MAUS Geometry

Ryan Bayes

School of Physics and Astronomy,
University of Glasgow

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Goals of Geometry Implementation

- Precision in the position of experimental elements is a fundamental requirement of simulation and reconstruction.
- Need to match MAUS geometry to surveys
- In the past all geometries have been implemented by hand.
  - Only as good as the information filtered to the programmer
  - Many hands means less certainty
- Implementing system to extract geometry from engineering drawing
  - As developed by Matthew Littlefield

Geometry Task Force

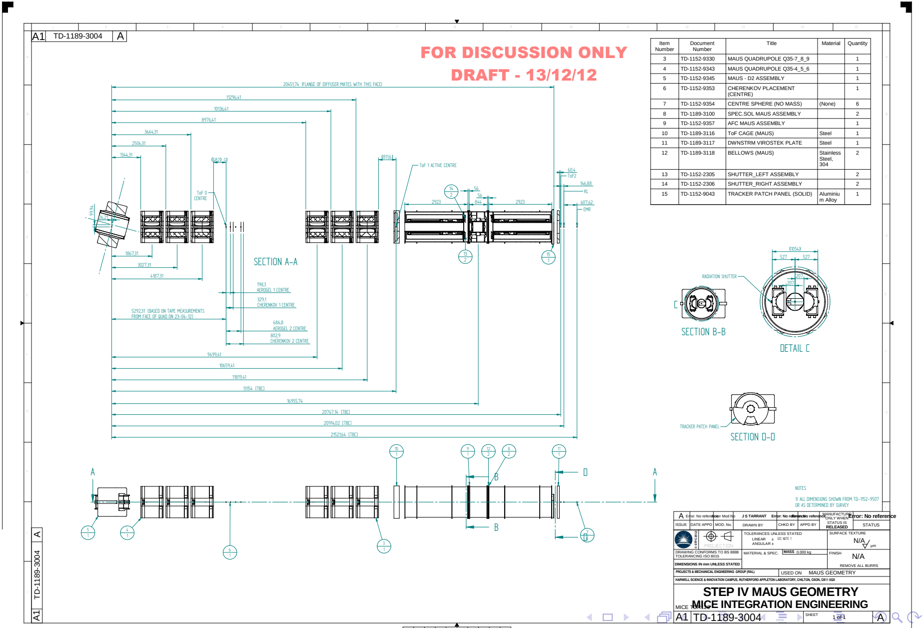
- Jason Tarrant
  - Develops CAD models of experiment.
  - Turns models into machine readable GDML.
- Stephania Ricciardi
  - Geometry validation
- Paval Snopak
  - Absorber model development
- Victoria Blackmore
  - Help in implementation and validation of magnetic fields.
- Chris Heidt
  - Implemented tracker geometry in GDML.
- Ryan Bayes
  - Assuming software development and handling of new models
- Chris Rodgers
  - Manages the group
- Matthew Littlefield
  - Developed the existing software
  - Graduating, consulting, and cheerleading.

From CM34

Future Work

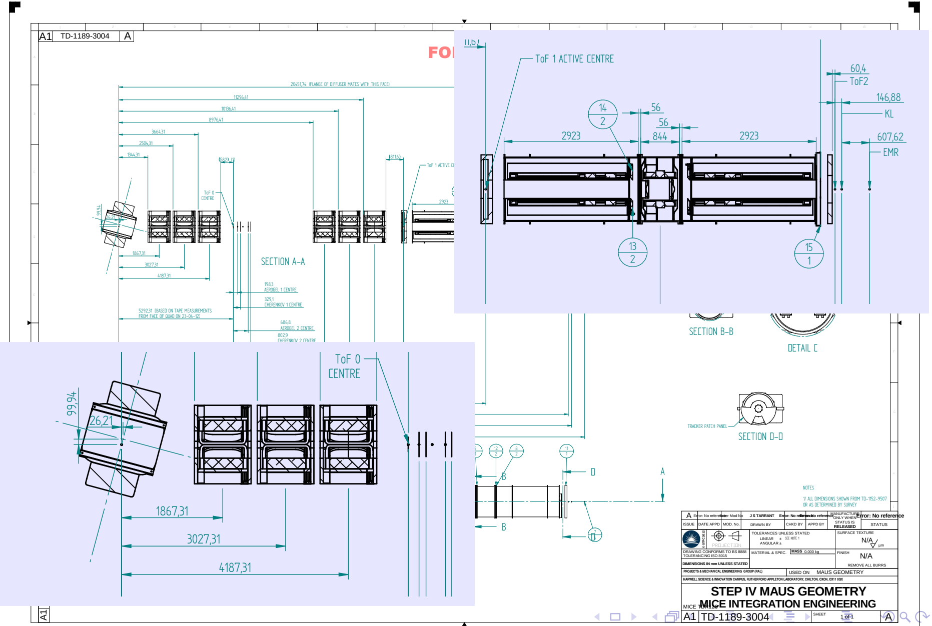
- Finish new models and upload these.
- Validate the models and incorporate these methods into integration tests.
- Validate Magnetic Fields.
- Begin looking at ways of speeding up the simulation
- Alter system to bring in new detector models.
- Bug fixes code improvements and general housework.

