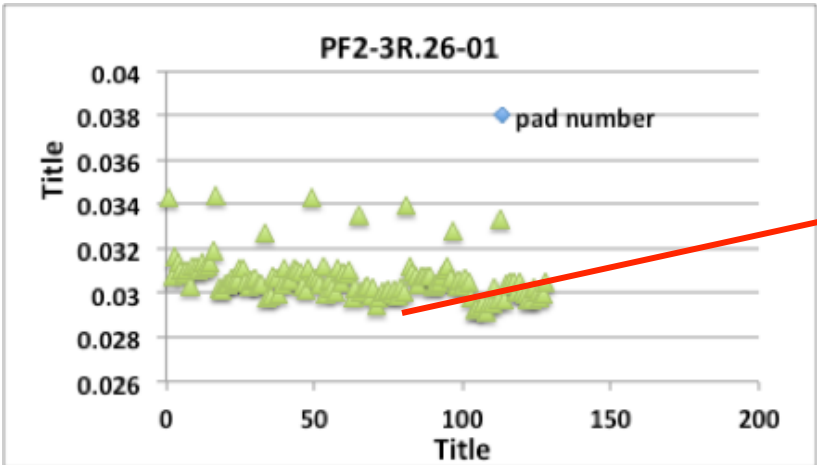
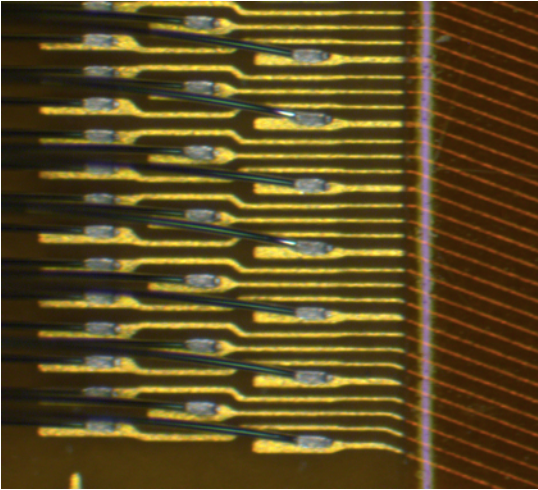
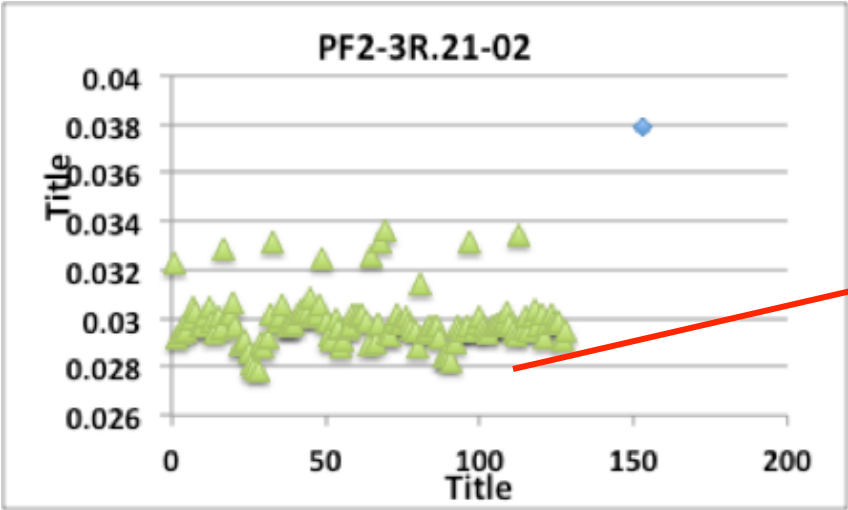
A. Profeti



# PA-Flex bonding test results in Pisa

- 4 PF/PB from 2<sup>nd</sup> preproduction, with regions with small pads, bonded to CMS half moon
- Bonding efficiency 100% but in regions with pads < 30 um some bonds had to be redone a 2<sup>nd</sup> time
- Poor alignment can make bonding very difficult also with pad = 30 um!
- See full set of pictures in
  - [https://drive.google.com/folderview?id=0BzYaX1UJ403HZWhNQTAwTUduVXc&usp=drive\\_web](https://drive.google.com/folderview?id=0BzYaX1UJ403HZWhNQTAwTUduVXc&usp=drive_web)
- NO pull force done (done in other sites with good results)
- Previous bonding experience on PA from 1<sup>st</sup> preproduction confirmed from this tests.
- **Our conclusion: bonding on pads  $\geq$  30 um, can be painful but ok.**





