

**LAB ANALYSIS REPORT**

<b>Company:</b>	<b>Date:</b> March 8, 2012
<b>Submitted by:</b> [Redacted] <b>Ph.</b>	<b>Report No.:</b> 12-0118
	<b>P. O. No.:</b>
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**IDENTIFICATION**

**Vendor:** Gennum / Reballer - Corfin  
**Part Number:** Original 00086852F / Reballer 048888A-00  
**Description:** BGA – 100G – IC Interface  
**Quantity Received:** 3  
**Request No.:** MILA 849

**BACKGROUND INFORMATION**

Three devices have been re-balled, analyze using the generic flow. Perform detailed external analysis for defects or contamination; Sonoscan analysis for delamination or other defects. Perform electrical test at R/T and XRF to verify ball composition. Perform ball shear testing and SEM of sheared pads to characterize the separation(s).

**SUMMARY OF ANALYSIS PROCESS** (Numbered in Order Completed)

<u>  4  </u> Electrical Test 25°C	<u>  2  </u> Detailed Internal/External Analysis
<u>    </u> Curve Tracer	<u>  5  </u> Scanning Electron Microscope (SEM)
<u>    </u> Bake and Retest 2 Hours at 180°C	<u>    </u> Energy Dispersive X-Ray (EDX) Analysis
<u>  6  </u> XRF	<u>  3  </u> Ball Shear
<u>    </u> Decapsulate <u>    </u> Mechanical <u>    </u> Chemical	<u>  1  </u> Sonoscan

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## ANALYSIS

External optical inspection of the re-balled devices finds no evidence of contamination, package damage, delamination or excessive residues. The balls in the A10 corner of sample 2 are somewhat flattened and the balls on sample 3 appeared less round. Ball diameter determined optically finds samples 1 & 2 to range from 0.49 to 0.52mm while sample three ranged from 0.43 and 0.45mm.

Curve tracer analysis finds no opens or shorts and the junction characteristics are normal. Sonoscan testing found no evidence of delamination on any of the parts. See Figures 1 – 3.

Ball shear was performed on ten (10) balls /package with the following results:

Sample	Min.kg	Max. kg	Ave. kg
1	0.56	0.75	0.66
2	0.50	0.65	0.61
3	0.58	0.64	0.60

SEM images were collected of a typical ball from each sample. See Figures 4 – 7.

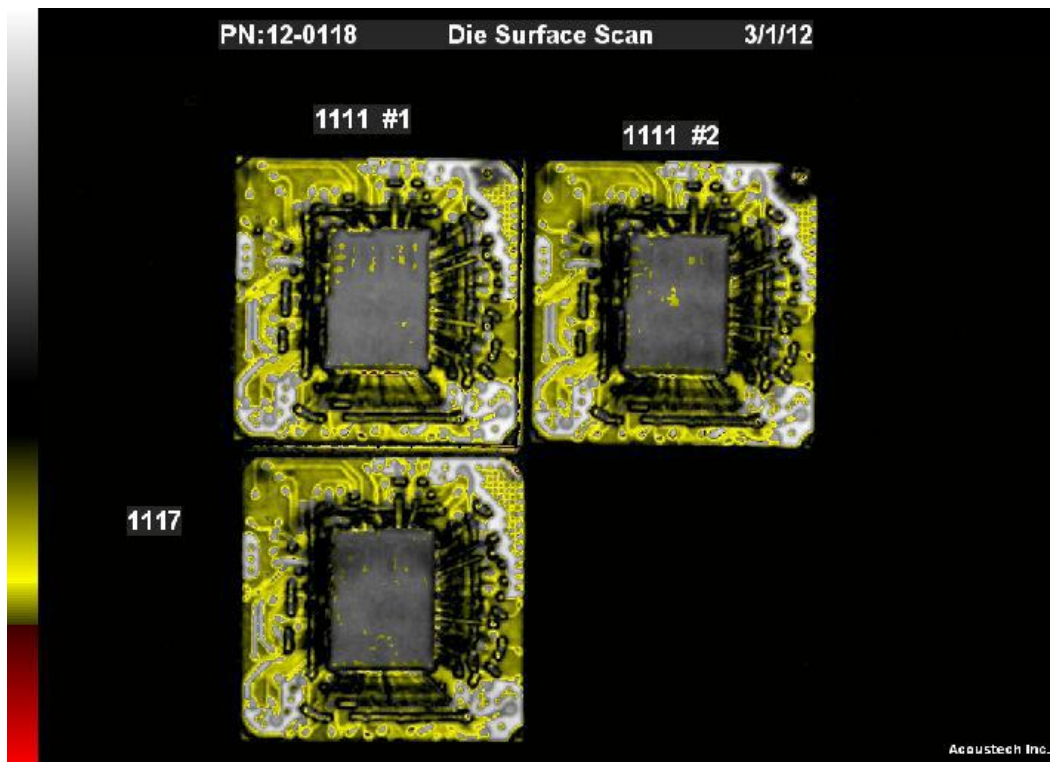
SEM inspection of the sheared device pads and balls finds that all sample separations appear to be ductile. See Figures 8 – 19.

