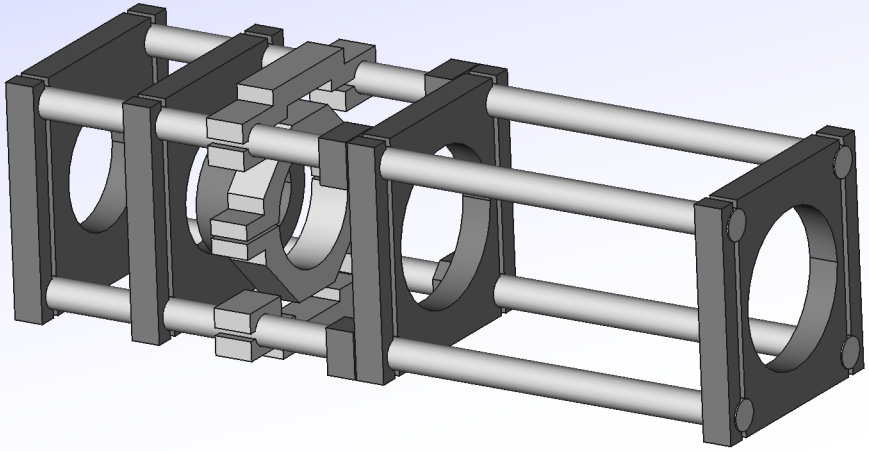
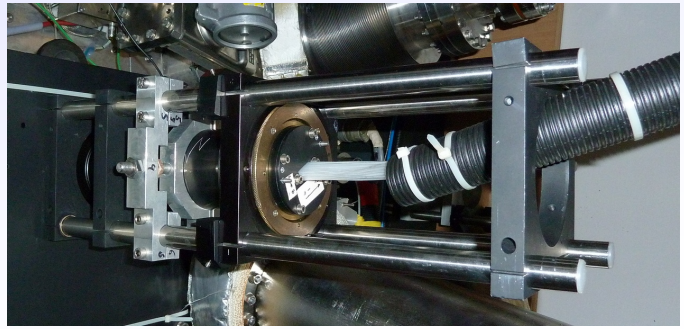
Oliver Ford, IPP Greifswald

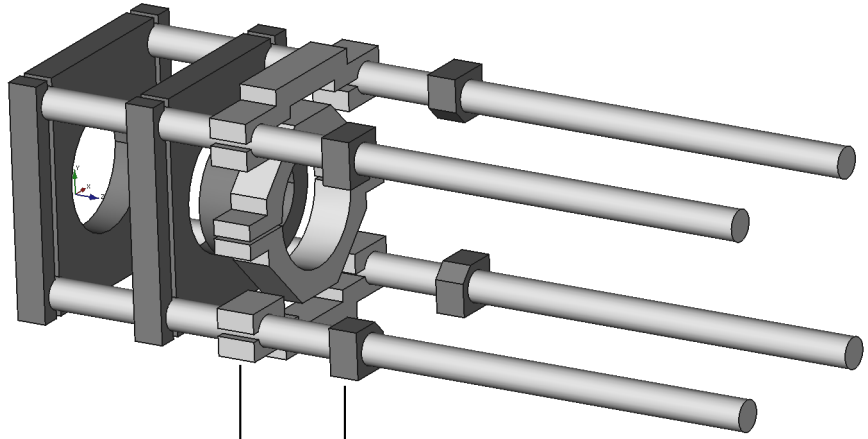
IMSE Design - Mechanical - Overview

The existing MSE system at ASDEX Upgrade looks like this:

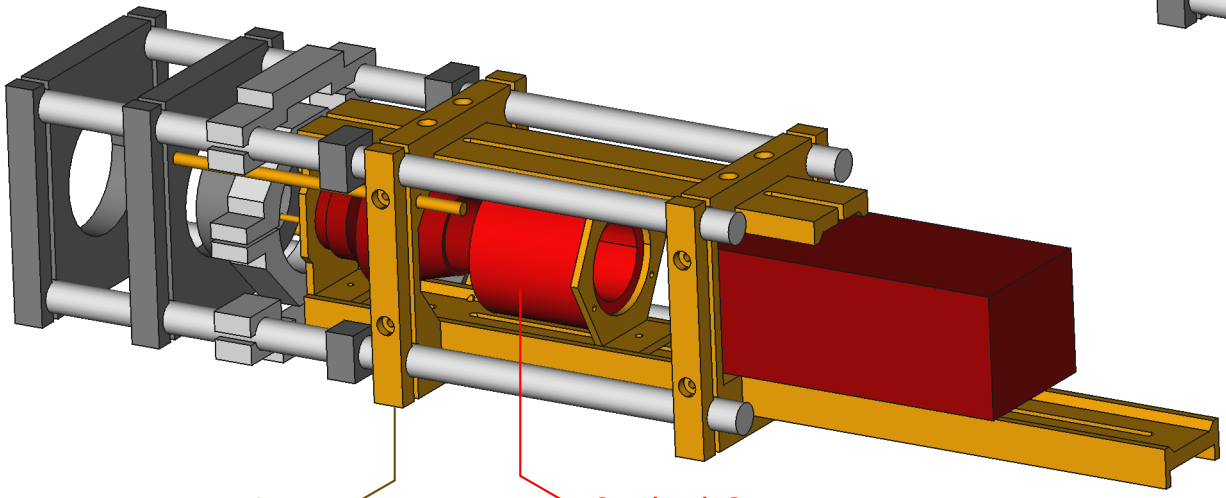




1) Remove fibres, fibre holder block and mount plates, leaving the 4 main rails, positioning stubs and the silver clamp:



2) Build the IMSE system (at HGW) as a complete unit which slides on to the 4 rails. It must avoid the positioning stubs and the fibre holder clamp:



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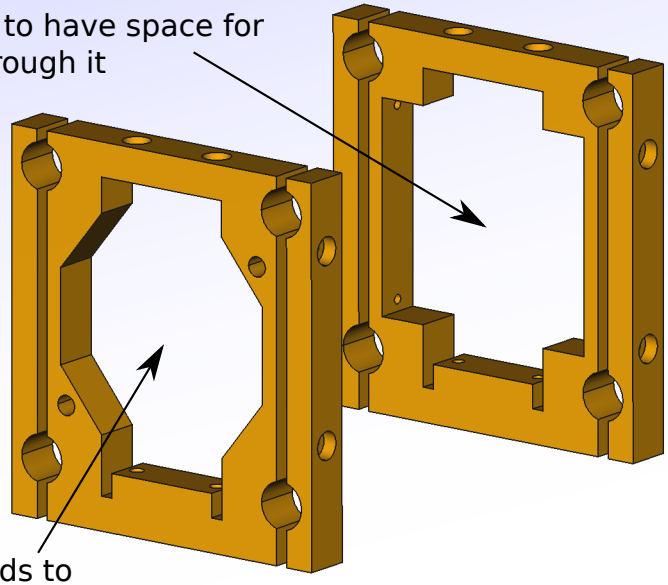
IMSE Design - Mechanical - Carriage

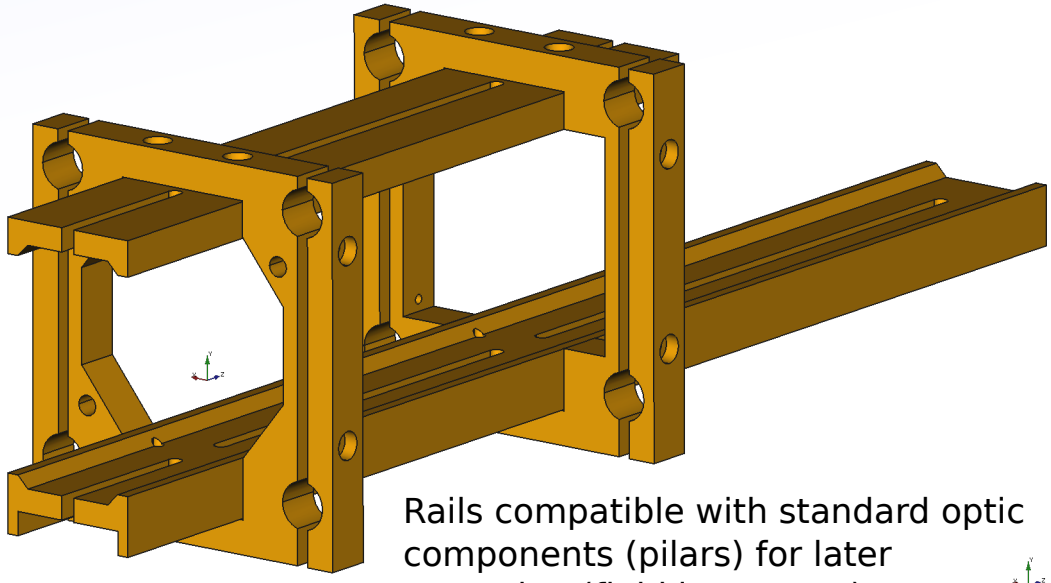
1) Build mounting plates based on the existing end plate design:

Rear mount needs to have space for camera to pass through it (93x78 mm)



