

# **ATLAS BARREL MODULE PRODUCTION**

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On Behalf of UK-B.**

**SCT Week- September 2003**

# Introduction : Reminder

- UK-B to deliver **550** Modules for the 4 Barrels
- Sensors
  - Delivery 100% Complete
  - We have received ~2750 sensors
  - Enough Sensors for **680** modules
- Baseboards
  - Delivery 100% Complete
  - We have received **630** Baseboards
  - Baseboards limit the number of starts
- Hybrids (see next slide)
- Yield required to be  $> 550 / 630 = 87\%$
- **To be confident we require a sustained yield  $> 90\%$**

# Hybrids : 1

- The Statistics

– Hybrids Received from KEK	<b>258</b>
– ASICs Attached	<b>237</b>
– Completed	<b>197</b>
– Currently in production	<b>18</b>
– Problem (Held in production) Hybrids	<b>19</b>
• Yield	<b>90.0 %</b>

- Yield recently increased

- release of the LGS chips
- Replacement of chips (11 in total, 10 clearly successfully)

## Hybrids : 2

- Production Stopped for 3-4 months due to PA problems
- Production has now restarted
  - Latest PA (Lots 59-65 ...) samples much improved.
  - Whiskers still observed but at a reduced level
- **Current Hybrid Output is Limited By Deliveries**
  - UK-B needs 18 Hybrids / Week to maintain a balanced production
  - We are **NOT** at this level yet.
  - If 18 Hybrids / week is achieved Hybrid production can be complete by Easter 2004.

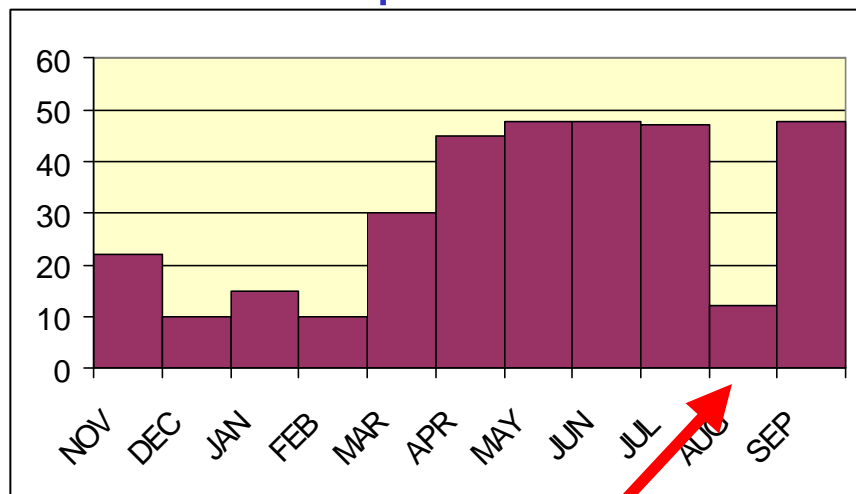
# Hybrids : 3

- **Some Concern Recently About Bonding**
  - Hybrid Bonding NOT PA bonding
  - Two Hybrids failed pull tests
  - Small areas of test Pads are of poor quality
  - Neighbouring areas are fine.
- **White PA Hybrids**
  - Recently agreed that our White PA Hybrids (with Chips) will be returned for use in Japan
- **1 Bad-Channel Chips**
  - We have built one Hybrid / Module with 12 x 1 Bad Chip (Ana).  
The module is found to be GOOD.