XRF analysis confirms that the re-balled balls contains lead (Pb). See Figure 20.

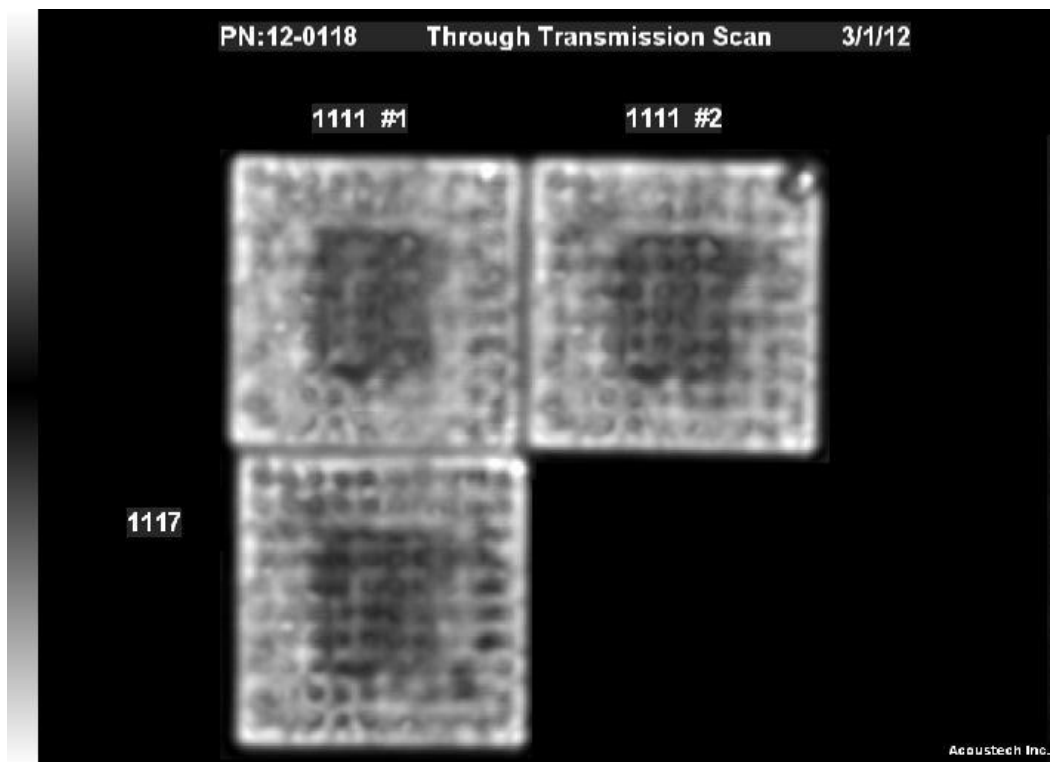
## CONCLUSION/COMMENTS

Sonoscan testing found no issues. Curve tracer analysis found no issues. The ball shear testing found the re-balled samples to be reasonably consistent sample to sample. The balls on sample 3 were smaller and not as round as the other samples. It appears that the balls on the A10 corner of sample 2 were flattened mechanically. SEM analysis indicated that all shear separations were ductile. XRF analysis confirms that the re-balled balls contain lead.