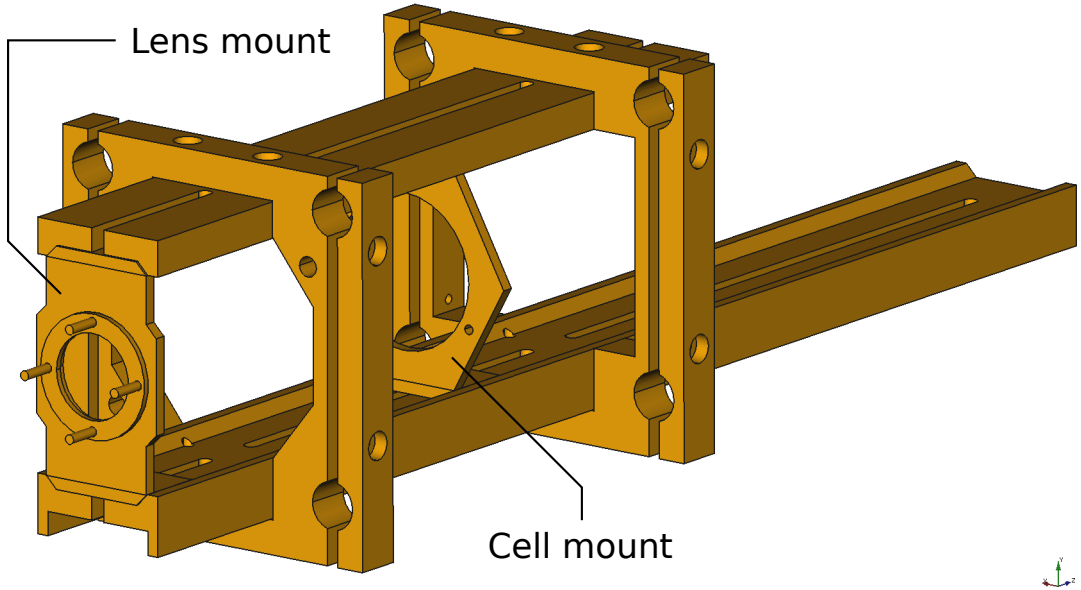
Forward mount needs to have space for cell + lenses to pass through it (ø100mm)

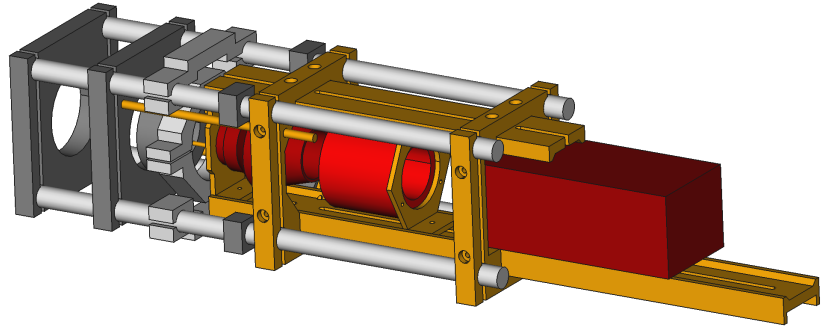
2) Add top and bottom rails that keep carriage stiff and allow optical element mounts to slide along:



Rails compatible with standard optic components (pilars) for later extension (field lenses etc)

3) Build mounts for lens and the optical cell/oven:





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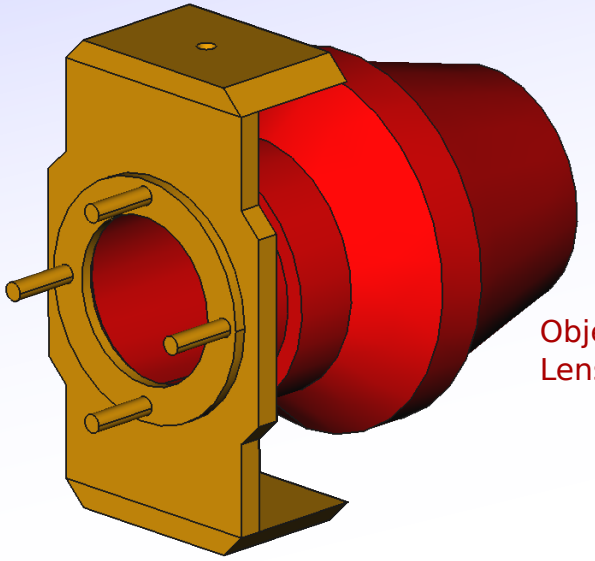
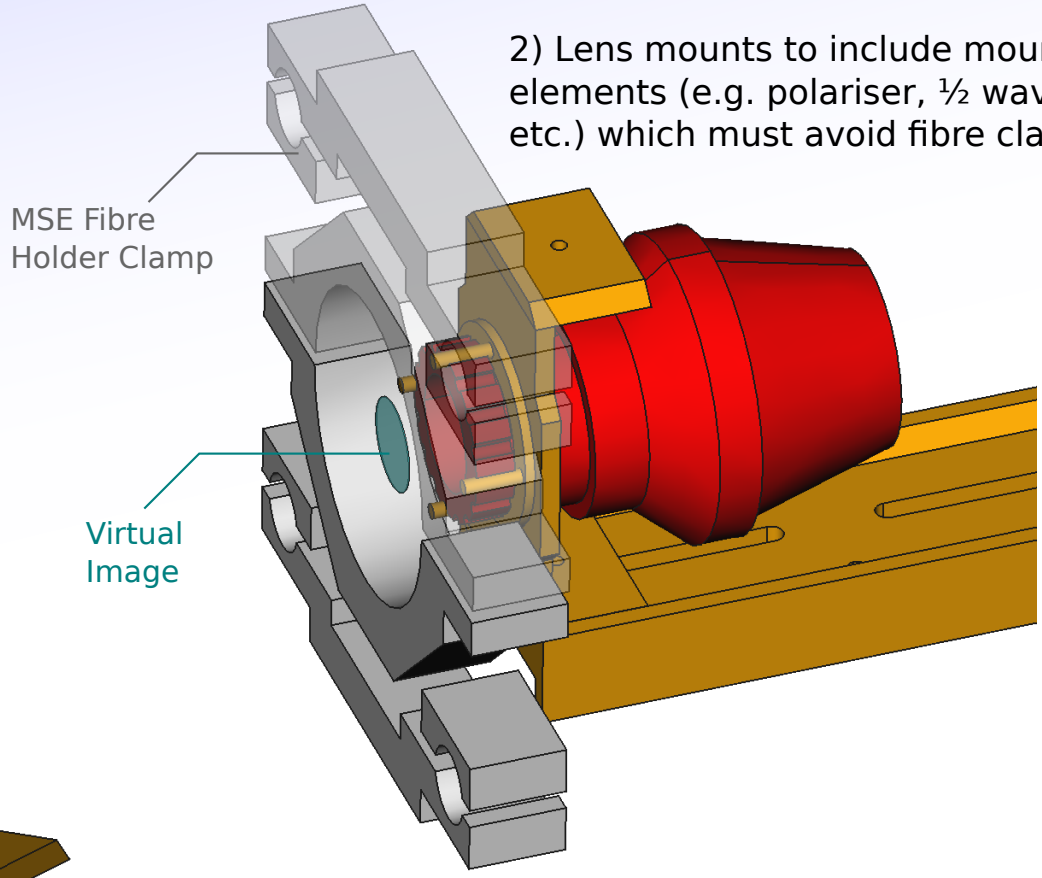
IMSE Design - Mechanical - Lens Mounts

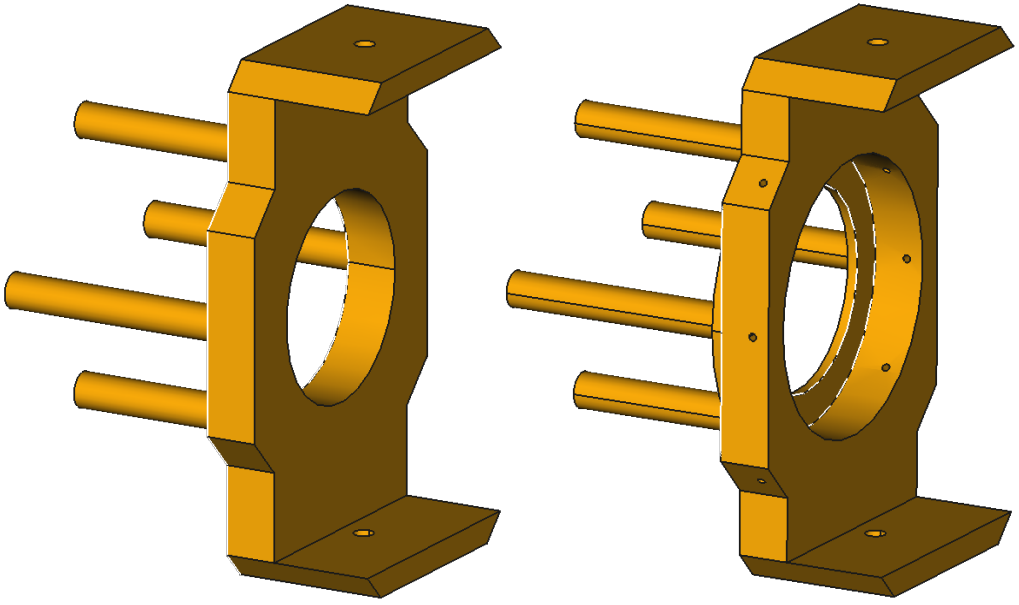
1) Objective lens mount, self-locates into rails fixed to system optical axis:



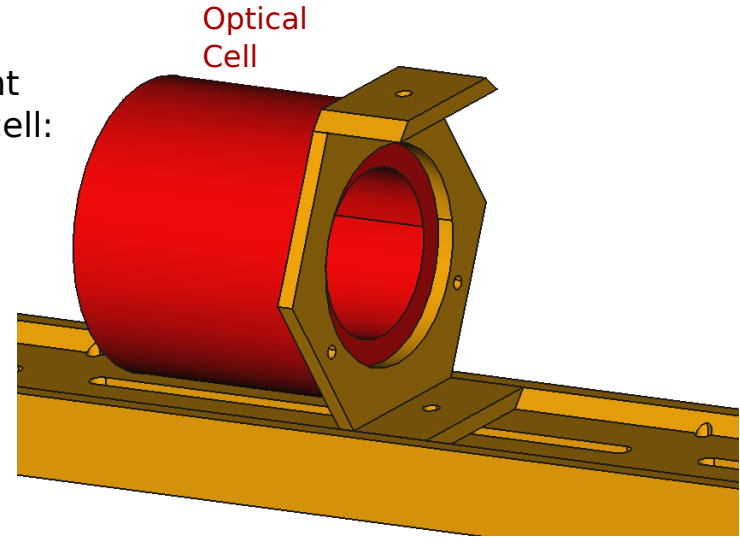
2) Lens mounts to include mount for cell elements (e.g. polariser, ½ wave plate etc.) which must avoid fibre clamp:



3) One for M42 thread lenses and one for Canon EF bayonet (and adapter to Nikon):