Engineering Drawing of Step IV Setup



Item Number	Document Number	Title	Material	Quantity
3	TD-1152-9330	MAUS QUADRUPOLE Q35-7_8_9		1
4	TD-1152-9343	MAUS QUADRUPOLE Q35-4_5_6		1
5	TD-1152-9345	MAUS - D2 ASSEMBLY		1
6	TD-1152-9353	CHERENKOV PLACEMENT (CENTRE)		1
7	TD-1152-9354	CENTRE SPHERE (NO MASS)	(None)	6
8	TD-1189-3100	SPEC.SOL MAUS ASSEMBLY		2
9	TD-1152-9357	AFC MAUS ASSEMBLY		1
10	TD-1189-3116	ToF CAGE (MAUS)	Steel	1
11	TD-1189-3117	DWNSTRM VIROSTEK PLATE	Steel	1
12	TD-1189-3118	BELLOWS (MAUS)	Stainless Steel, 304	2
13	TD-1152-2305	SHUTTER_LEFT ASSEMBLY		2
14	TD-1152-2306	SHUTTER_RIGHT ASSEMBLY		2
15	TD-1152-9043	TRACKER PATCH PANEL (SOLID)	Aluminium Alloy	1

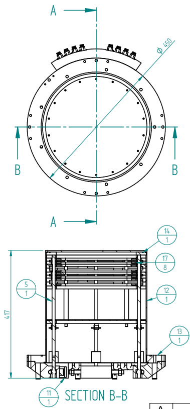
Engineering Drawing of Step IV Setup

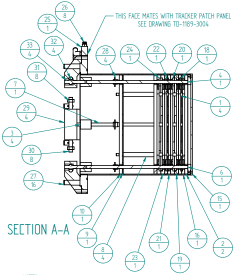


Engineering Drawing of Diffuser

A2 | A

Item Number	File Name	Material	Quantity
1	IRIS LOCKING SHAFT.par	Stainless steel	4
2	SHAFT SUPPORTING RING A.par	Phenolic	2
3	XGT-30C FLEXABLE COUPLINGS.par	Stainless steel	4
4	DRIVE SHAFT A.par	Stainless steel	1
5	DRIVE SHAFT B.par	Stainless steel	1
6	DRIVE SHAFT C.par	Stainless steel	1
7	DRIVE SHAFT D.par	Stainless steel	1
8	SPACING TUBE.par	Brass, yellow brass	4
9	IRIS PROTECTION PLATE.par	Polycarbonate	1
10	SHAFT SUPPORTING RING B.par	Phenolic	1
11	WIRE BLOCK.par	Aluminium, 5083	1
12	DIFFUSER CYLINDER DRUM.par	Stainless steel	1
13	DIFFUSER CYLINDER TOP.par	Stainless steel	1
14	DIFFUSER CYLINDER BASE.par	Stainless steel	1
15	BLACK LEXAN BASE PLATE.par	Polycarbonate	1
16	IRIS A HOLDING RING 1.par	Phenolic	1
17	IRIS MOVEMENT RING.par	Stainless steel	8
18	IRIS A HOLDING RING 2.par	Phenolic	1
19	IRIS B HOLDING RING 1.par	Phenolic	1
20	IRIS B HOLDING RING 2.par	Phenolic	1
21	IRIS C HOLDING RING 1.par	Phenolic	1
22	IRIS C HOLDING RING 2.par	Phenolic	1
23	IRIS D HOLDING RING 1.par	Phenolic	1
24	IRIS D HOLDING RING 2.par	Phenolic	1
25	AIR INTERFACE BLOCK.par	Aluminium, 5083	1
26	PUSH IN PIPE FITTING (8mm).par	Stainless steel	8
27	ELBOW PUSH IN PIPE FITTING (8mm).par	Stainless steel	16
28	POSITIONAL SENSOR SETUP READ DISK.par	Brass, yellow brass	4
29	ACTUATOR BODY.par	Aluminium, 5083	4
30	ADJUSTMENT SCREW.par	Stainless steel	8
31	M12 NUT.par	Stainless steel	8
32	RACK.par	Brass, yellow brass	4
33	PINION.par	Brass, yellow brass	4