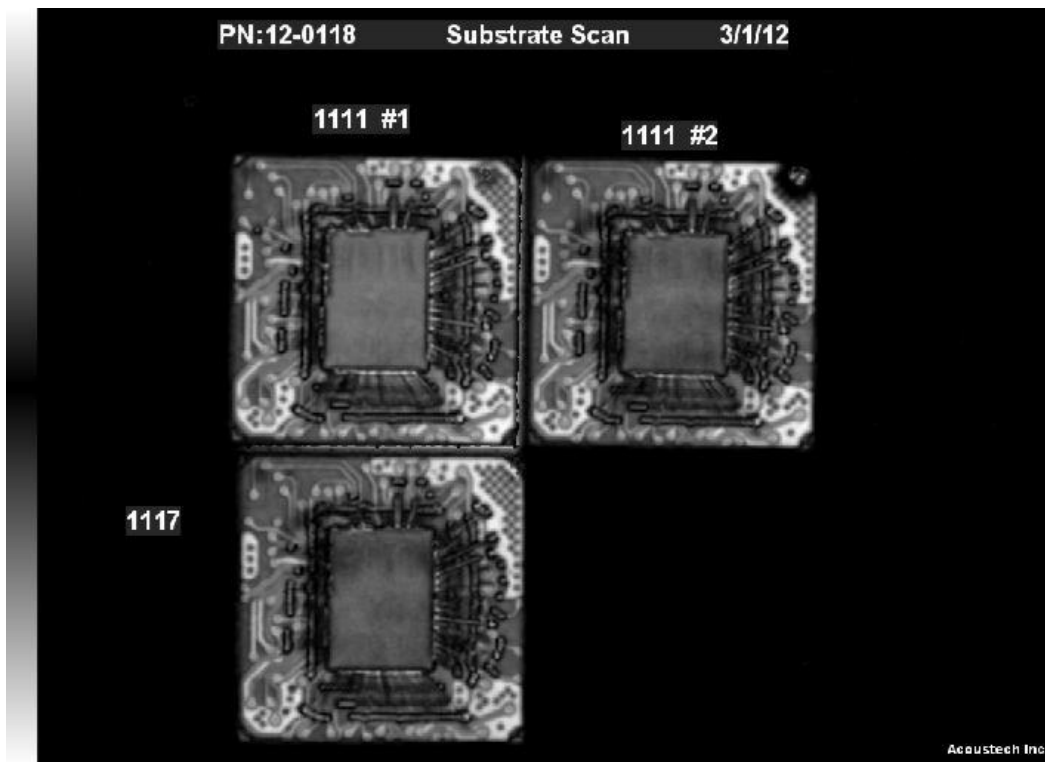
**Figure 1**  
**Sonoscan**  
**Re-balled 1 - 3**  
**Die**



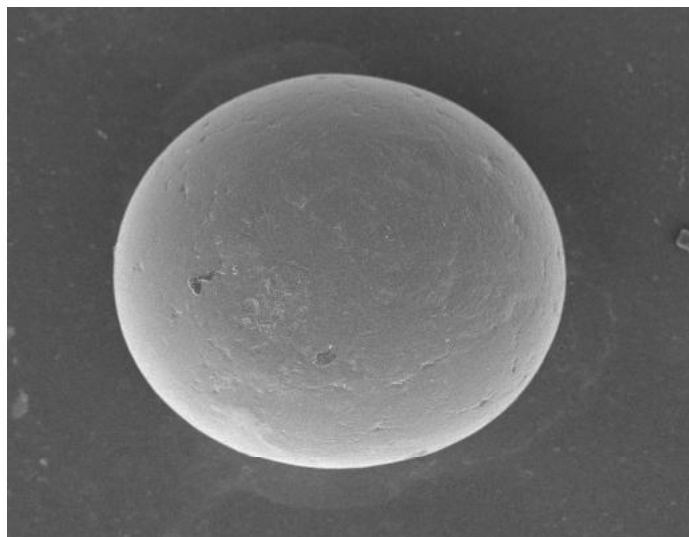
**Figure 2**  
**Sonoscan**  
**Re-balled 1 - 3**  
**TS Scan**