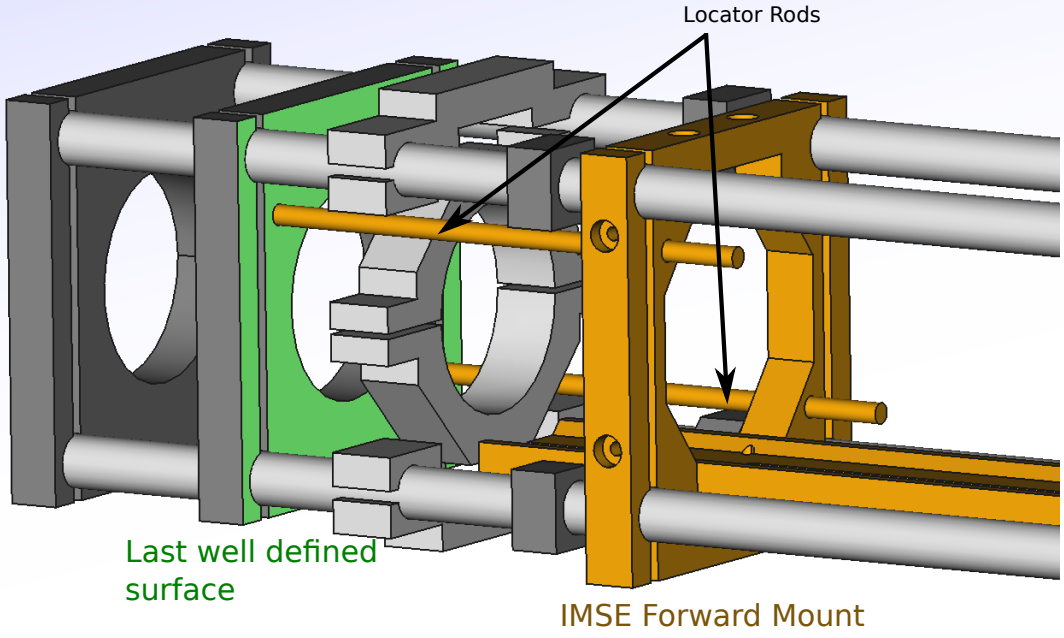
4) Similar mount for the optical cell:

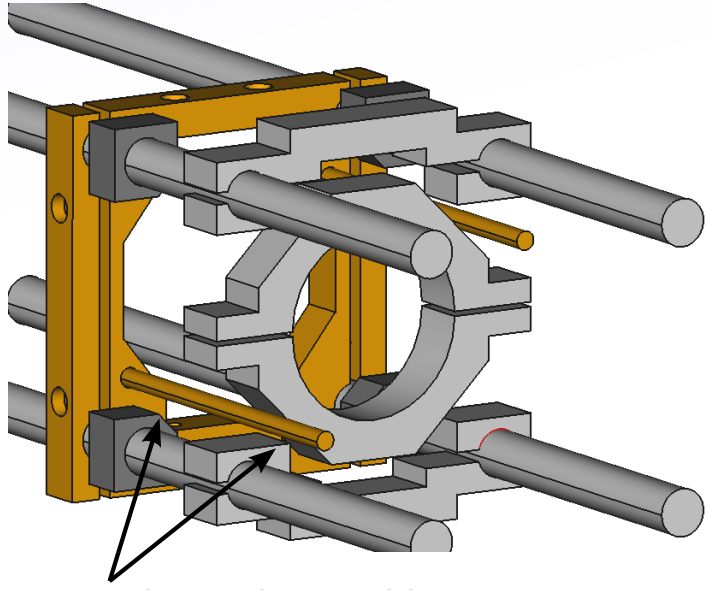


Oliver Ford, IPP Greifswald

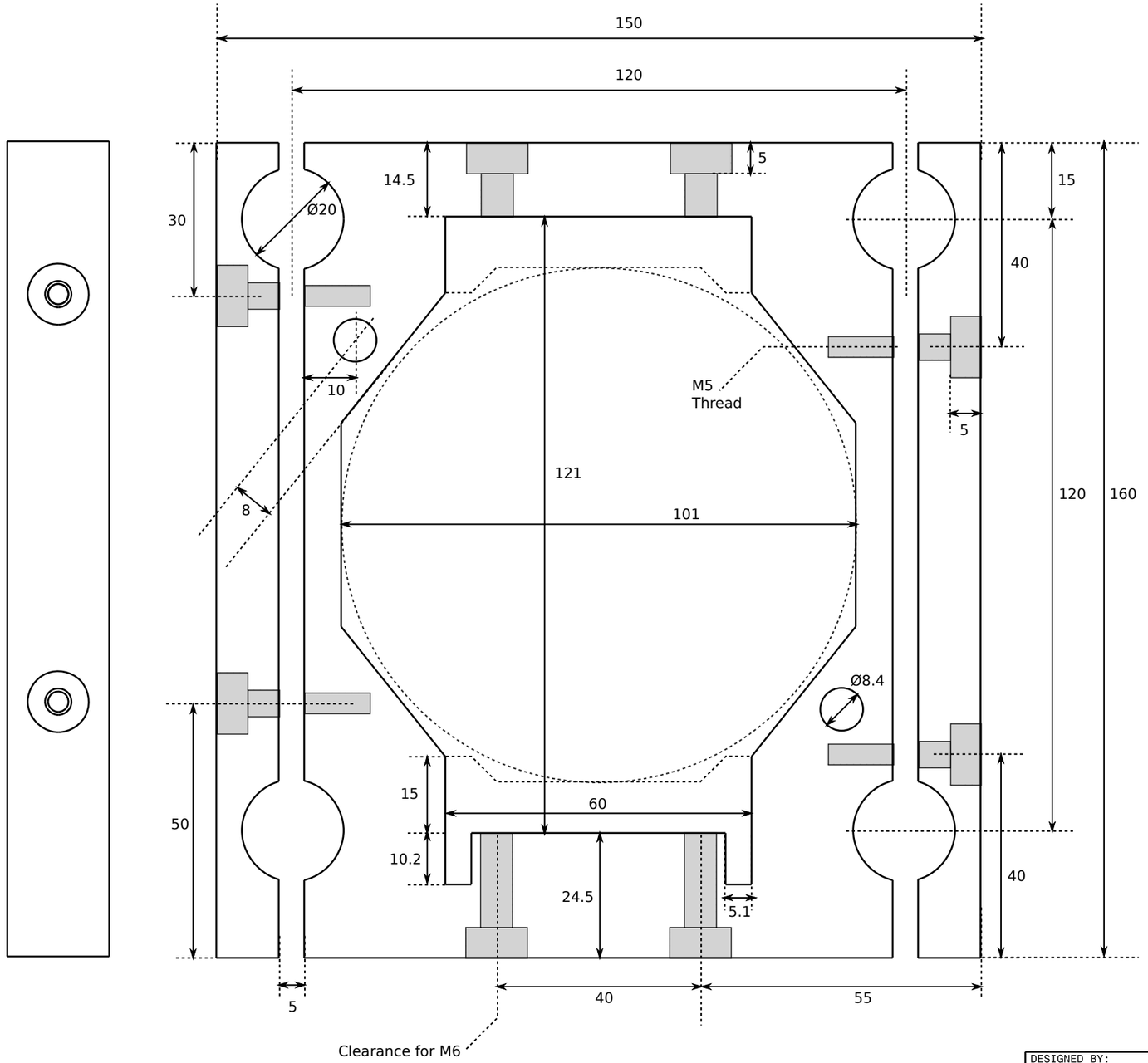
IMSE Design - Mechanical - Locator Rods

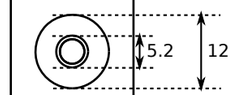
We can't be completely sure where the clamp or the positioning stubs are, so need to locate the IMSE system from the last precisely known plane:

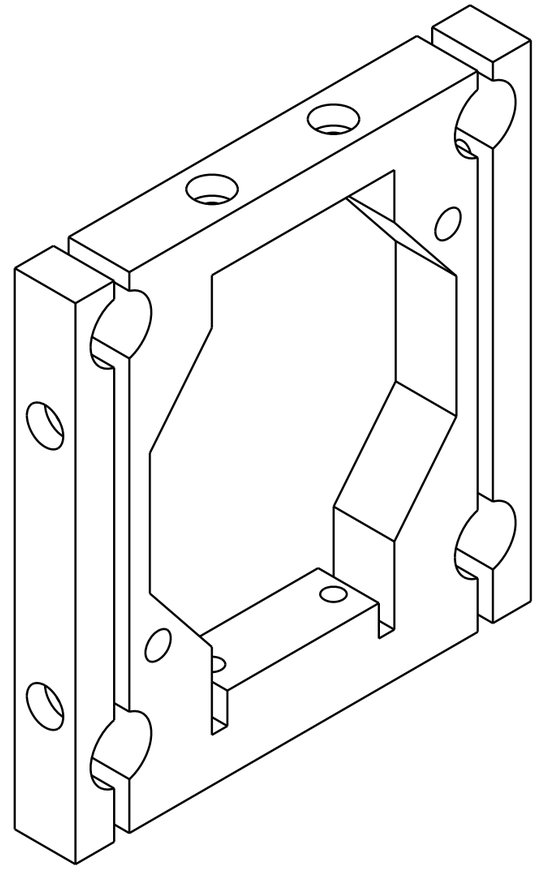


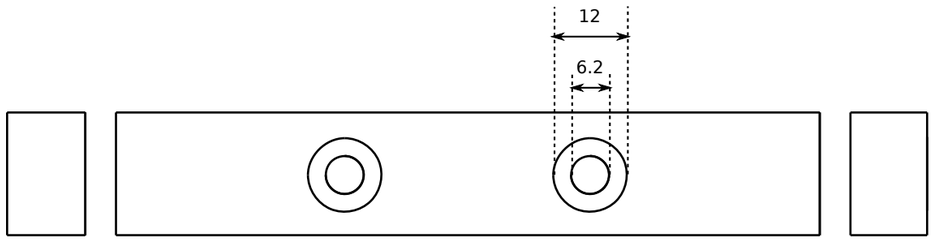


Locator rods need to avoid positioning stubs and fibre clamp









DESIGNED BY: OLIVER FORD
DATE: 20/06/2012
CHECKED BY:
DATE:

