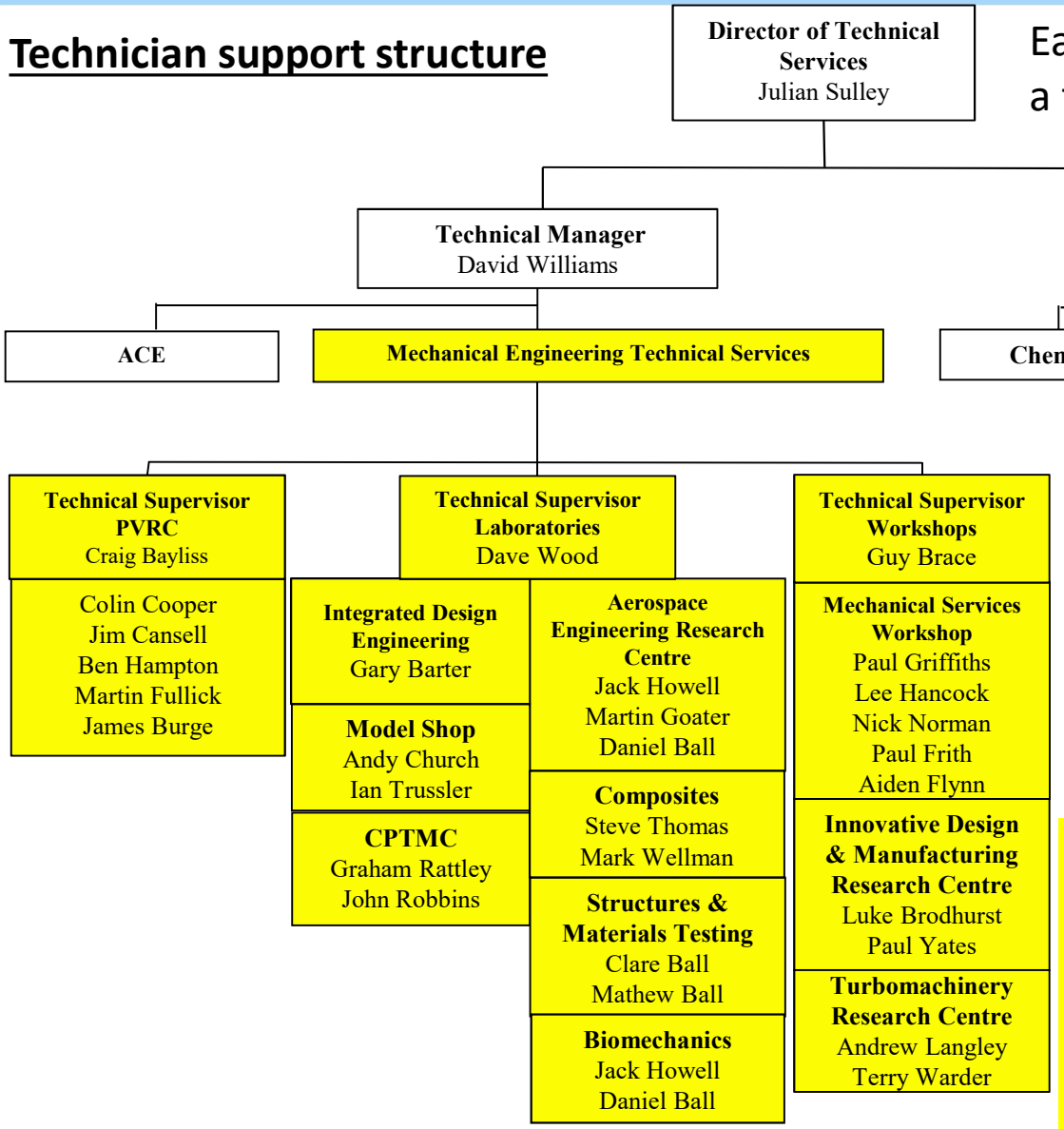
# Technical support for Final Year Projects

Andy Green – 4E 1.7b
David Wood – 4E 1.28

A copy of this presentation will be located on the FYP moodle page for further reference.