**Figure 3**  
**Sonoscan**  
**Re-balled 1 - 3**  
**Substrate**



**Figure 4**  
**Re-balled - 1**  
**Ball**  
**130X**

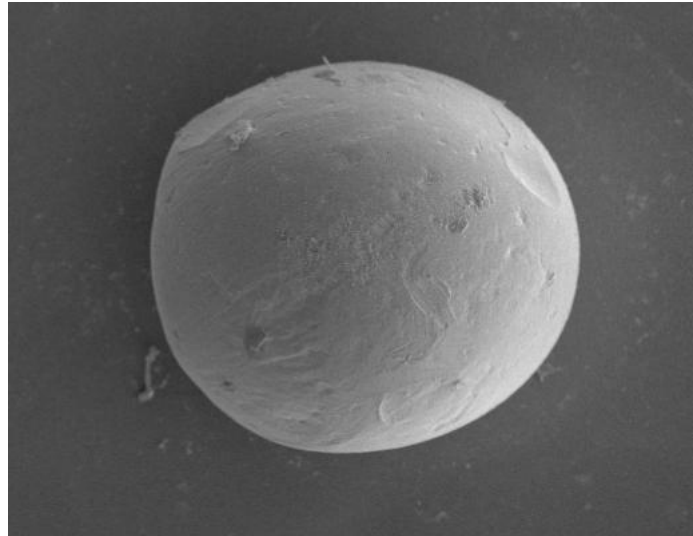


**Figure 5**

**Re-balled - 2**

**Ball**

**130X**



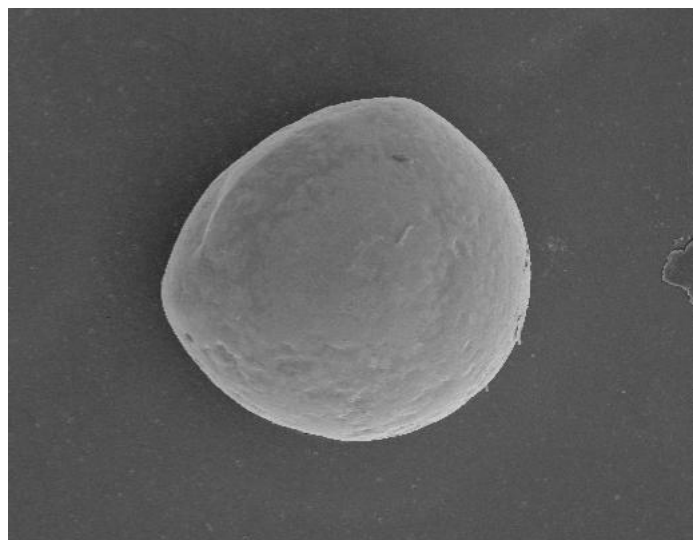
**Figure 6**

**Re-balled - 3**

**Ball**

**130X**

**Note smaller ball  
diameter**