IMSE Carriage

Forward Rail Mount

SIZE A3

SCALE 1:1 | WEIGHT (kg) | DRAWING NUMBER 1 | SHEET 1

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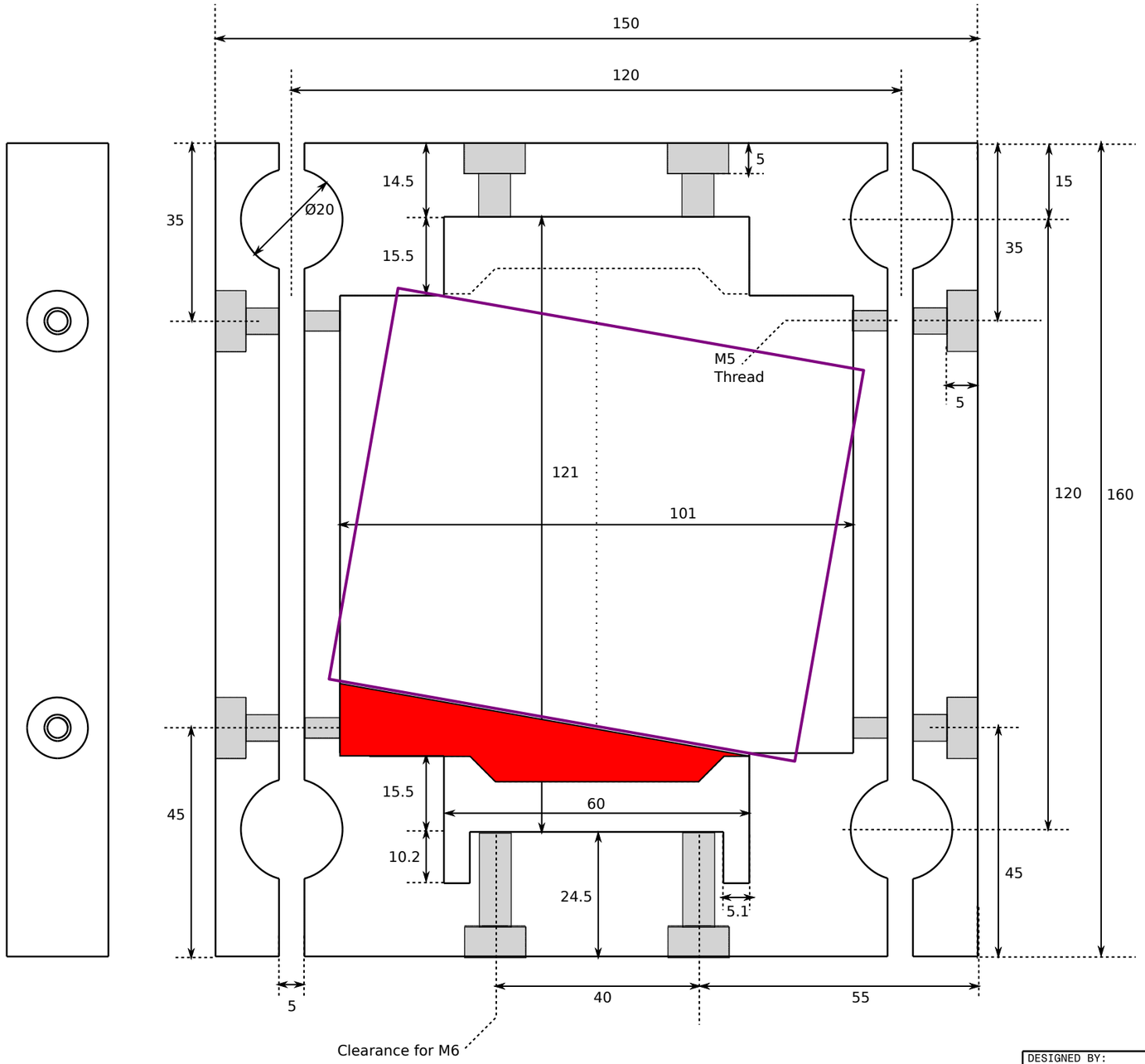
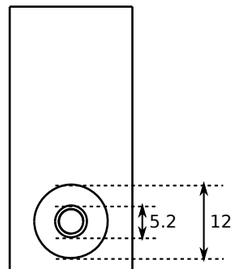
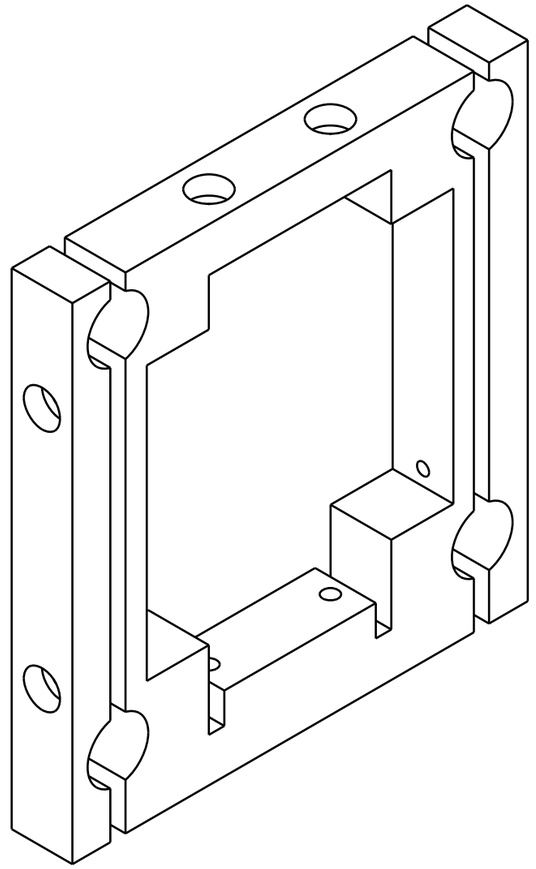
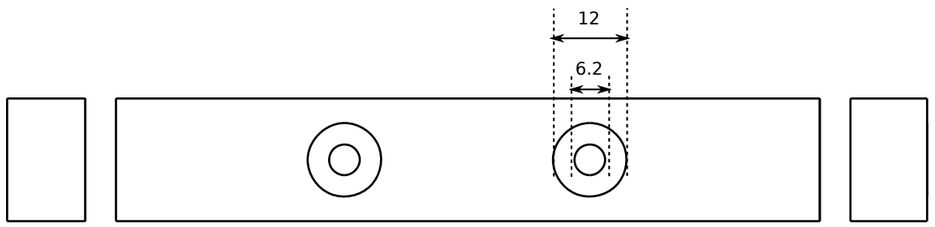
I	_
H	_
G	_
F	_
E	_
D	_
C	_
B	_
A	_









DESIGNED BY: OLIVER FORD
DATE: 20/06/2012
CHECKED BY:
DATE:

IMSE Carriage

Rear Rail Mount

SIZE A3

SCALE 1:1

WEIGHT (kg)

DRAWING NUMBER 2

SHEET 1

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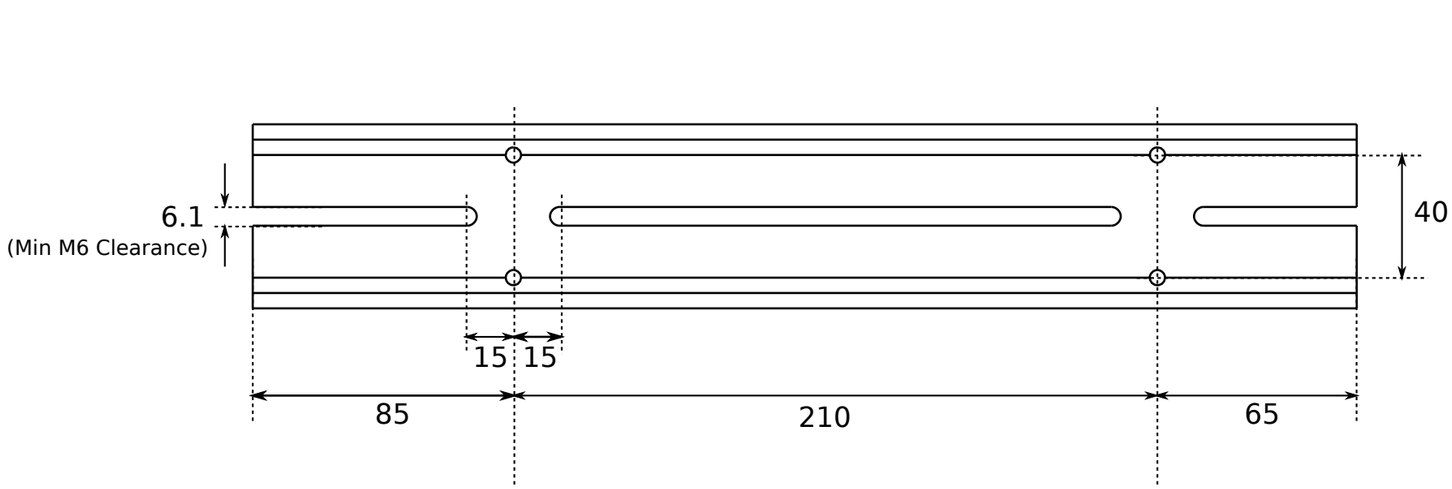

