



REPORT

CUSTOMER'S REF NO:
ALS THAILAND REF NO.: ATT/ELP/14/3959A-H
ALS SINGAPORE REF NO.: ATS/ELT/0176/15
DATE: 16 March 2015
COMPANY: Altum Precision Co., Ltd.
133 Moo 1, Hi-Tech Industrial Estate Asia – Nakornsawan Road
T.Banlane A.Bangpa-in, Ayutthaya 13160

DATE SAMPLE RECEIVED: 10 February 2015
DATE ANALYZED: 10 March 2015
DATE TEST COMPLETED: 13 March 2015

SAMPLE DESCRIPTION: Description: Base Plate 3.5" FA Sample
Model: Eiger 6TB
Surface Area: 549 cm²
Remark: test on Machining area

METHOD:

Particle Analysis by SEM EDX	Taped Area For Drive Parts	No. of Times Taped	Surface Area Analysed (cm ²)	Particle Ranges
Procedure No: 2092-701412 Rev. AE	Base	20	0.02090	0.5um - 5.0um

RESULTS:

The Specification is based on WD's specification Doc No 96-004575 Rev.AX for Machined / Cast Base / (Aluminium) (3.5" Enterprise)

Test	Particle Classification	Result (Particles/cm ²)	Specification Limit (Particles/cm ²)	PASS / FAIL
Particle Analysis by SEM EDX	Total Hard Particles	4	NA	NA
	Total MgSiO Particles	0	NA	NA
	Total Steel Particles	7	NA	NA
	Total Magnetic Particles	0	NA	NA

Total hard particles/cm² = total no. of hard particles/(no. of times taped x surface area analysed)
Stage Mimic of Base



Please refer to attachment for details of results

Note: This report was performed test by ALS Singapore.



ALS THAILAND REF NO.: ATT/ELP/14/3959A-H
 ALS SINGAPORE REF NO.: ATS/ELT/0176/15
 DATE: 16 March 2015
 COMPANY: Altum Precision Co., Ltd.

Analysis Table on Base

Elemental Composition	Count	Particle/cm2	Remarks
Hard Particles			
Al-Mg-O (0.5≤ECD≤2.0 um)	0	0	
Al-Ti-O (0.5≤ECD≤2.0 um)	1	2	
Al-Si-O (0.5≤ECD≤2.0 um)	0	0	
Si-O	1	2	
Al-Si-Cu-O (0.5≤ECD≤2.0 um)	0	0	
Al-Si-Fe-O (0.5≤ECD≤2.0 um)	0	0	
Ti-C	0	0	
Ti-O	0	0	
W-O	0	0	
Al-O (0.5≤ECD≤2.0 um)	0	0	
Al-Si-Mg-O (0.5≤ECD≤2.0 um)	0	0	
Al-Cu-O (0.5≤ECD≤2.0 um)	0	0	
Zr-C	0	0	
Zr-O	0	0	
Ti-B	0	0	
Ti-N	0	0	
W-C	0	0	
Al-Cu-O (2.0<ECD≤5.0 um)	0	0	
Al-Mg-O (2.0<ECD≤5.0 um)	0	0	
Al-O (2.0<ECD≤5.0 um)	0	0	
Al-Si-Cu-O (2.0<ECD≤5.0 um)	0	0	
Al-Si-Fe-O (2.0<ECD≤5.0 um)	0	0	
Al-Si-Mg-O (2.0<ECD≤5.0 um)	0	0	
Al-Si-O (2.0<ECD≤5.0 um)	0	0	
Al-Ti-O (2.0<ECD≤5.0 um)	0	0	
Pb-Zr-Ti (PZT)	0	0	
Si-C	0	0	
Subtotal - Hard Particles Only	2	4	
Magnetic Particle			
Fe-Sm	0	0	
Fe-Nd	0	0	
Fe-Sr	0	0	
Ni-Co	0	0	
Sm-Co	0	0	
Ce-Co	0	0	
Nd-Pr	0	0	
Subtotal - Magnetic Particles Only	0	0	
Subtotal- Hard Particles including Magnetic Partilces	2	4	



ALS THAILAND REF NO.: ATT/ELP/14/3959A-H
ALS SINGAPORE REF NO.: ATS/ELT/0176/15
DATE: 16 March 2015
COMPANY: Altum Precision Co., Ltd.

Analysis Table on Base

Elemental Composition	Count	Particle/cm2	Remarks
Steel Particle			
Fe-Cr	0	0	
Fe-Cr-Ni	1	2	
Fe-Cr-Ni-Si	0	0	
Fe-Mn	0	0	
Fe-Ni	0	0	
Fe-Cr-Mn-S	0	0	
Fe-Cr-Ni-Mn	0	0	
Fe	2	5	
Fe-O	0	0	
Subtotal - Steel Particle Only	3	7	
Other Particle			
Cu-S-Al-O Base	0	0	
No Element	0	0	
SCrMn/Fe	0	0	
Ti-O/Al-Si-Fe	0	0	
Ni	0	0	
Ni-P	0	0	
Sn base	0	0	
Other	6	14	
Al	0	0	
Al-Mg	0	0	
Al-Ti-Si	0	0	
Al-Cu	0	0	
Al-Si-Cu	0	0	
Al-Si/Fe	0	0	
Al-Si-Mg	0	0	
Mg-Si-O-Al	0	0	
Mg-Si-O	0	0	
Ti Base	0	0	
Cr-O	1	2	
Na-Cl	0	0	
Cu	0	0	
Cu-Au	0	0	
Ag-S	0	0	
Au-Ni	0	0	
Cu-Au-Ni	0	0	
Cu-Zn Base	0	0	
Cu-Zn-Ni	0	0	
Cu-Zn-Au-Ni	0	0	



ALS THAILAND REF NO.: ATT/ELP/14/3959A-H
ALS SINGAPORE REF NO.: ATS/ELT/0176/15
DATE: 16 March 2015
COMPANY: Altum Precision Co., Ltd.

Elemental Composition	Count	Particle/cm2	Remarks
Other Particle			
Zn	0	0	
Pb	0	0	
Fe-Cu	0	0	
Cr-Mn	0	0	
F-O	0	0	
Al-Si Base	0	0	
NiP/Al	0	0	
NiP/Fe	0	0	
NiP Base	0	0	
Ba-S Base	0	0	
Al-S/Si	0	0	
AlSi/K	0	0	
Ca	0	0	
AlSi/Fe-Cr-Mn-Cu	0	0	
Cu-Zn	0	0	
Cu-S	0	0	
Fe-Cr/S	0	0	
Sb Base	0	0	
Subtotal - Orther Particle Only	7	16	
Grand Total of Particles	12	27	

ALS Testing Services
(Thailand) Co.,Ltd.

Warunee Maneesuwan
M.Sc, B.Sc, Laboratory Manager