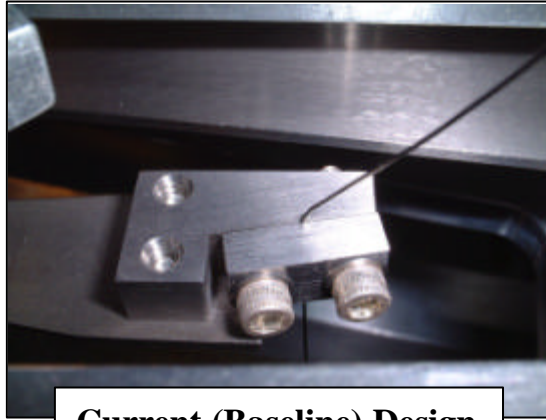


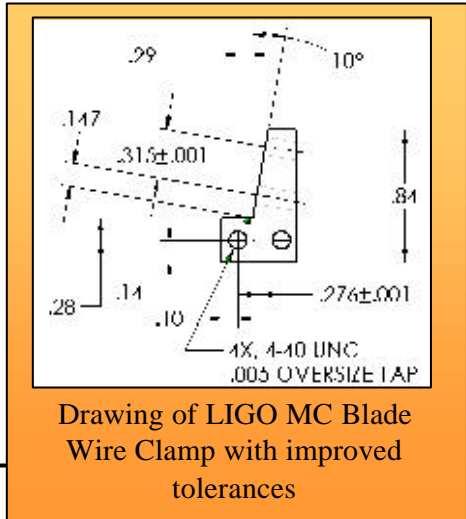


# SUMMARY OF BLADE WIRE CLAMP TESTING

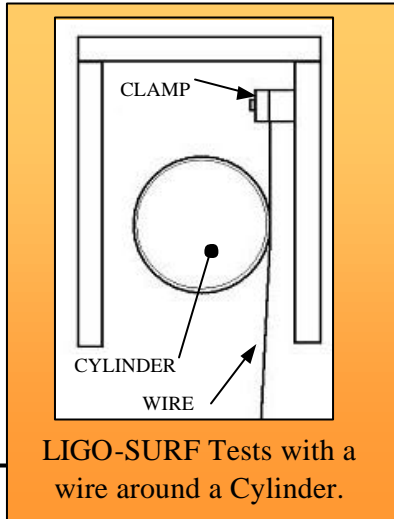


Current (Baseline) Design

**Introduction**  
 The blade wire clamp attaches to the tip of the cantilever blades to clamp the wires that suspend the upper stages of triple pendulum.  
 The reason for completing these experiments was to understand if the current baseline design could be improved upon, increasing the breaking stress of the wire.



Drawing of LIGO MC Blade Wire Clamp with improved tolerances



LIGO-SURF Tests with a wire around a Cylinder.

**Experiments by John Veitch and Dan Mason (LIGO SURF students).**

- Tried to increase breaking stress of wires by improving hole-to-hole tolerances, tighter hole tolerances and fly cutting of surfaces after assembly.
- Also researched the effect of winding the wire around a cylinder.
- Lead to the suggestion for the design of a rounded BWC .

**The LIGO-SURF Tests**

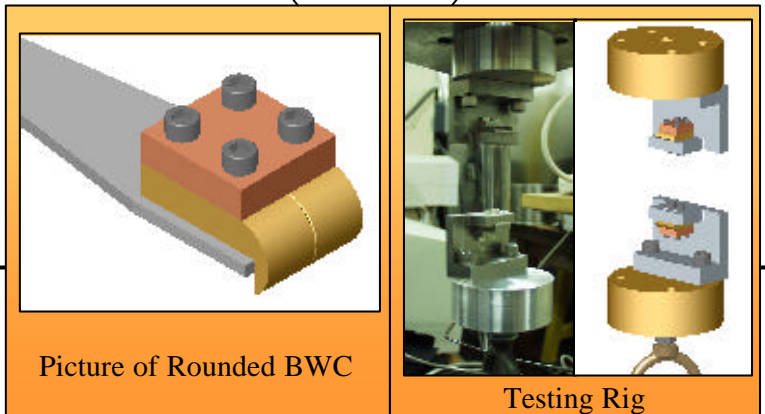
**Designs Tested in Glasgow by R.Jones, M.Perreur-Lloyd, C.Torrie**

1. Baseline (L-shaped) BWC
2. Rounded Blade Wire clamp

The design was then reviewed due to concern about the poorly defined break-off point. The following designs were then manufactured and tested:

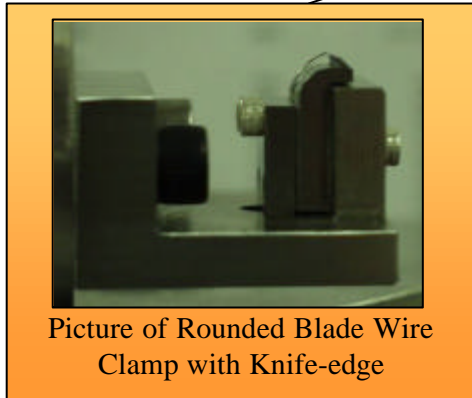
3. BWC with Knife-Edge
4. Revised Rounded BWC
6. RAL Rounded BWC

**The Glasgow Tests**

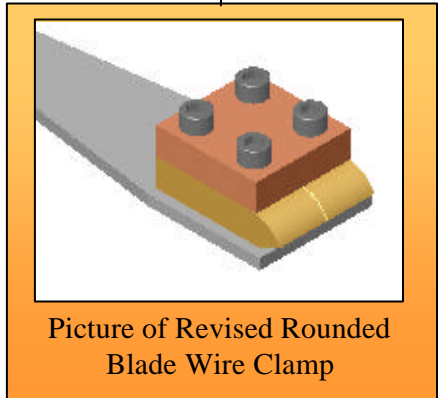


Picture of Rounded BWC

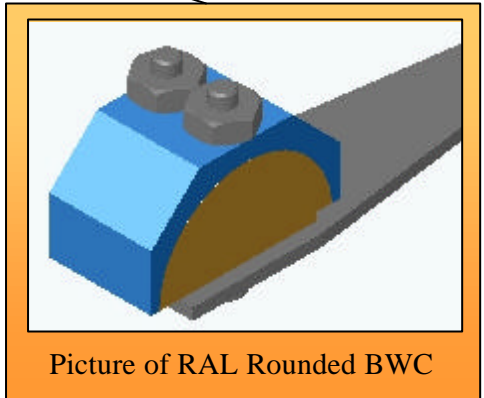
Testing Rig



Picture of Rounded Blade Wire Clamp with Knife-edge



Picture of Revised Rounded Blade Wire Clamp



Picture of RAL Rounded BWC

**Results**

1. Rounded BWC is the only clamp to show any significant improvement.
2. RAL BWC showed small improvement but was fiddly to assemble and is (around 3x) heavier.

**Conclusions**  
 We should continue using the current baseline design

**Next Steps**

- Adapt the RAL design and re-test.
- Mass of BWC on larger suspensions
- Materials – Use of Titanium in BWCs
- Internal Resonance of the blades

**Results / Conclusions**