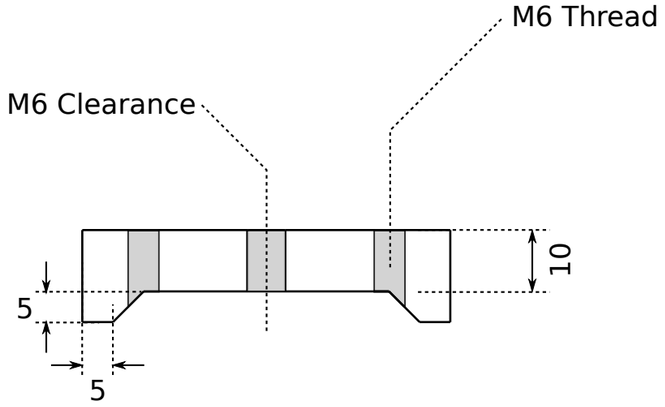

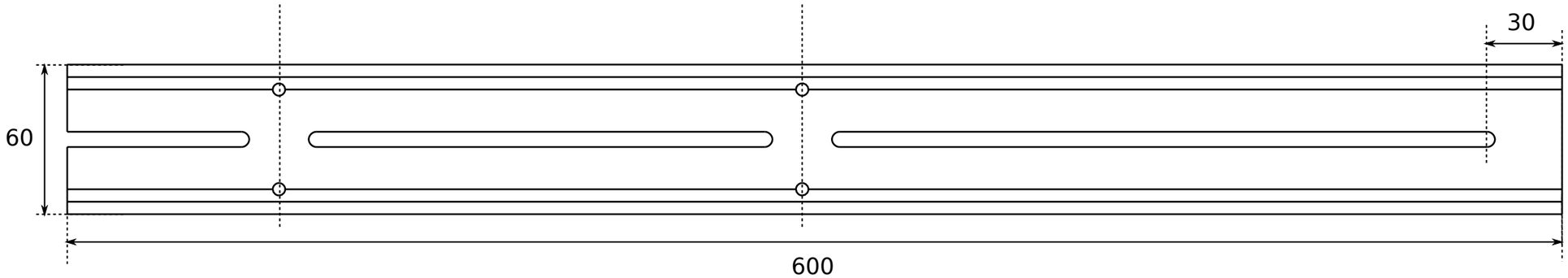

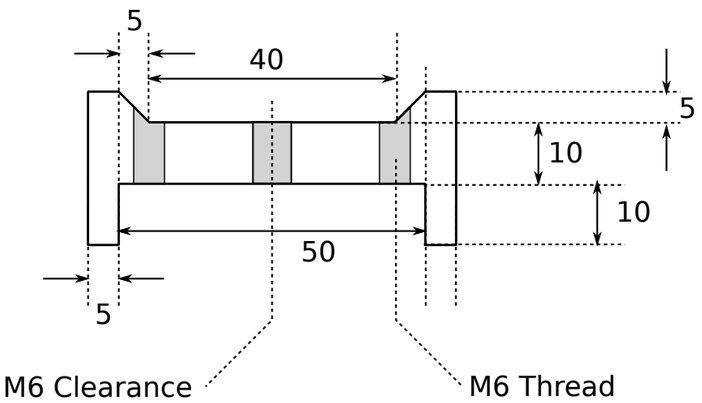

DESIGNED BY: OLIVER FORD		IMSE Carriage	
DATE: 20/06/2012		Optic Rails	
CHECKED BY:			
DATE:			
SIZE A3			
SCALE 1:1	WEIGHT (kg)	DRAWING NUMBER 3	SHEET 1

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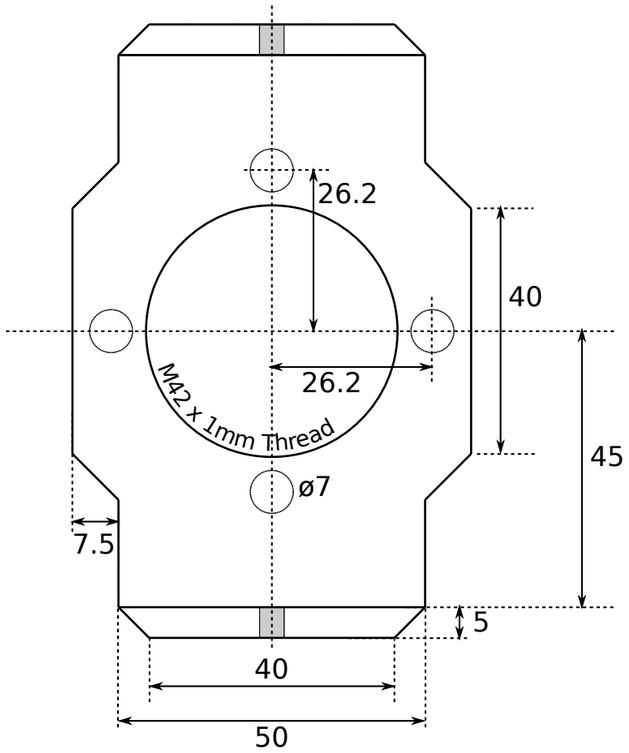

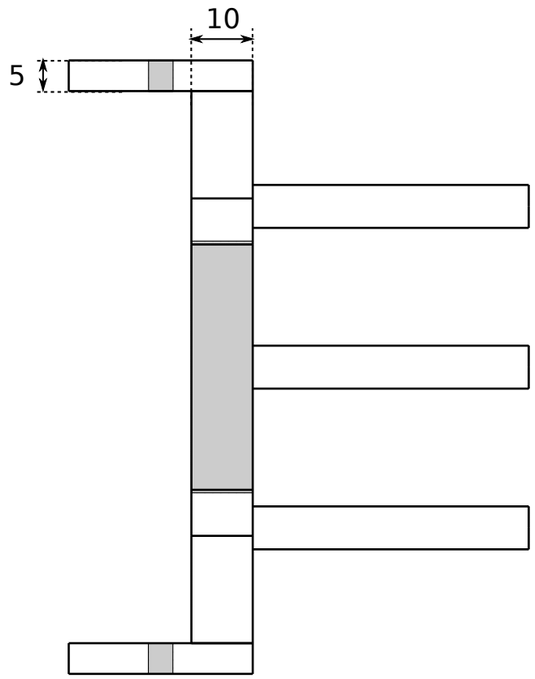

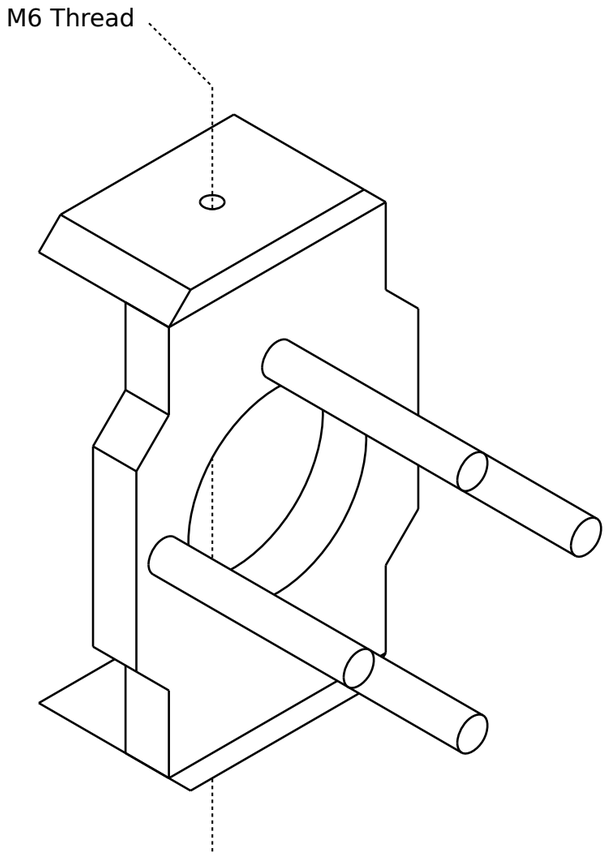

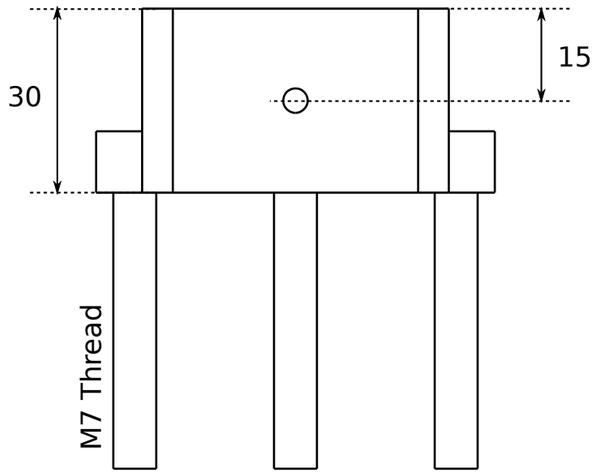

DESIGNED BY: OLIVER FORD		IMSE Carriage	
DATE: 22/06/2012		Lens Mount - M42	
CHECKED BY:			
DATE:			
SIZE A3			
SCALE 1:1	WEIGHT (kg)	DRAWING NUMBER 4	SHEET 1