NOTES

1/ THIS DRAWING HAS BEEN CREATED FROM A CONVERTED STEP EXCHANGE AS SENT IN EMAIL
From: Joseph Tacon [mailto:j.tacon1@physics.ox.ac.uk]
Sent: 14 July 2011 10:10
To: Tarrant, Jason (STFC,RAL,TECH); Cc: John Cobb
Subject: MICE Diffuser

MATERIALS ASSIGNMENTS FROM EMAIL
From: Joseph Tacon [mailto:j.tacon1@physics.ox.ac.uk]
Sent: 04 December 2012 11:08
To: Tarrant, Jason (STFC,RAL,TECH)
Subject: RE: Diffuser Materials

FOR REVIEW ONLY
DRAFT 13/12/12

THIS DRAWING AND ASSOCIATED MODEL ARE NOT IN THE TEAMCENTRE SERVER THE FILE IS LOCATED AT
_Projects\143 MICE Intergration Engineering - J Tarrant_Tasks\030 CAD Outputs for Other Uses\001 MAUS Geometry\013 Diffuser\000 CAD MICE DIFFUSER.dft

ISSUE	DATE APPD	MOD. No.	DRAWN BY	CHKD BY	APPD BY	MANUFACTURE ONLY WHEN STATUS IS RELEASED	STATUS
A	---	Enter Mod No	J S TARRANT	---	---		WIP

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TOLERANCES UNLESS STATED: LINEAR ± N/A; ANGULAR ± N/A

SURFACE TEXTURE N/A µm

DRAWING CONFORMS TO BS 8888 TOLERANCING ISO 8015

MATERIAL & SPEC. — MASS 39.528 kg

FINISH N/A — REMOVE ALL BURRS

DIMENSIONS IN mm UNLESS STATED

PROJECTS & MECHANICAL ENGINEERING GROUP (RAL) — USED ON MAUS SIMULATION

HARWELL SCIENCE & INNOVATION CAMPUS, RUTHERFORD APPLETON LABORATORY, CHILTON, OXON, OX11 0QX

metric assembly

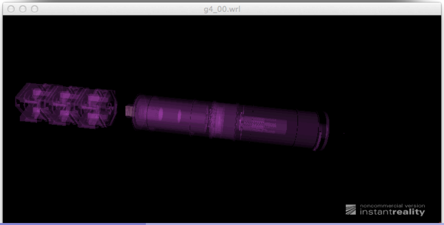
MICE INTEGRATION ENGINEERING

MICE TDR126

A2 — SHEET 1 of 1 — A

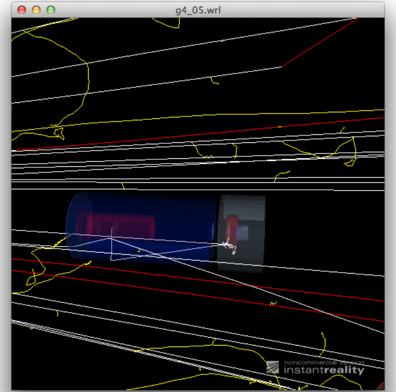
Implementation of Step IV geometry

- Beam line elements coded including
  - Dipole 2
  - Quadrupoles
  - Spectrometer Solenoids
- Position of detector geometries marked in GDML files
  - Latest draft does not include position of diffuser.
  - Use either legacy or GDML derived detector geometries.
- Accelerator elements placed on x-axis (not z)



Detector implementations

- Still primarily uses legacy geometry.
  - Have received model from tracker group but there is a version problem
- Need to develop models for the TOF, CKov, KL, and EMR.
  - A GDML schema is being written for TOFs
  - Detector groups should contribute by writing their own schema.



Current Issues

- Further iteration of GDML files in production
  - Files do not include position of diffuser in context.
  - Want to place elements on the z-axis in CAD model extraction.
  - Want to reduce resolution of CAD model
- Still a hybrid model
  - Beam-line elements all coded in GDML — detector elements still use legacy code.
  - Chris Heidt has produced a tracker geometry in GDML.
  - Volunteers required to generate other detector geometries.

Conclusions

- Implementation of Step IV geometry in progress.
    - Coding to facilitate the new models is yet to be committed.
    - Waiting on stability in model development.
- Validation of geometry is pending.
    - Goal of speeding up simulation dependent on resolution of geometry model.
    - How much is too much detail.