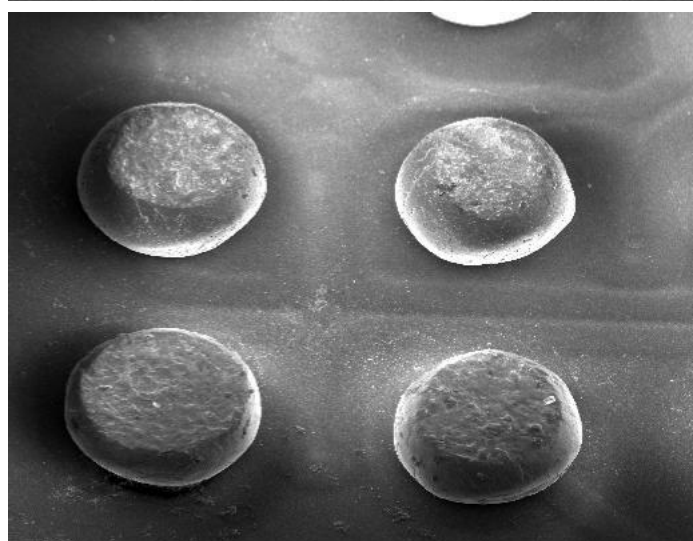


**Figure 7**

**Re-balled - 2**

**Flattened Corner Balls**

**50X**

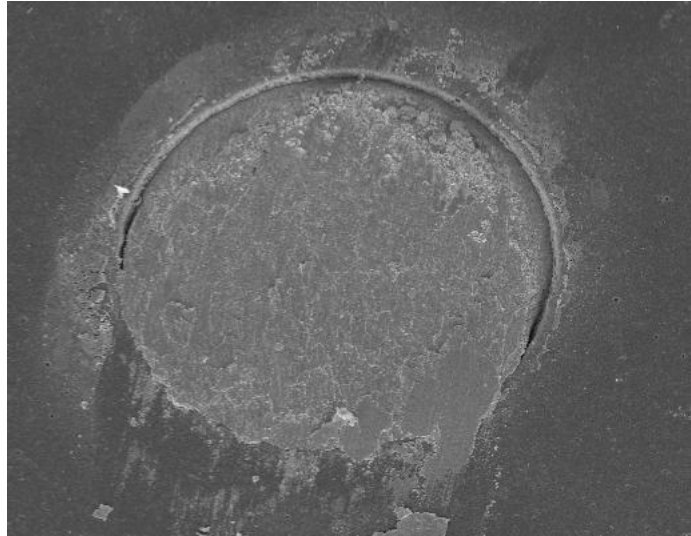


**Figure 8**

**Re-balled - 1**

**Typical Sheared Pad**

**160X**

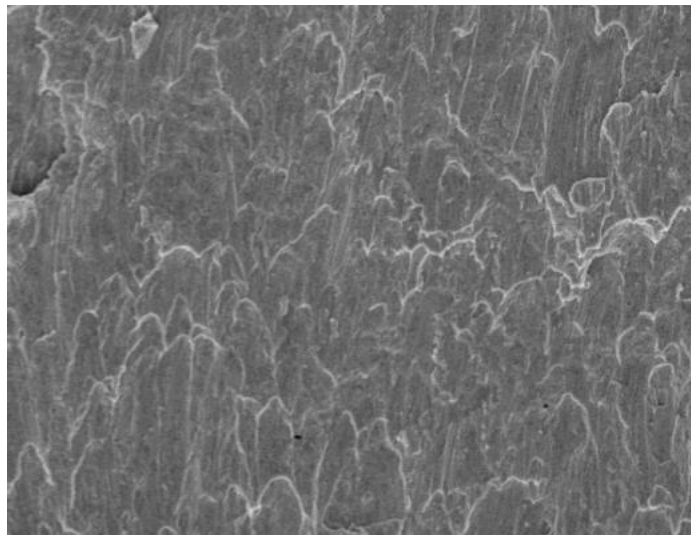


**Figure 9**

**Re-balled - 1**

**Typical Sheared Pad**

**1KX**

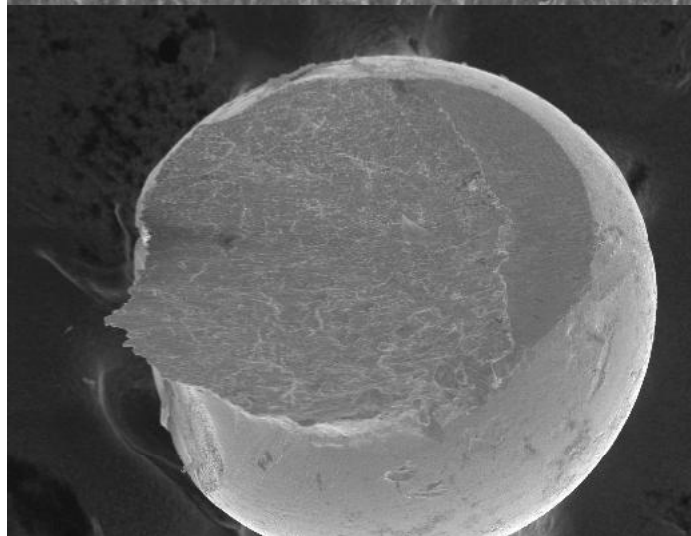