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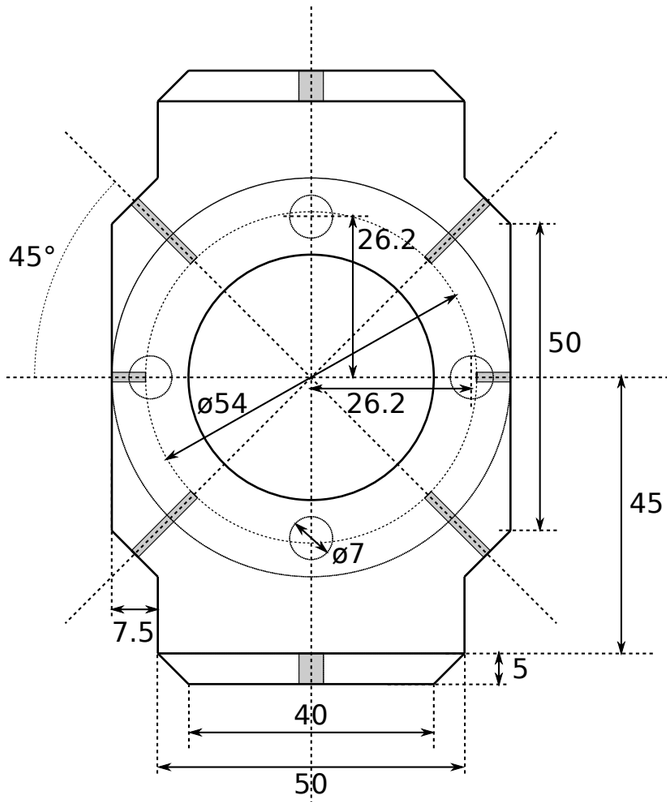
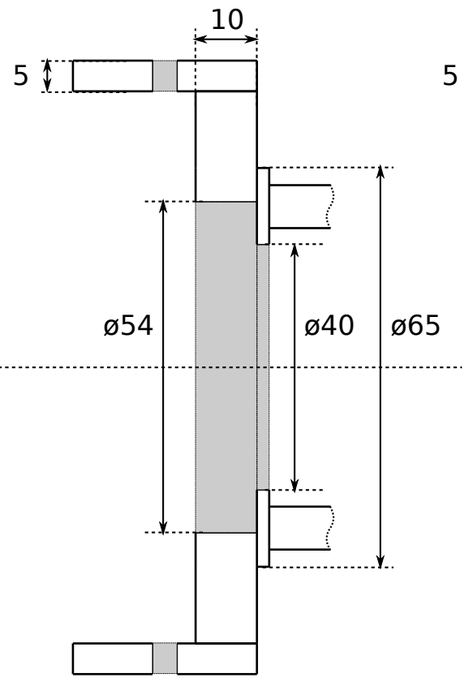
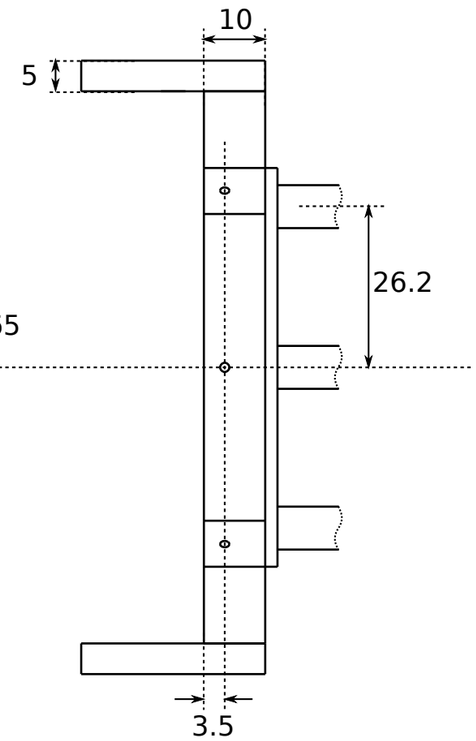
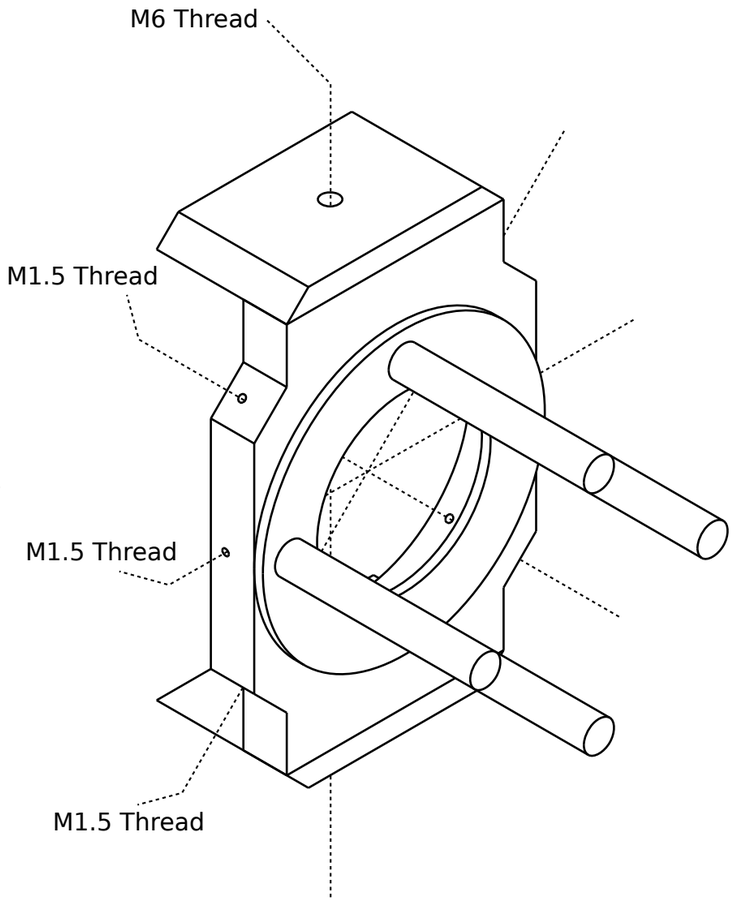
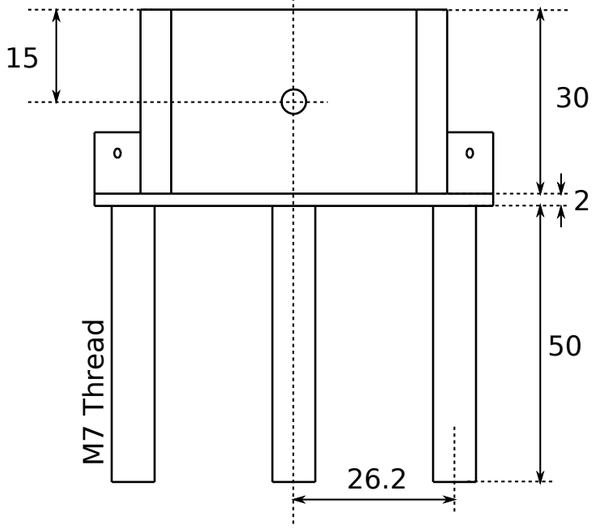




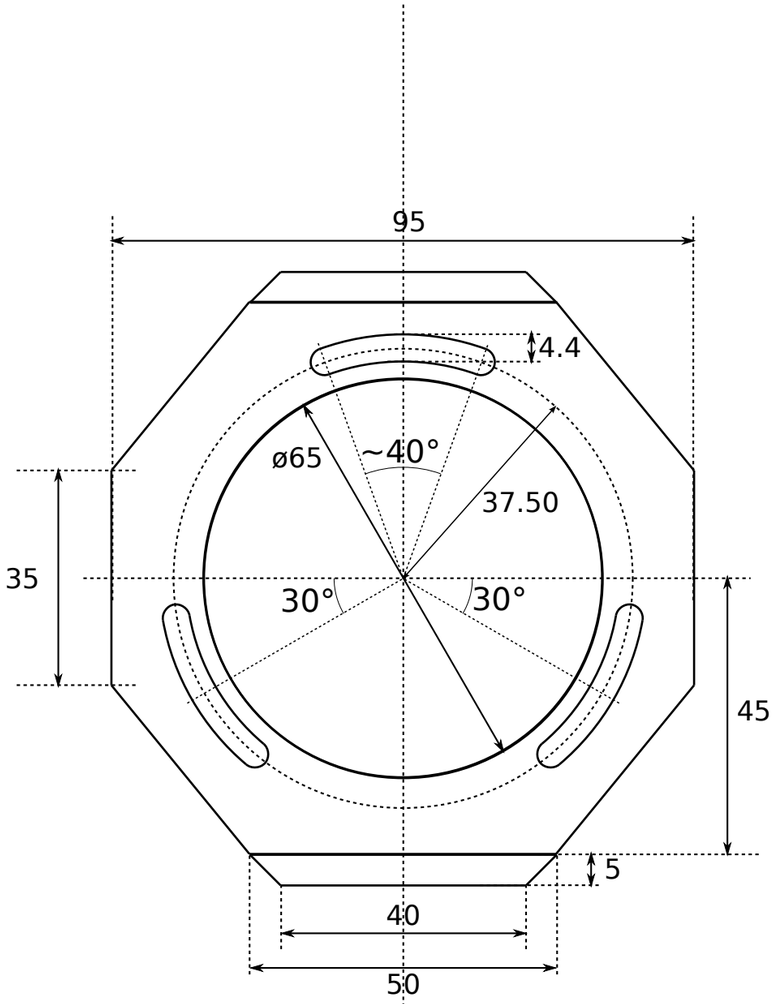


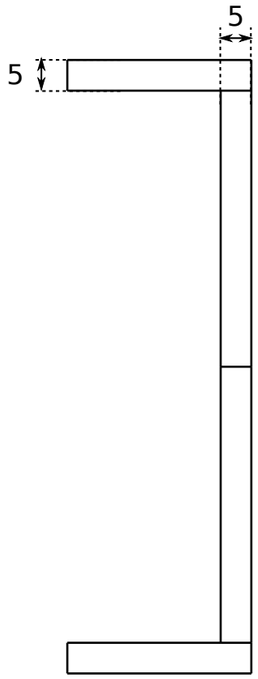


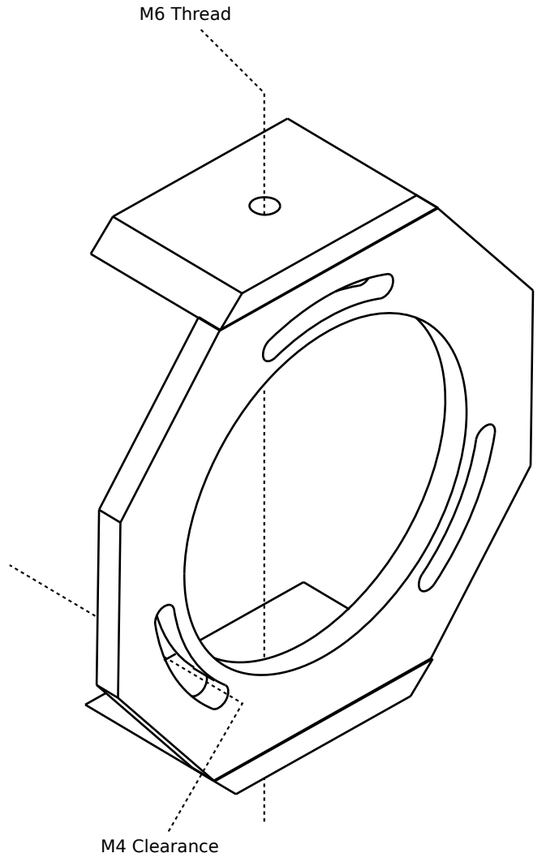


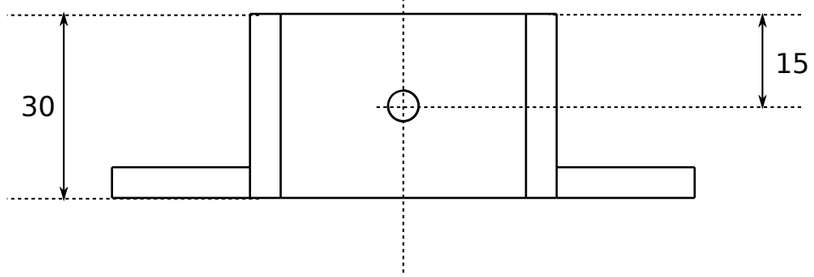
DESIGNED BY: OLIVER FORD		IMSE Carriage	
DATE: 22/06/2012		Lens Mount - Canon EF	
CHECKED BY:			
DATE:			
SIZE A3			
SCALE 1:1	WEIGHT (kg)	DRAWING NUMBER 5	SHEET 1

This drawing is our property; it can't be reproduced or communicated without our written agreement.