# 1<sup>st</sup> preprod PA-Flex already bonded on FW/BW assembly

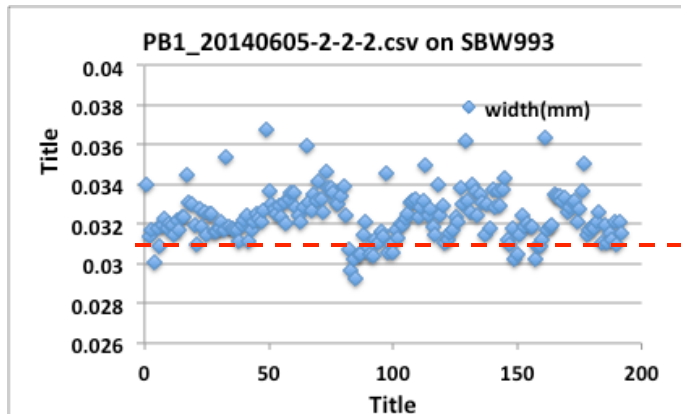
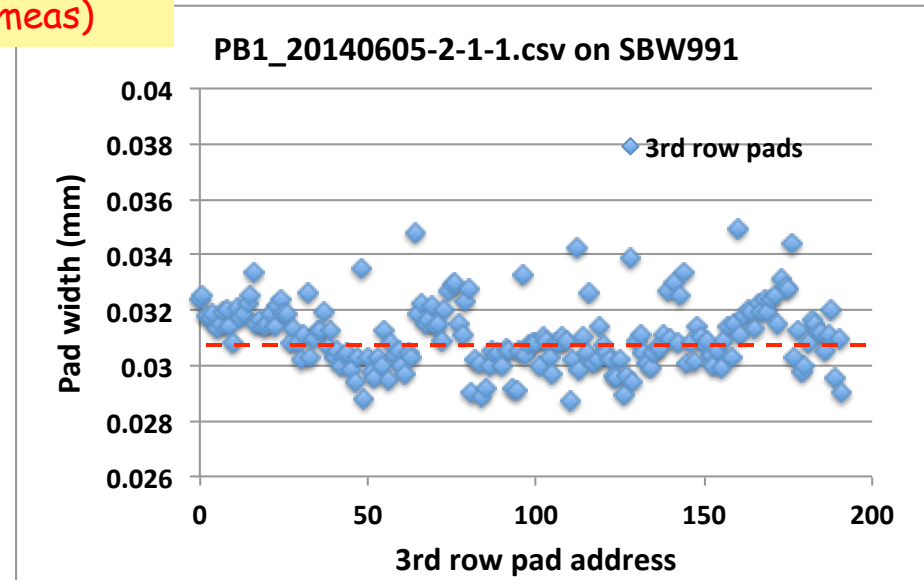
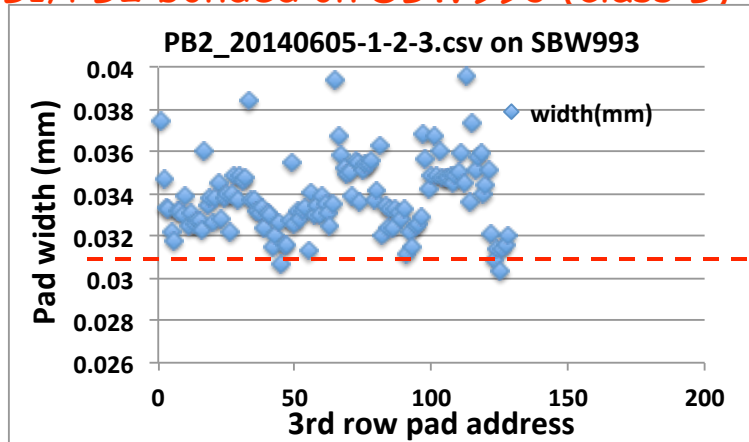
1<sup>st</sup> preprod **bad** sample: Accepted by Tokai- will be rejected after full meas. @ IPMU

• Data on pad size from July meas. confirmed several pads were  $< 30 \mu\text{m}$  ( $< 31-32$  in this plots from July measurement)

Bonding was painful! (module class C not tested, Class B tested and only 1 bonding was missed)

PADS  $> 31 \mu\text{m}$   
(Jul. meas)

PB1/PB2 bonded on SBW993 (class B)





backup