Bonding Strength Laboratory Test Report
界面结合强度试验报告

Type: TLM-YR-50x10 （Soft）
产品规格：TLM-YR-50x10 （软态）

Test Date: Aug.5 2014
测试日期：2014.8.5

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1. Bonding Strength (Reference)
界面结合强度（参考）

1) Test Objective: Through the tensile test, it gets the bonding strength of the copper and aluminum composite interface, and we can evaluate the bonding properties of the copper and aluminum composite materials.

试验目的：通过拉力试验，测试铜铝结合界面的结合强度，对铜铝复合材料的结合性能做评判。

2) Test Apparatus: 200KN Tensile Tester

测试设备：200KN 拉力试验机

Fig.1 200KN Tensile Tester
图 1 200KN 拉力试验机

3) Sample Preparation: Sample length is 100mm, sample width (b1) is 20.00mm ± 0.10mm, sample shear plane width (L1) is 5.00mm ± 0.10mm, grooving width less than 2 mm.Sample should be used to cut by mechanical processing, and should guarantee that the shear plane is not damaged.The shape and size of the sample as shown in figure 2.

试样制备：试样长度为 100mm，宽度（b1）为 20.00mm ±0.10mm，试样剪切面宽度（L1）为 5.00mm ±0.10mm，切槽宽度不超过 2mm。试样采用机械加工切割，应保证剪切面不受损伤。试样形状及尺寸如图 2 所示。
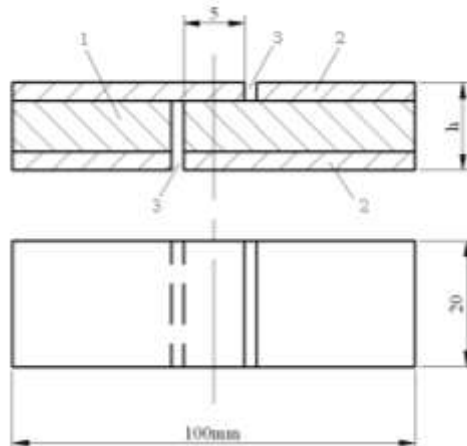

Fig.2 The shape and size of the sample to be tested
图 2 待测试样的形状及尺寸

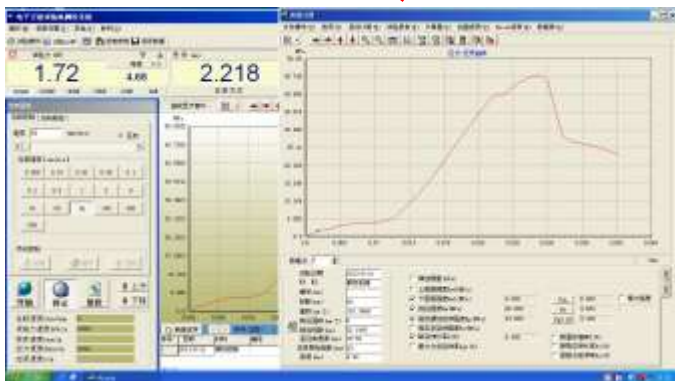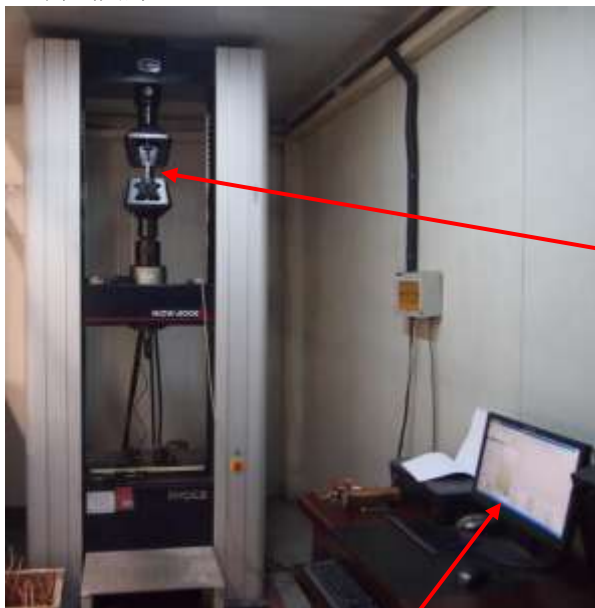## Bonding Strength Laboratory Test Report
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Description 说明：