DESIGNED BY: OLIVER FORD	IMSE Carriage
DATE: 20/06/2012	Oven Mount
CHECKED BY:	
DATE:	
SIZE A3	
SCALE 1:1	WEIGHT (kg)
DRAWING NUMBER 6	SHEET 1

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IMSE Design - Mechanical - U1: Calibration Polariser

Upgrade 1 (the week before first experiments in January 2013)

For intrinsic contrast calibration, needed a rotatable polariser.
Need to be switchable in/out by remote control.
Does not need a full rotation - ~135° is probably OK.

Jan 2013: Self cut plastic wheel with cable tie as teeth.
April 2014: Laser sintering 3D printer wheel and matching cogs.

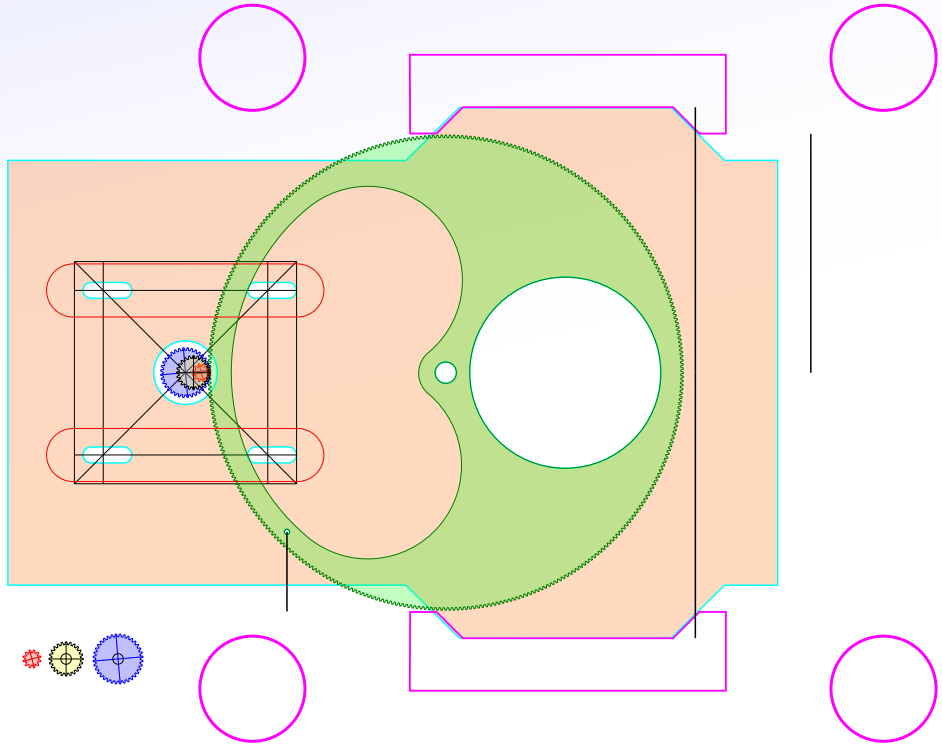
Stepper motor controllers built into IMSE Arduino controller box.
Light barrier and small hole in wheel for zero positioning.

Motor on sprung assembly to maintain tensions.

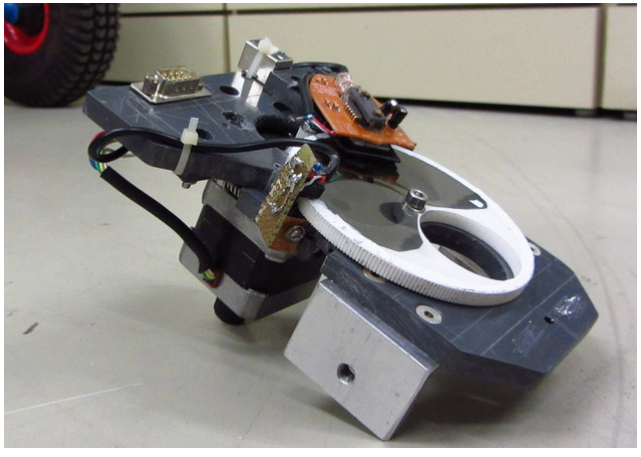
Whole thing seems to be ±0.2° linearity and ±0.5° reproducibility.

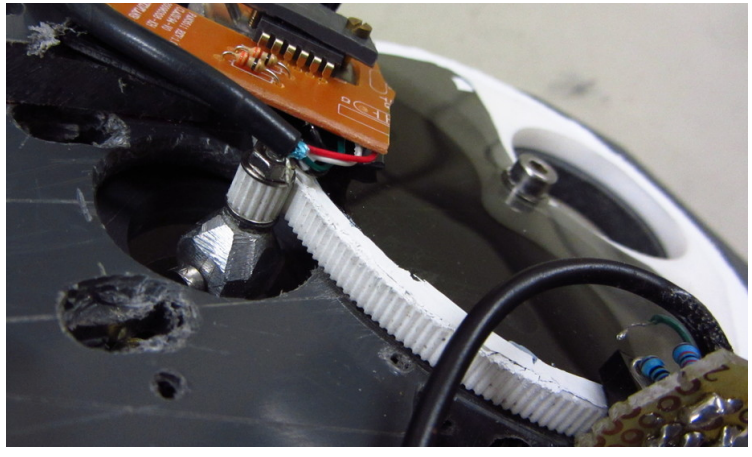
May2014: Plate was mounted at quite severe angle.

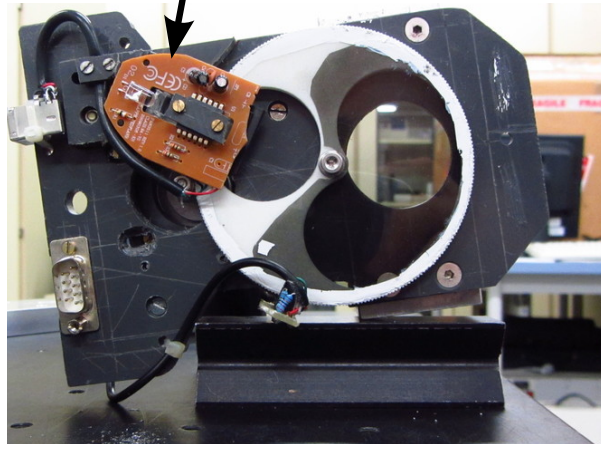
Need better base plate and mounting - get Garching to reproduce.
Needs bearing on wheel to improve linearity.



Position sensor using PC Mouse.
Was less accurate than trusting the stepper motor, so removed.

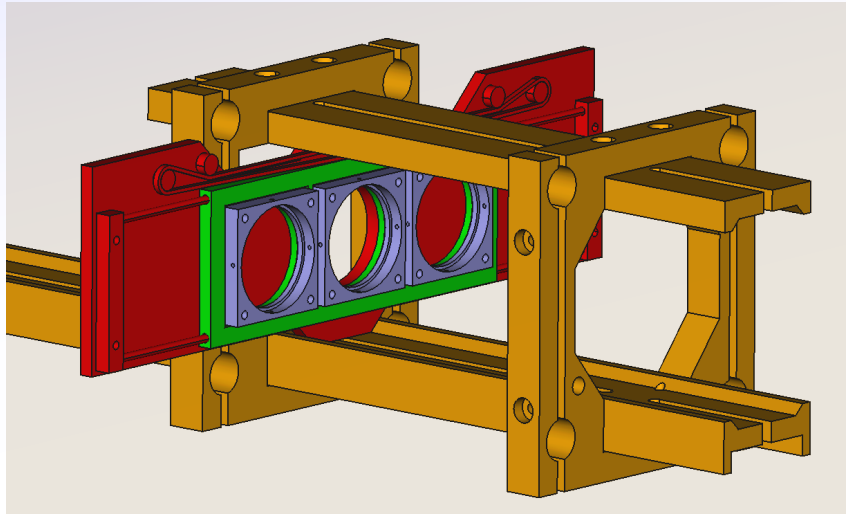


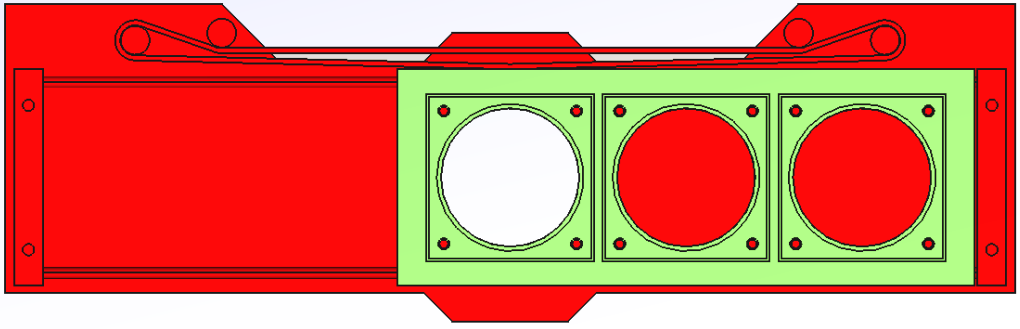




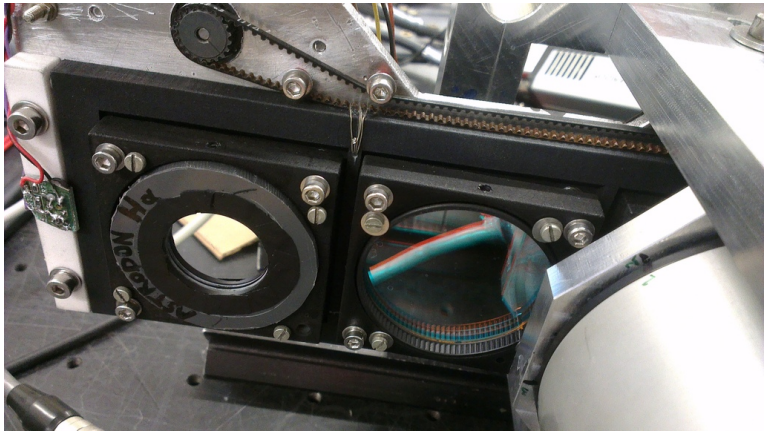
IMSE Design - Mechanical - U2: Filter Slider