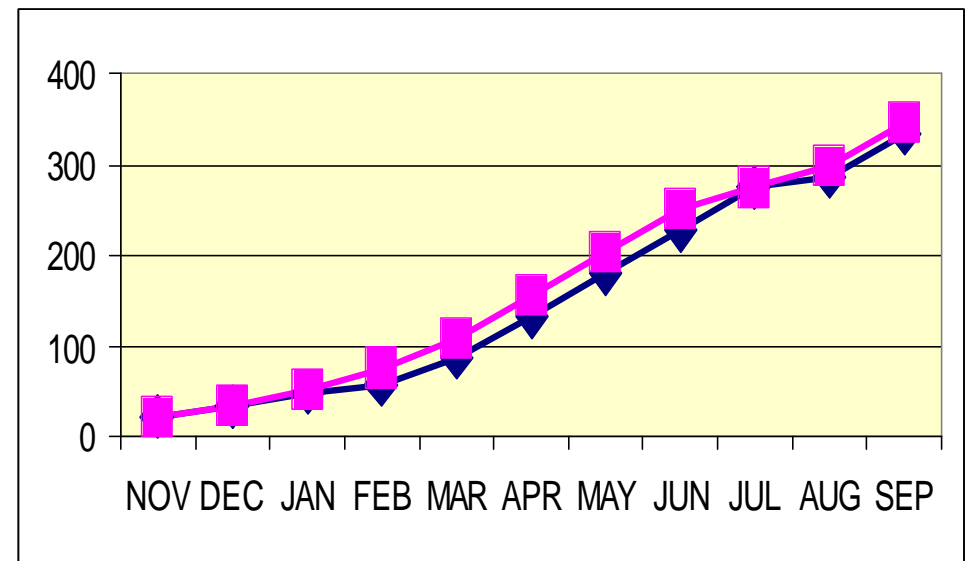
# Production of Four-Wafer-Assemblies

- Total number of starts at End of September = **335**
- Can sustain **2.5 to 3** modules per day
- Can mount **9 Hybrids every 2 days** (not a limiting factor)

## Starts per Month



## Total Number of 4-W-A



Stopped production for 2 weeks in August as pipeline too deep

— Original 2002 Model  
— Achieved

# Bonding of Modules : 1

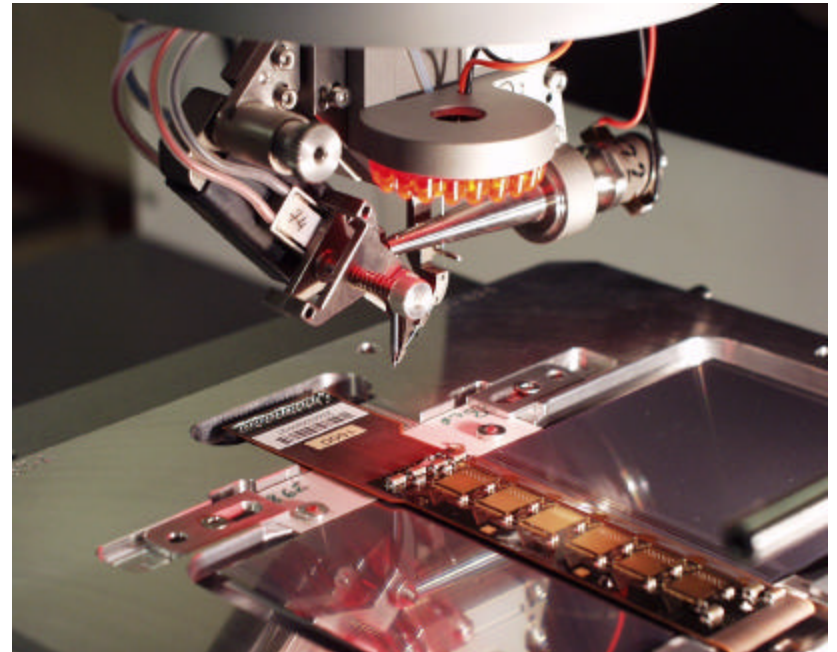
- **Bonding was a particular problem area for RAL**

- **The Past**

- Older K&S 1470 machine.
- High (FAT) Leakage Currents up to 3-4 micro Amp
- Breakdown below 500 Volts.
- Now confident we have solved FAT I-V problem.

- **The Present**

- **H&K 715M machine**
- 100 KHz Ultrasonic
- Delivered July 2003
- Operational since mid August
- Good Results
  - See Below
- Throughput
  - See Below
  - Not a Limiting Factor