**Figure 10**

**Re-balled - 1**

**Typical Sheared Ball**

**160X**

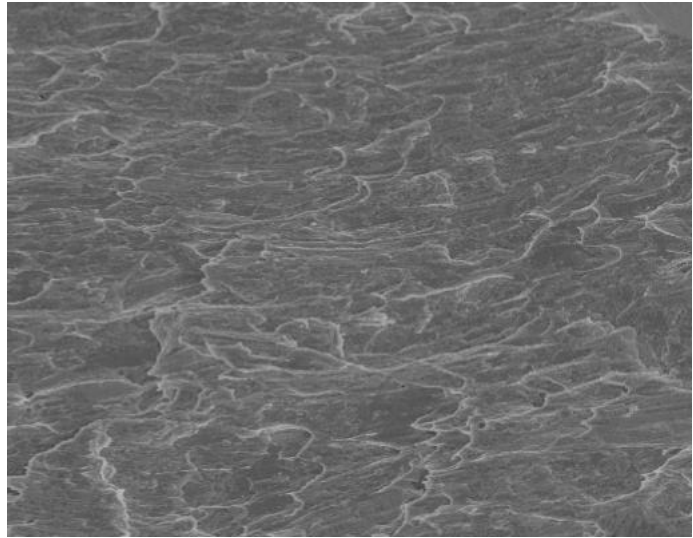


**Figure 11**

**Re-balled - 1**

**Typical Sheared Ball**

**1KX**

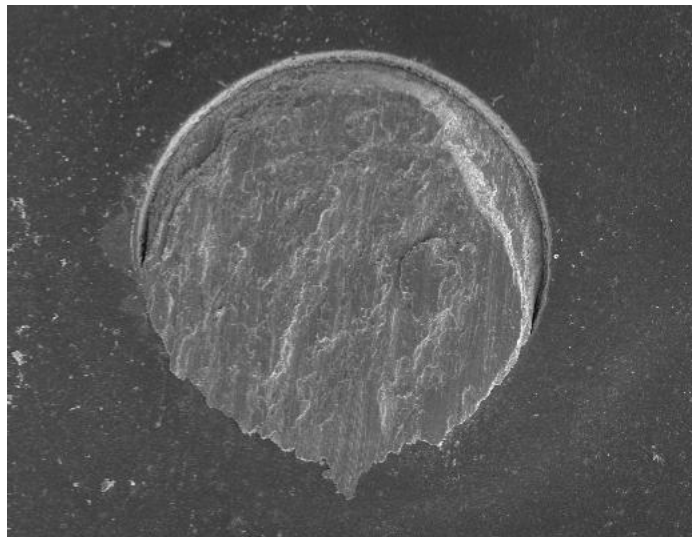


**Figure 12**

**Re-balled - 2**

**Typical Sheared Pad**

**160X**

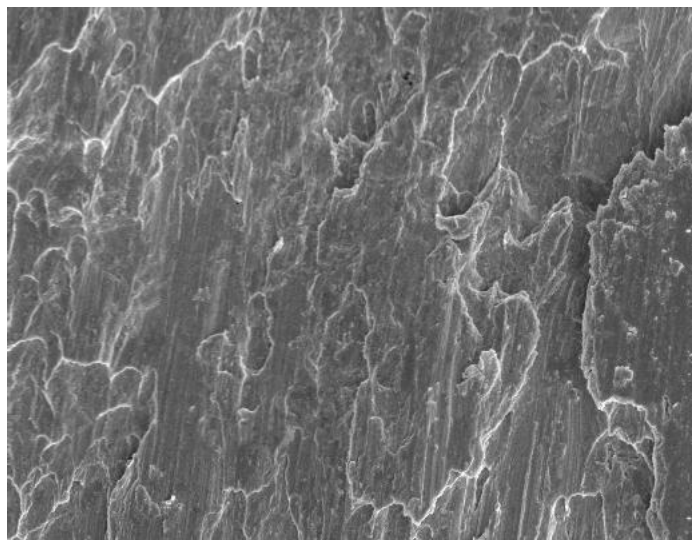


