Provisional Target Installation Plan

Outline

There is a requirement to assemble and test two complete target systems in time for installation during the ISIS shutdown period in August 2009. One complete system will be installed in ISIS and the other acts as the test rig and will operate in R78. The general plan is to assemble one system and install in the MICE test area in R78 where it will operate for approximately 300k pulses. During this test period a second system will be assembled. When the first system (Target 1) has been operated for approx. 300k pulses it is removed and carefully inspected with particular emphasis on the bearing surfaces. Simultaneously the second system (Target 2) is installed in the test rig and also run for 300k pulses. At this point Target 2 is removed prior to final install in ISIS and Target 1 reinstalled in the test rig and run continuously.

Any relevant health and safety documentation for the works will be supplied by Sheffield.

Assembly of first system

In order to assemble the first system the following components are required.

Stator body with the new end plates welded.	RAL provides.
Optics block (calibrated) with laser safety covers.	Sheffield provides.
Coated bearings, upper and lower.	RAL provides.
Shaft, vane and magnets assembled	RAL provides.

The above components need to be assembled in a clean area (yet to be found) prior to transportation to final assembly area in R78. Once in R78 the following components/tasks are required for final assembly.

Bellows			RAL provides.
Connections	-	Power	Sheffield to make connections.
	-	Cooling water	Sheffield to make connections.
	-	Fiber optics	Sheffield to make connections.
Chiller	Do we have a second chiller?		RAL provides.
Electrical safety housing			RAL provides.
Power electronics upgrade			Daresbury provides. (Steve Griffiths)
Control software upgrade			Daresbury provides. (Steve Griffiths)

The power electronics and control software will also need upgrading in the VacRack area.

DAQ PC and rack Sheffield provides.

The above components will be assembled in the target frame with the stator assembly ready for initial testing. Once a system has demonstrated reliable running (300k pulses ?) the complete assembly including frame will be transported to ISIS and installed onto the beamline.

Detailed Assembly Plan

The Target Shaft:

- The target shaft needs suitable supports on a flat table. i.e. 2 x V blocks suitably cleaned.

- The magnet assembly is slid onto the shaft from the vane end. This is over the DLC coating therefore care has to be taken not to damage this coating. The stainless steel two piece clamp is placed in position and the M1.6 s/s cap head screws tightened. A check is made to make sure the magnets are secured and no movement can be detected. A shim may be required between the magnet and the clamp to gain full effect.

- The Vane is then fitted onto the end of the shaft. N.B. The index marker is at the bottom of the vane at the magnet end of the vane. The M1.6 s/s cap head screws are used to fix the vane.

- The bearing areas are checked and cleaned for a final time in readiness for insertion into the stator.

The Stator Main Body:

- The coil housing, top and bottom plates and welded s/s core arrive as an assembly.
  This assembly requires a suitable stand so other components can be added safely and the shaft can be protected. It has to be suitably high enough to accommodate the bellows in position with stabilising rods.

- The assembly is inverted and the bottom DLC coated bearing is fitted into its seat. Details of this assembly will be added later after seeing final drawing arrangement.

- The bottom bellows arrangement can also be fitted. This is a Con-Flat fitting and requires a copper gasket and 8 x M8 s/s set screws. Two of the set screws are replaced with the long M8 studs and nuts arrangement, used to stop the bellows from moving and protecting the bottom of the shaft in transit.

- The assembly is inverted again and placed on the stand. The assembly now stands the right way up.

- The shaft is now inserted through the stator and the bottom bearing. It rests on the shaft stop against the bottom bearing. A foil is or cap is placed over the bottom of the bellows.

- The top bearing (full Dia. Piece) is passed over the vane and onto the shaft. The vane passes through the elongated hole in the bearing which then is placed into its seat. Details of this assembly will be added later after seeing final drawing arrangement.

- The shoe arrangement is now fitted and adjusted into position to give a good sliding fit on the flat of the shaft. More details to be added later.

- The shaft movement can be checked to make sure we have perfect movement through the bearings.

- The optics block can now be fitted. A copper gasket is placed on to the sealing knife edge and the block lowered over the vane onto the six M5 studs on the top con-flat. Great care is needed at this stage not to damage the vane. The joint can now be tightened into place.

- There is a further top hat to fit on the optics block. Using a copper gasket seal and 4 x M6 set screws this can be tightened into place.

- The whole assembly can now be transported to the test area (R 78).

Assembly in R78:

- Once in R78 the assembly has to be attached to the main test frame above the beam pipe. Here the assembly is attached to four s/s rods hanging from the transport plate.
  This is done by hand. Orientation is subject to where the water connections are best made .Optical fibres; Electrical wire harness, thermocouples etc must be safely stowed whilst the flange is bolted to the rods. With the top plate firmly in position the bellows can be attached to the beam pipe using an aluminium diamond seal. This facilitates the removal of the 2 stabilising rods which are now replaced with set screws.

- Pumping can now begin to test the vacuum.

- The electrical connections can now be made for the stator power.

- Earth connections to cooling coil and stator checked.

- Optical fibres taken through the top of the support frame and connected to the patch panel on top.

- Water connections to chiller made and leak tested. Also there is a clamping arrangement to hold the water cooling pipes so as not to put strain on the joints and cooling pipes.

- Electrical Safety covers can be fitted. Details of final design to follow.

With all final checks complete the Target can be tested.

Timescales

Clean room assembly of stator plus shaft (#2)	1-2 days
Concurrent with this Paul S sets up electronics in R78	1-2 days
Final assembly and pumping down in test rig.	1 day
Test run to test mechanical stability – 300k pulses	4 days

Date	**Target 1**	**Location**	**Target 2**	**Location**
12th Aug	Assemble	Cleanroom		
14th Aug	Test	R78	Assemble	Cleanroom
18th Aug	Remove/Inspect	R78	Test	R78
22nd Aug	Reinstall	R78	Install in ISIS	ISIS
23rd Aug	Continuous run	R78	Ready to run	

Table 1. Assembly and testing schedule for MICE targets August 2009.

Provisional start date for initial assembly is Wed. 12th August.
Expect first full system ready for test run Friday 14th August.

The above plan implies a time period over the latter part of August for final installation in ISIS.

The second stator assembly can be made during the test period and as soon as the target is transferred into ISIS the final assembly of the second (test) system can take place.

Daresbury will perform the required power electronics and control software upgrades during the last two weeks in June (22nd and 29th). The power electronics modules in R78 and the VacRack area will be identical and hence interchangeable for backup purposes. All connections between the target assembly and the assembly frame will be clearly labeled and documented allowing rapid disconnection by non -specialist personnel.

People

Sheffield		C. Booth
		P. Hodgson
		R. Nicholson
		P. Smith
		A. N. Other (summer student)
Daresbury		S. Griffiths
RAL	Vacuum	Geoff Matthews
	Crane	Terry ?
	General	Jim Loughrey
		J. Tarrant
		E. McCarron
MICE	MOM	M. Ellis ?
		W. Spensley