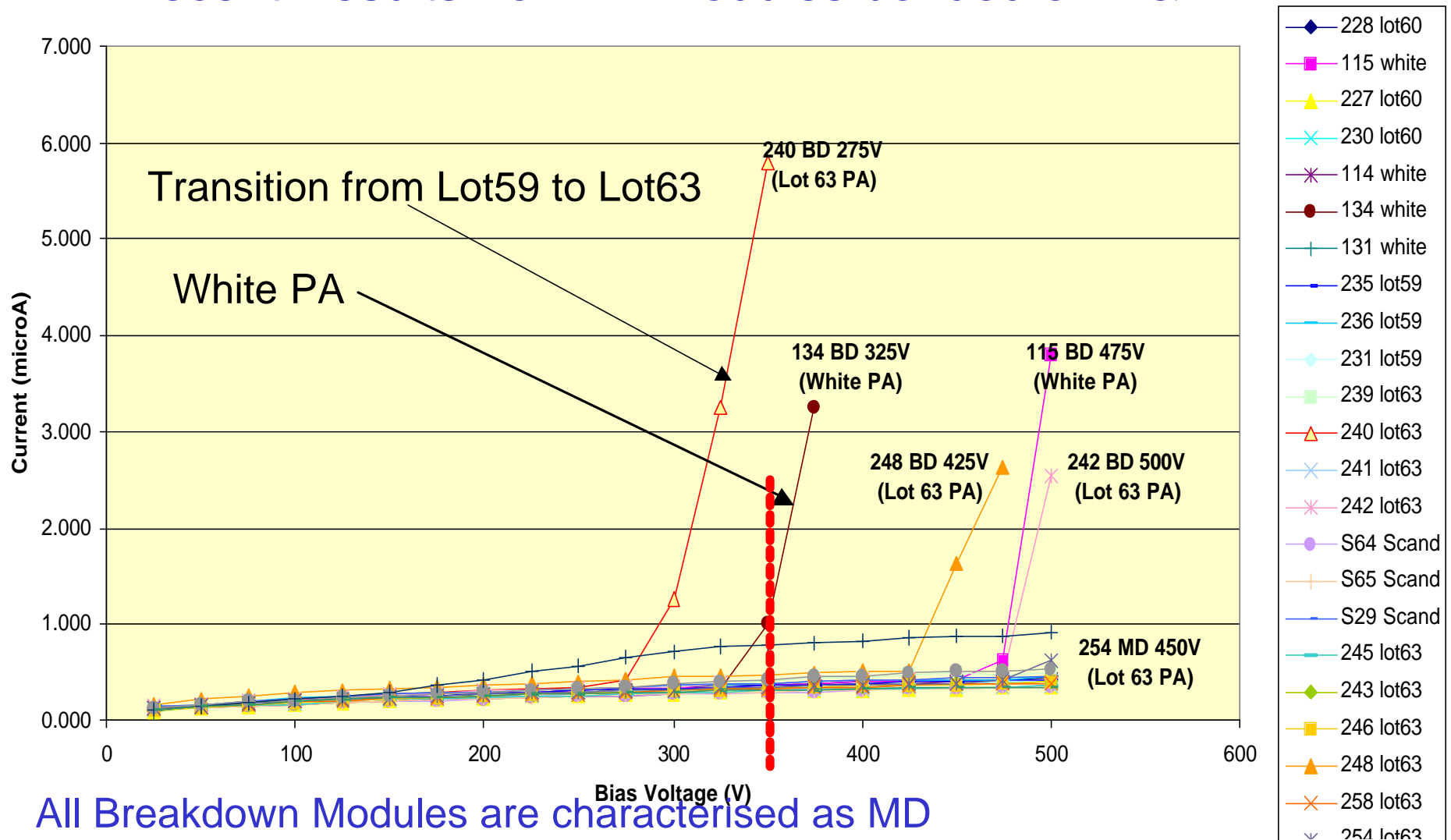
# Bonding of Modules : 2

- **Residual Problems Do Exist with Bonding**
  - Significant Changes going from one batch of PA processing to another
    - An Example would be from Lot-62 to Lot-63.
    - Causes a Large Numbers of rebonds that are problematic
    - Increased probability of damage
    - Decreased throughput
    - Can Bond 1 module in 1.25 Hrs if no rebonds
    - Each reworked wire adds 10 minutes (7 rebonds doubles the time!).
    - On recent PA samples could expect anything between 1 and 8 rebonded wires
  - It is expected that the transitions between batches will be less traumatic.
    - More experience with new machine
    - Catalogue of settings for different thicknesses of Aluminium
- **Bonding Older (Scand Hybrids to UK-B Modules)**
  - 3 Modules Bonded. No rebonds on any of the modules.
  - No Evidence of Wiggles.



# Bonding of Modules : 3

Recent Results from 24 modules bonded on H&K



All Breakdown Modules are characterised as MD

Some that breakdown at RAL (close to 500v) do not do so in LTT

## Summary Statistics & Yields Finished Modules

Total Good Modules			<b>119</b>	<b>73%</b>
Total Pass Modules			<b>9</b>	<b>6%</b>
Total (Good + Pass) Modules			<b>128</b>	<b>79%</b>
Total Hold + Rework Modules			<b>30</b>	<b>18%</b>
Failed			<b>5</b>	<b>3%</b>

## The HOLD Category : 24 Modules

		<b>ALL</b>	<b>Module</b>
Meachanical in Origin		<b>15</b>	<b>3</b>
Electrical In Origin		<b>9</b>	<b>7</b>

Mechanical **MOSTLY** means just outside metrology tolerance

Electrical means problems with leakage current

## The FAIL Category : 5 Modules

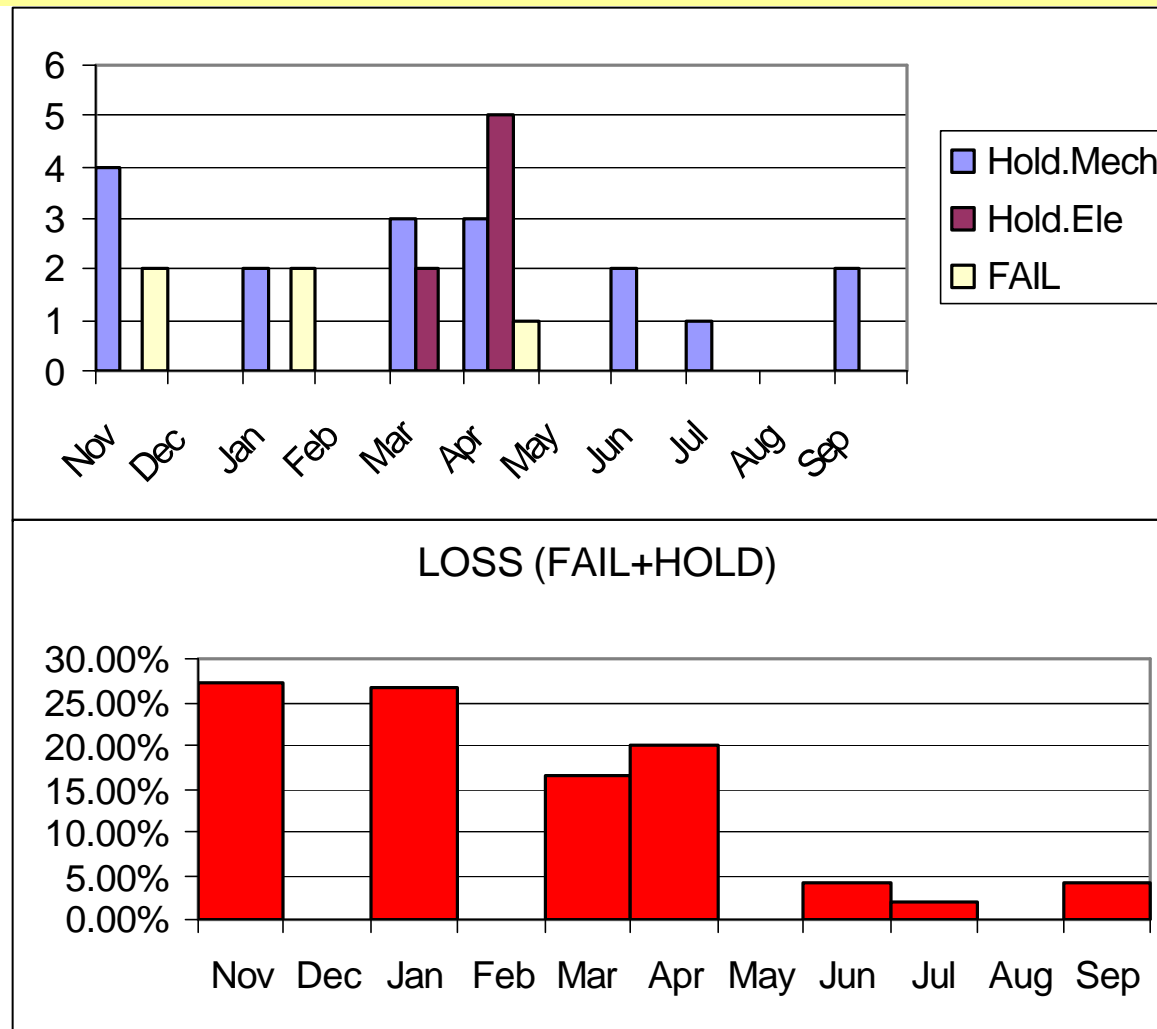
All accidents in setting up period. 2 modules have hybrids

## The REWK Category : 6 Modules

1 Chip replacement, 1 Cracked PA, Leakage Current Problems

# Yield : UK-B Losses as a function of Time

## Will we achieve GT 90% Yield?



The trend is towards below 10% of starts every month

# Schedule and Time to Complete

- **Four-Wafer-Assemblies**
  - Seems likely we can complete 630 starts by **MAR-04**
- **Modules**
  - If we continue to match the production rate of four-wafer-assemblies and HYBRIDS (about 15 / week) we will only have the backlog to “consume”. This will take ~3 months **JUN-04**.
- **HYBRIDS**
  - To complete the schedule we require a regular delivery of 18 Hybrids/Week to Birmingham.

# Module Categorisation

- The Categorisation of UK-B Modules post LTT is very well advanced
- See the NICE web-page at <http://hepunx.rl.ac.uk/atlassct/>