1——Aluminium core 铝芯；

2——Copper cladding layer 铜包覆层；

3——Grooving 切槽。

4) Test Method: The sample is clamped in the universal material testing machine, clamping length of the sample is 20mm, as shown in figure 3. Start the universal material testing machine, the sample is applied axial tension, and keep the clamp movement speed is not more than 50 mm/min, until the core material and copper cladding layer produce shear deformation and complete separation. From the records of force-displacement curve, or from the load recorder (such as a computer), read the most energetically (Fmax) of the test process to add on the sample.
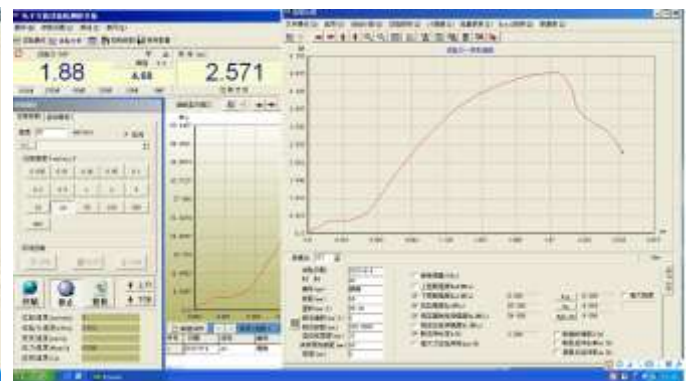
测试方法：如图 3 所示，将试样夹持在万能材料试验机上，试样夹持长度为 20mm。启动试验机，对试样施以轴向拉力，并保持夹头移动速度不大于 50mm/min，直至芯材与铜包覆层产生剪切变形，并完全分离。从记录的力-位移曲线图，或从测力记录仪（计算机）上，读取测试过程中加在试样上的最大剪切力（Fmax）。

5) Test Picture:

测试图片：

(1)

(2)

Fig.3 Test process

图 3 测试过程

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6) Bonding Strength Calculation: According to the formula (1) calculate the interface shear strength.

$$\tau = \frac{F_{max}}{S_1}$$ ……………………………………………（1）

Type:

τ——Interface shear strength, take one decimal places, units is newton per square millimeter (N/mm²);

F_{max}——Maximum shear, take one decimal places, units is newton (N);

S1——The shear plane area of the sample, according to formula (2) calculation, take two decimal places, units is square millimeter (mm²).

$$S1= L1×b1$$……………………………………………（2）

结合强度计算：按公式（1）计算界面剪切强度。

$$\tau = \frac{F_{max}}{S_1}$$ ……………………………………………（1）

式中：

τ——界面剪切强度，取小数点后一位数字，单位为牛顿每平方毫米（N/mm²）；

F_{max}——最大拉剪力，取小数点后一位数字，单位为牛顿（N）；

S1——试样的剪切面面积，按公式(2)计算，取小数点后两位数字，单位为平方毫米（mm²）。

$$S1= L1×b1$$……………………………………………（2）

7) Test Data:
测试数据：

Serial number 序号	Maximum shear/N 最大拉剪力/N	Shear plane area/mm² 剪切面面积/mm²	Bonding Strength/Mpa 结合强度/Mpa
1	4663.5	101.37	46.0
2	4675.0	85.00	55.0

8) Conclusion: Bonding strength meet the national standard GB/T30586-2014 which provides it not less than 40MPa.

结论：结合强度满足国标 GB/T 30586-2014 中不小于 40MPa 的要求。