**Figure 13**

**Re-balled - 2**

**Typical Sheared Pad**

**1KX**

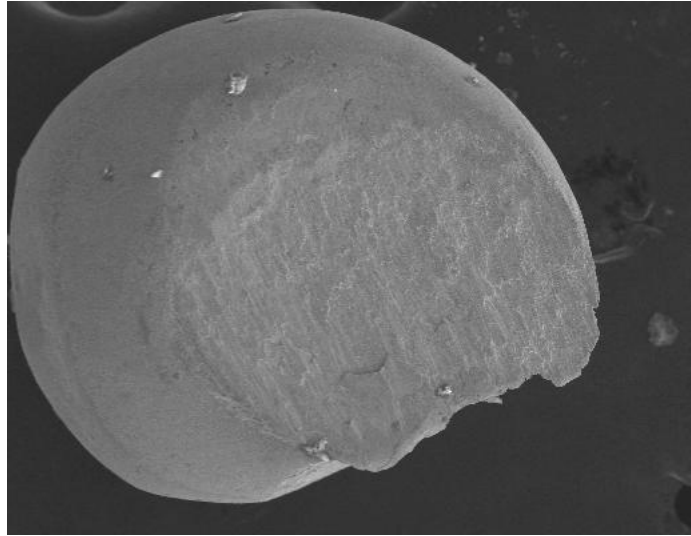


**Figure 14**

**Re-balled - 2**

**Typical Sheared Ball**

**130X**

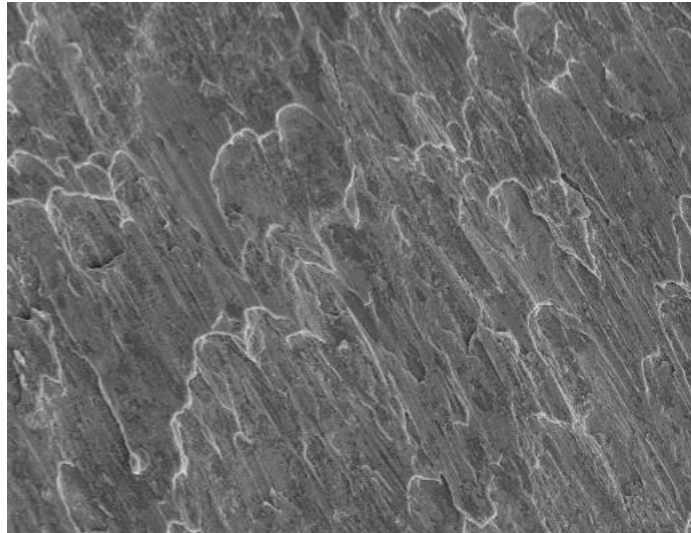


**Figure 15**

**Re-balled - 2**

**Typical Sheared Ball**

**1KX**

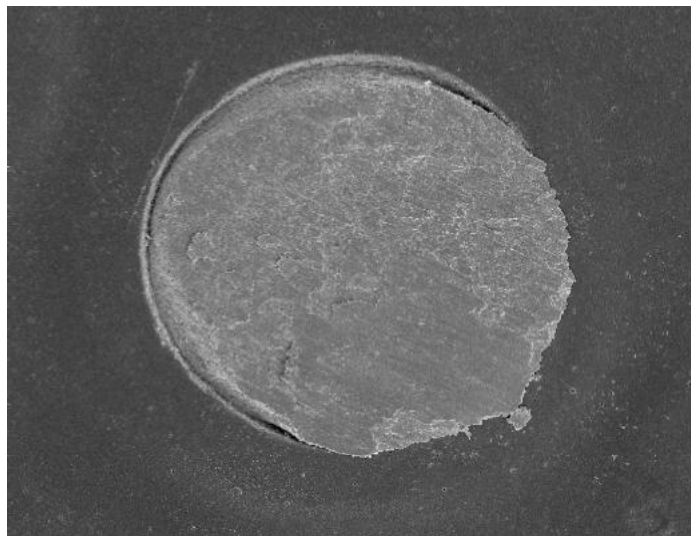


**Figure 16**

**Re-balled - 3**

**Typical Sheared Pad**

**160X**



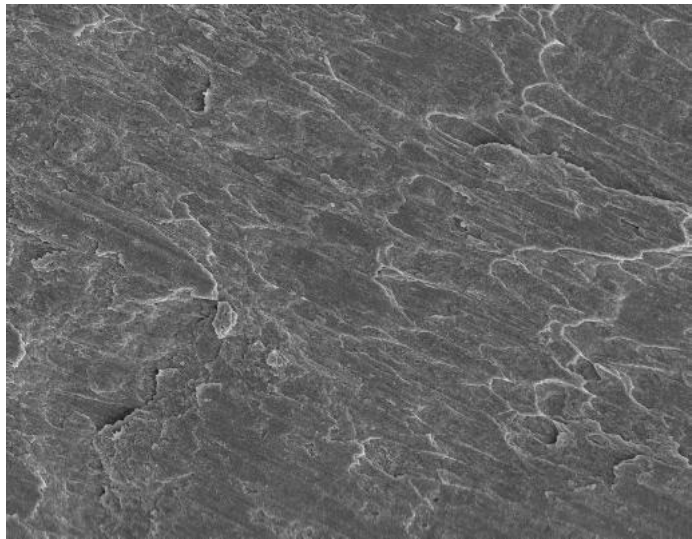