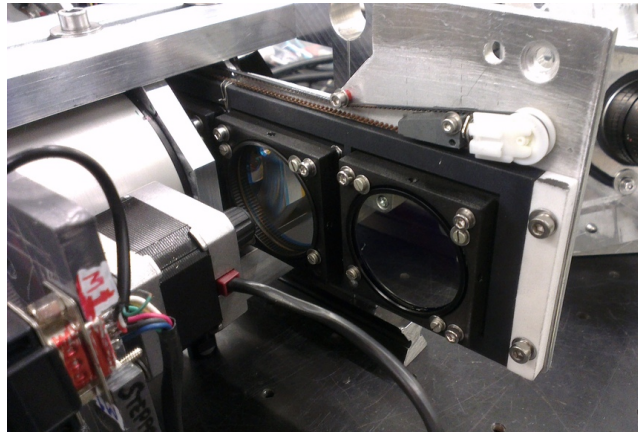
Work on cold D/Hα Zeeman splitting required different filters. Needs to be switchable remotely. Each filter needs individual 2D tip/tilt adjustment.
An extra common filter for IR blocking - with tip/tilt adjustment is also required.

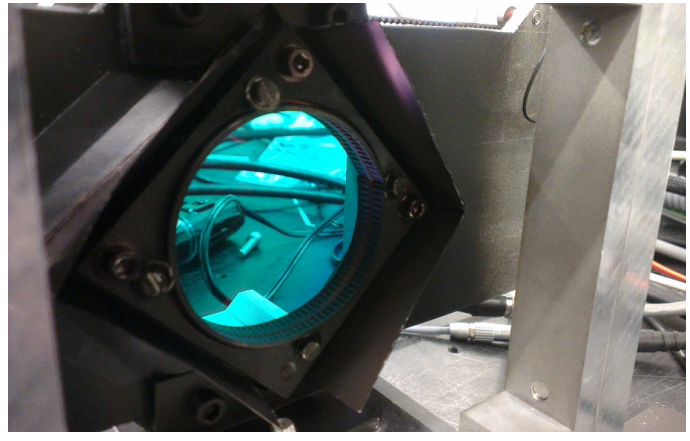




- Laser sintered parts: 4x holders and 1x tray.
- Self-cut blackplane and mounts.
- 2x 4mm Aluminium bars.
- Stepper motor and belt from an old printer
- Tilt/tip using M3 bolts, nuts and springs from old ball-point pens.





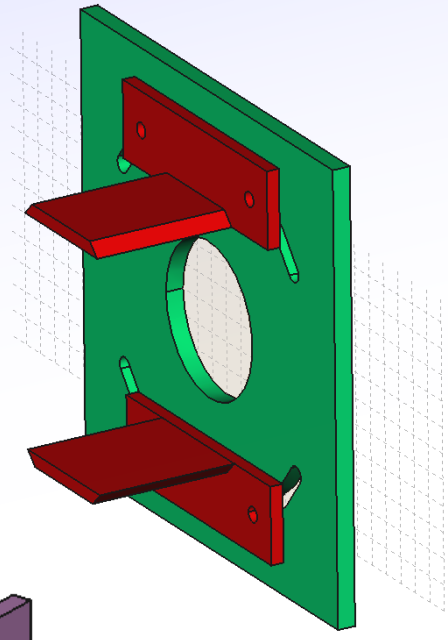


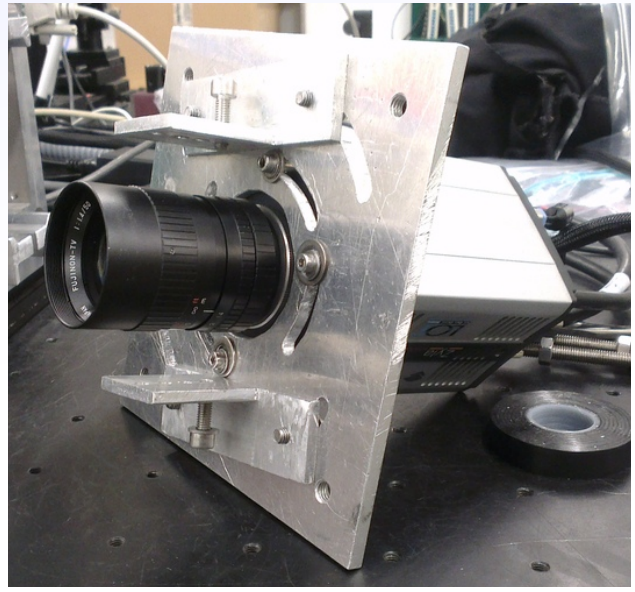
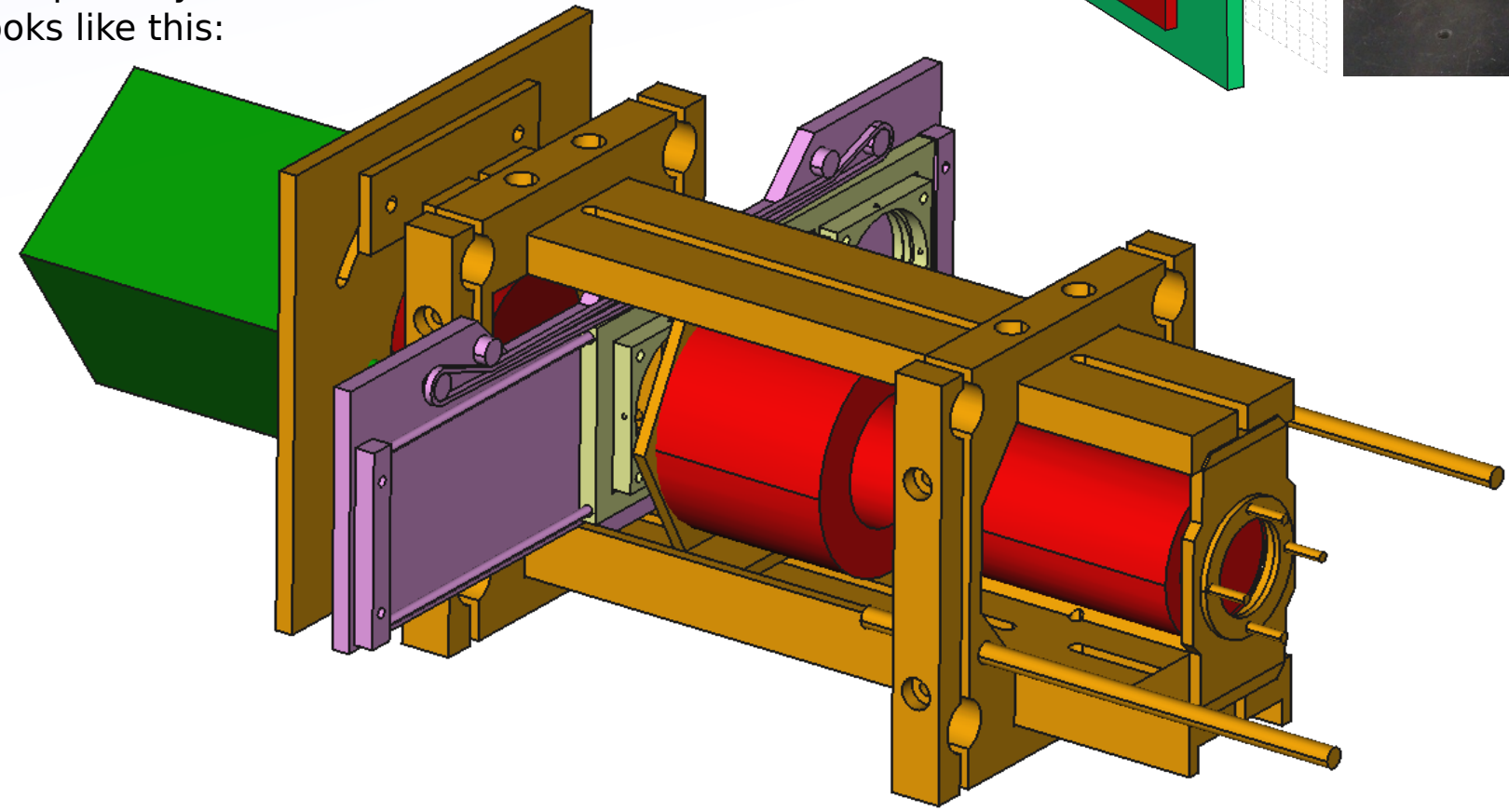
(This is anyway very useful to have for switching filters offline with reproducible tilts)

IMSE Design - Mechanical - U3: Camera Rotation Mount

May2014: New camera (Zyla) needs to be aligned with beam for high speed operation - requires free rotation. Both cameras are too big to fit inside IMSE frame when rotated.

So, cut off the rails and mount camera end-on. Adjustable: Translation in all *x,y,z* and rotation about *y, z*.





Complete system now looks like this: