

# S2 Fabrication

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- Where we are
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## Where we are....

S2 is wound, all thermocouples fitted and electrical connections made. It has been tested electrically (and passed) and now awaits potting.

The body for S2 has been aligned and doweled and awaits the stator.

Eamonn has made a set of small clamps that allow extra thermocouples to be fitted to the cooling water input/output. This will allow for closer monitoring and hopefully better understanding.

# Choices

Having spoken to George Elwood who said that because the temperature is lower than we first allowed for, it would be possible to use a different potting mix. This would give the resin higher fluidity.

The advantage is that he feels we may get better penetration into the stator.

The disadvantage is that it may run through the mould and this may make a mess as in the first prototype.

My (and Eamonn's) feeling is having potted S1 successfully we should stick to the recipe we know.

# Field Mapping

The following slides are the ones previously distributed for discussion

The Z stage will need to be upgraded to allow for automated measuring. Ben has a price for this which is ~ £3k Inc. VAT.

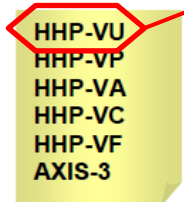
The only other major expense is the Hall Probe (See next slide)

The rest is either Existing equipment (kinematic mount), small machined pieces and Minitec extrusion of which we have plenty.

## SPECIFICATIONS

### Features

- *Very small active area 0.0025 mm<sup>2</sup>*
- *High sensitivity*
- *High linearity*
- *Magnetic field range  $\pm 5$  T*
- *Temperature range 1.5 - 350 K*
- *Wide variety of shapes and applications*

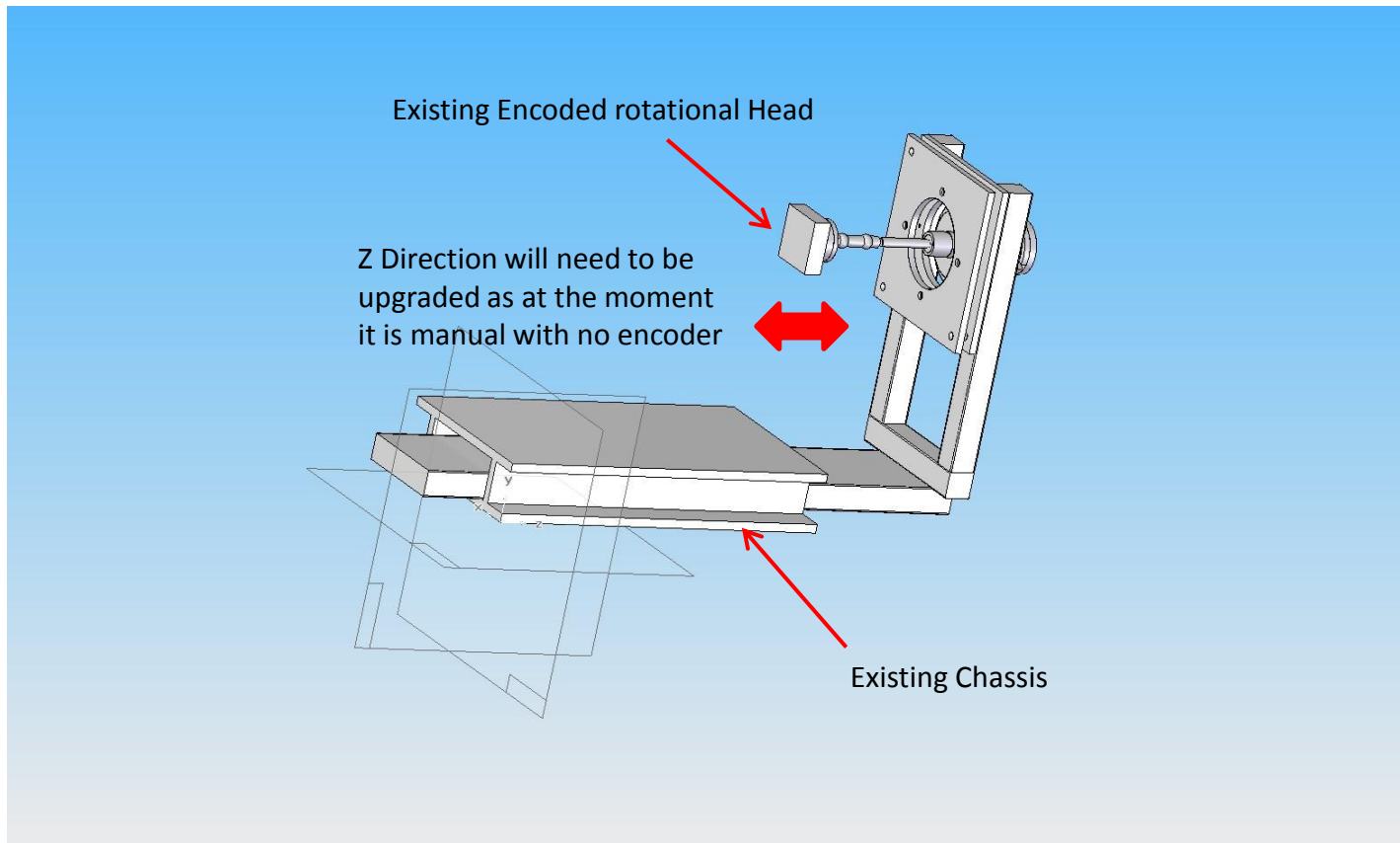


Bens Recommendation

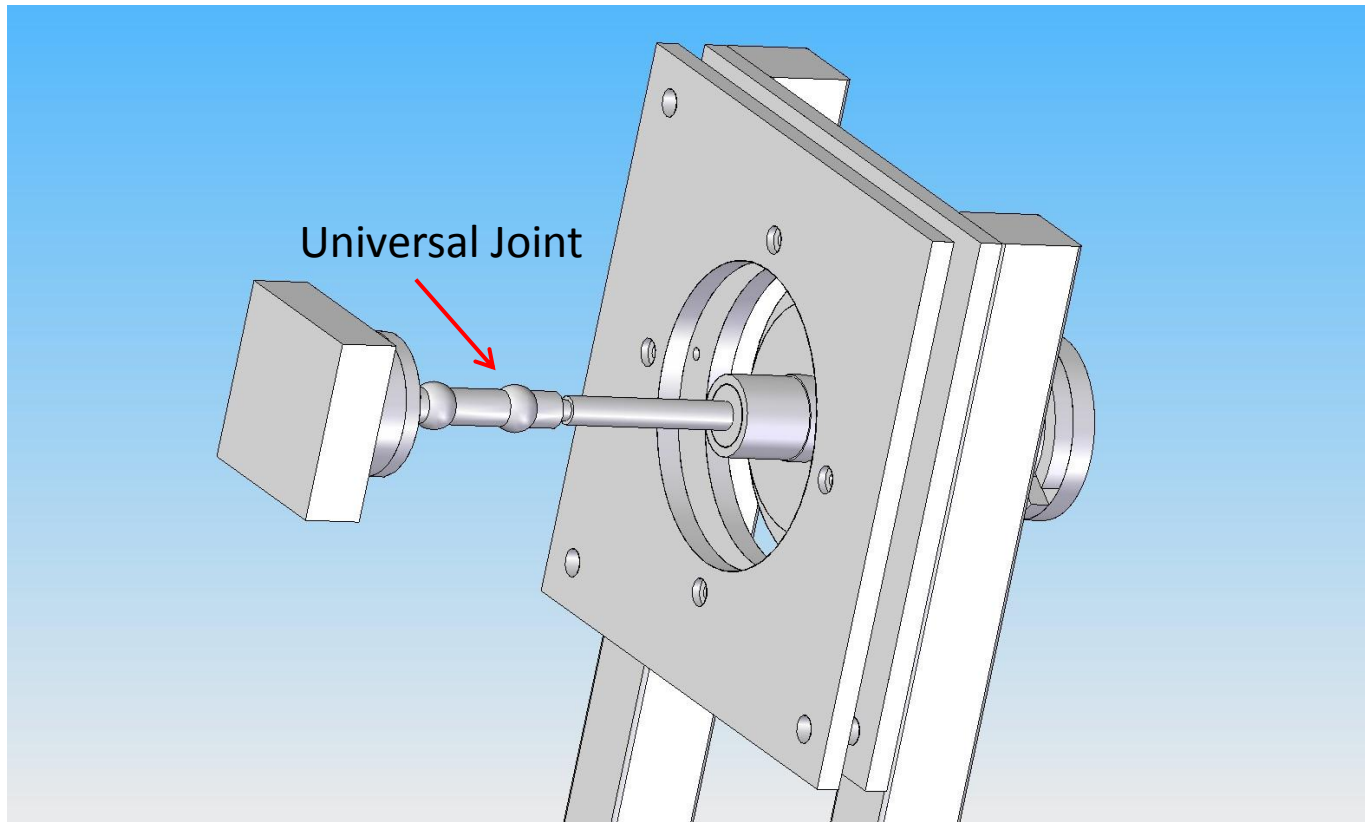
PARAMETER	UNIT	VALUE
Magnetic field range	[T]	0 - 5
Temperature range	[K]	1.5 - 350
Nominal control current $I_n$	[mA]	10
Maximum control current	[mA]	15
Sensitivity at $I_n$	[mV/T]	> 50
Linearity error at 300K, B = 0 - 1 T	[%]	< 0.5
Linearity error at 77K, B = 0 - 0.2 T	[%]	< 0.1
Linearity error at 4.2K, B = 0 - 5 T	[%]	< 1.5
Mean temp. coefficient of sensitivity at temperature range 4.2 - 77 K	[K <sup>-1</sup> ]	$5 \cdot 10^{-5}$
Mean temp. coefficient of sensitivity at temperature range 77 - 300 K	[K <sup>-1</sup> ]	$2 \cdot 10^{-4}$
Residual voltage	[ $\mu$ V]	< 200
Temperature coefficient of residual voltage	[ $\mu$ V/K]	< 0.3
Input resistance at 4,2 K (in zero field, including leads)	[ $\Omega$ ]	< 60
Input resistance at 77 K (in zero field, including leads)	[ $\Omega$ ]	< 60
Input resistance at 300 K (in zero field, including leads)	[ $\Omega$ ]	< 60
Output resistance at 4,2 K (in zero field, including leads)	[ $\Omega$ ]	< 70
Output resistance at 77 K (in zero field, including leads)	[ $\Omega$ ]	< 70
Output resistance at 300 K (in zero field, including leads)	[ $\Omega$ ]	< 70
Quantum oscillations beginning at 4.2 K	[T]	> 1.5
Amplitude of quantum oscillations at 4.2 K, B = 0 - 5 T	[%]	< 0.15
Active area	[mm <sup>2</sup> ]	0.0025
Control current leads (green, black)	[mm]	$\varnothing$ 0.1
Hall voltage leads (orange, red)	[mm]	$\varnothing$ 0.08

Please contact us for more information on non-standard modifications.  
 Non-standard overall dimensions of HHP-VU model can be reduced to 3.5 x 2.5 x 0.8 mm.

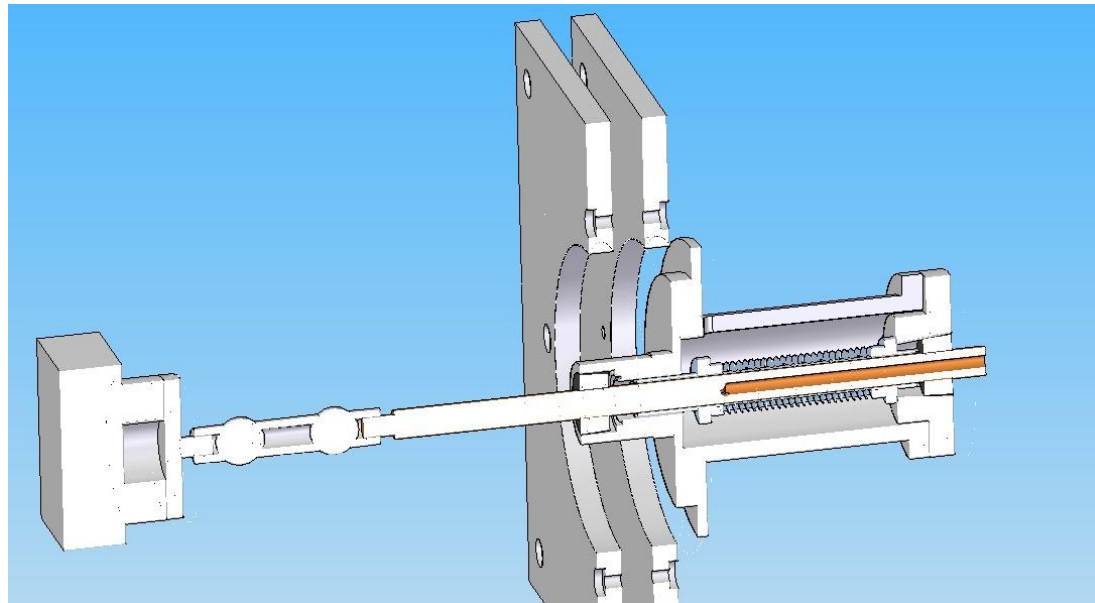
# Layout using Existing Equipment



# Close-up Showing Kinematic Mount

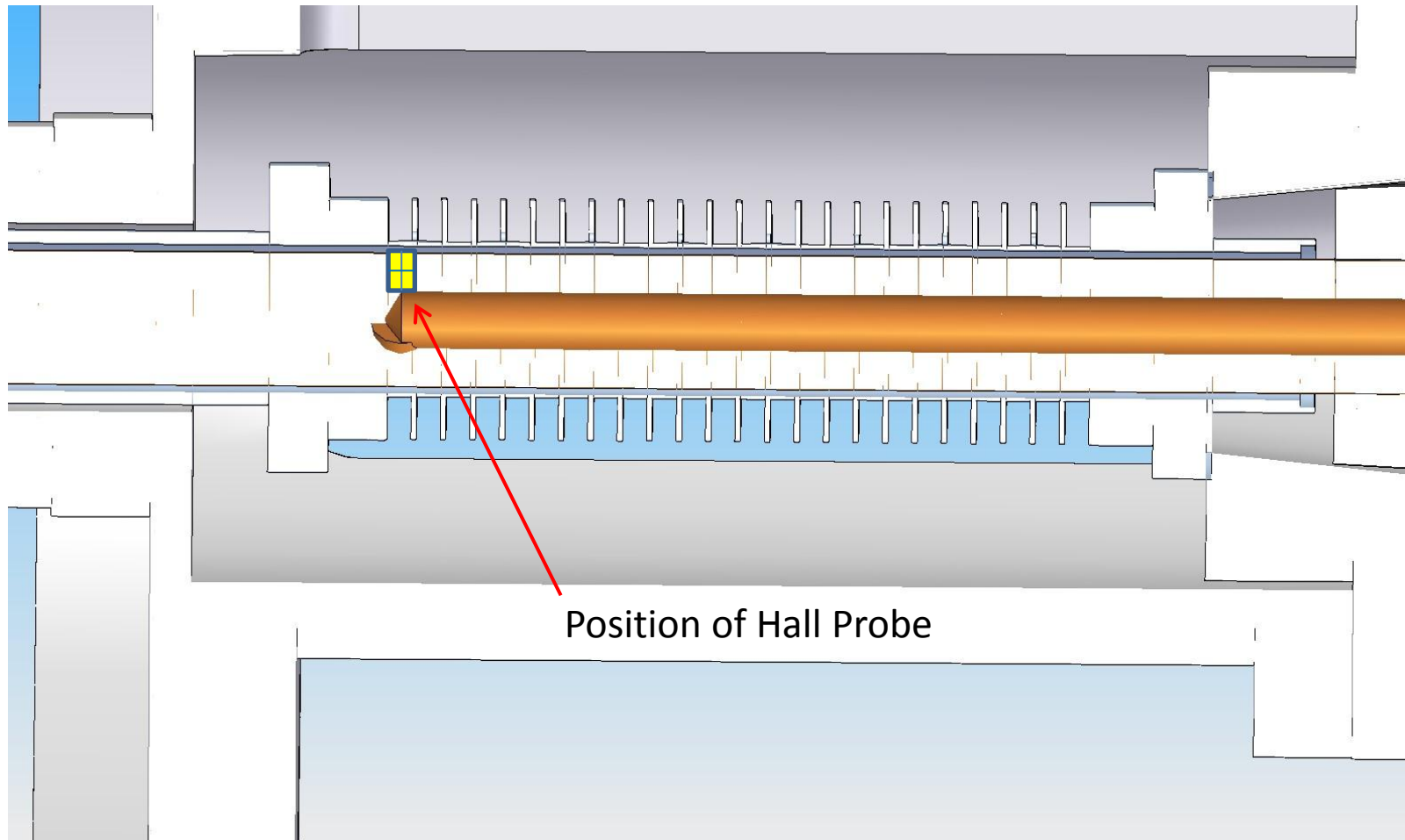


# Sectioned View

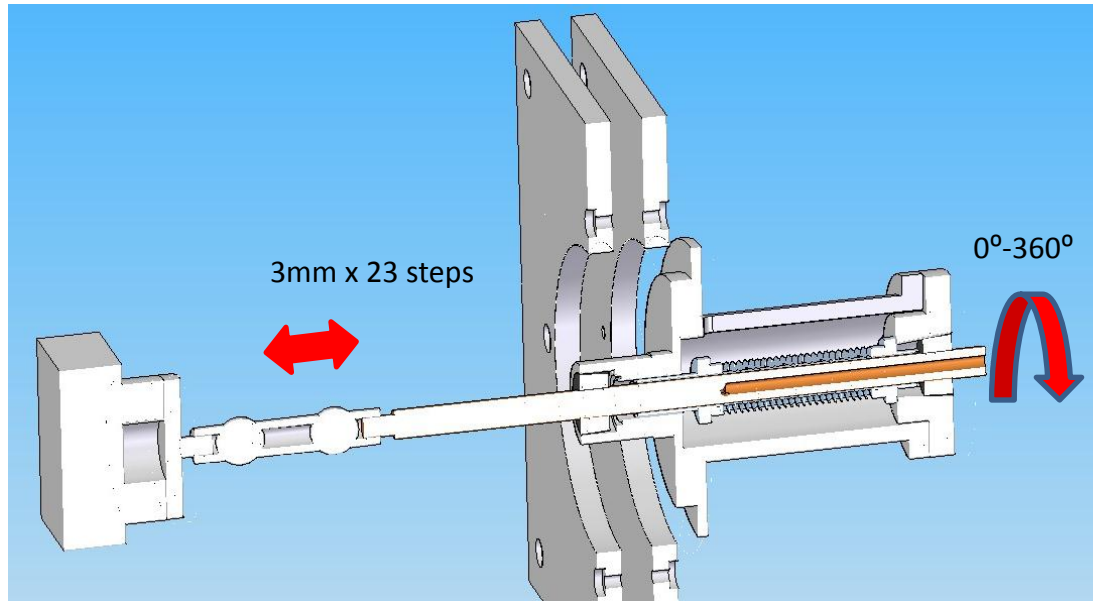




# Hall Probe Fixed Into Shaft Therefore maintaining its Radial Position



# Mapping Process



- 1, Move Hall Probe to Starting Position (axial centre of 1<sup>st</sup> coil, 0°)
- 2, At this axial position scan around 360° then reverse back to 0°\*\*
- 3, Move in "Z" 3mm and repeat the radial sweep.

Continue until all 24 coils have been measured

\*\* to avoid twisting the Hall Probe leads