**Figure 17**

**Re-balled - 3**

**Typical Sheared Pad**

**1KX**

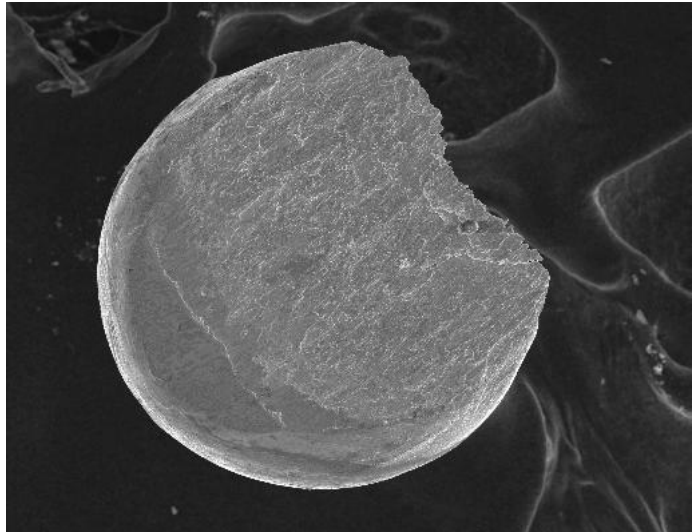


**Figure 18**

**Re-balled - 3**

**Typical Sheared Ball**

**130X**

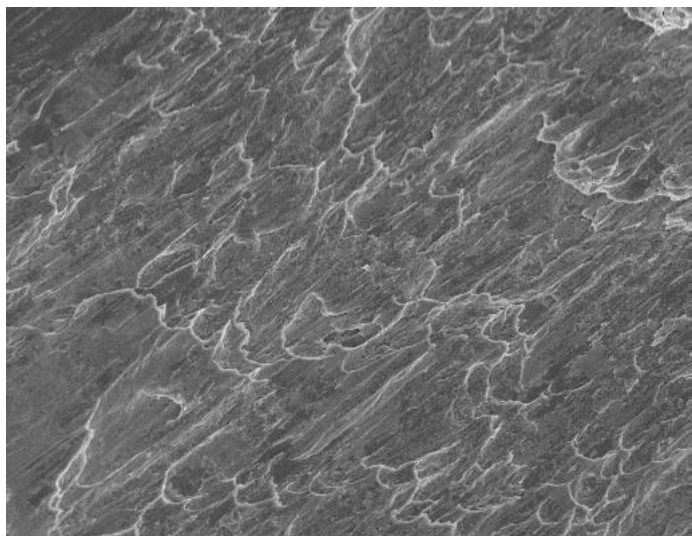


**Figure 19**

**Re-balled - 3**

**Typical Sheared Ball**

**1KX**



**Figure 20**  
**Re-balled**  
**XRF**