# Technician support structure




Each experimental project is allocated a technician

## LIMITED RESOURCES AVAILABLE

- 250 FYPs (MEng, MIDP, BEng, IMEE and MSc).
- ~25 Mechanical Technicians
- 10 projects per technician
- 10 - 15 hours per project (TOTAL)
- 1 - 1.5 hours per project (WEEK)

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# Timescale for Project

| | Week | w/c | Activity/action |
|---|---|---|---|
| Sem 1 2019 | 1 | 30 Sep | Project selection |
| | 2 | 07 Oct | Project selection |
| | 3 | 14 Oct | Wed 16 Oct at 16:00 student choices submitted |
| | 4 | 21 Oct | Wed 23 Oct 19 - Project allocation details distributed |
| | 5 | 28 Oct | Supervisor meeting. Background reading |
| | 6 | 04 Nov | Initial allocation of project technician skills |
| | 7 | 11 Nov | Wed 13 Nov from 9.15 Technician Surgery - discuss support requirements |
| | 8 | 18 Nov | Tue 19 Nov - Technician allocation complete Discussion with technician |
| | 9 | 25 Nov | Wed 27 Nov at 16:00 Project Scoping and Planning submission |
| | 10 | 02 Dec | |
| | 11 | 09 Dec | |
| | 12-18 | 16 Dec | Vacation, revision week, Exams, inter-semester break |
| Sem 2 2020 | 19-22 | 03 Feb | Full time project work |
| | 23 | 02 Mar | First Assessor meeting |
| | 24-26 | 09 Mar | |
| | 27 | 30 Mar | Second Assessor meeting |
| | 28-29 | 06 Apr | Easter Vacation |
| | 30 | 20 Apr | Full time project work |
| | 31 | 27 Apr | Wed 29 Apr at 16:00 Final project report submission |

← Now

Discuss experimental aspects of project with supervisor

← SURGERY

← Meet allocated technician

Full time project period

Technician time

**10 - 15 hours per project (TOTAL)**

**1 - 1.5 hours per project (WEEK)**

**Need for planning ahead!**

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# Now Timescale for Project

Discuss experimental aspects of project with supervisor

| | Week | w/c | Activity/action |
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| | 6 | 04 Nov | Initial allocation of project technician skills |
| | 7 | 11 Nov | Wed 13 Nov from 9.15 **Technician Surgery** - discuss support requirements<br>Appointments (10mins max talking time with 5 mins gap)<br>12 technical skills areas - with specialists to discuss each project<br><br>Purpose:<br>To identify areas under control or requiring minimum support (tick)<br>To identify areas that require significant support (ring)<br>To identify areas that have not been thought about and discuss with relevant specialists<br>To raise alarm bells for projects that require too much support<br>Dr Wang & I will discuss these with supervisors to trim down expectations |
| | 8 | 18 Nov | Tue 19 Nov - Technician allocation complete Discussion with technician |
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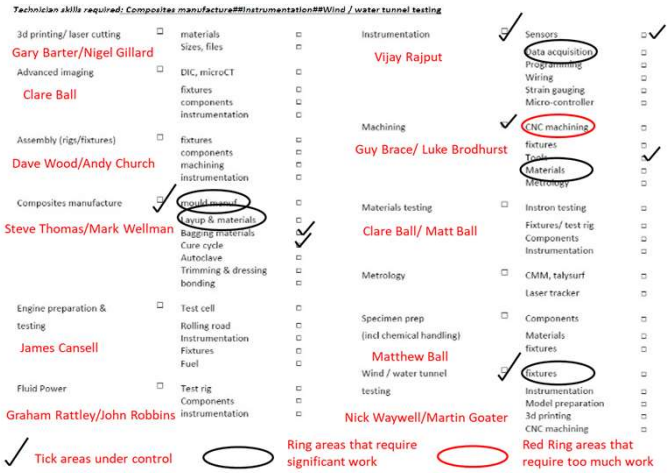
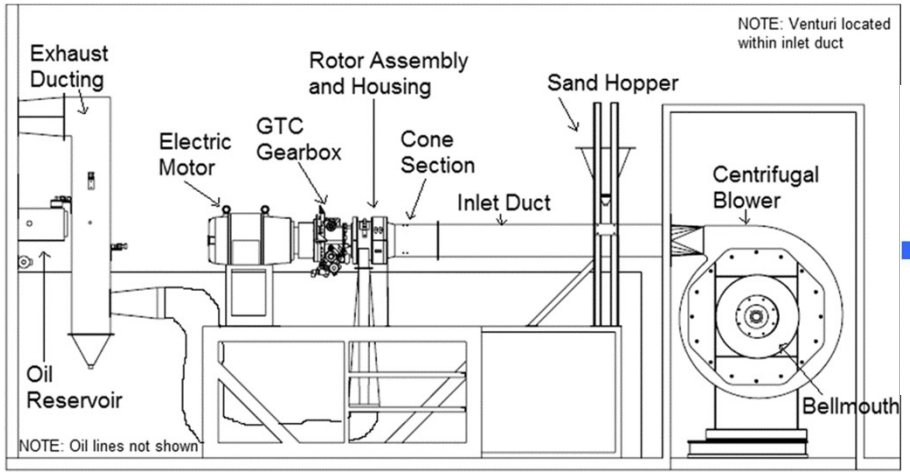
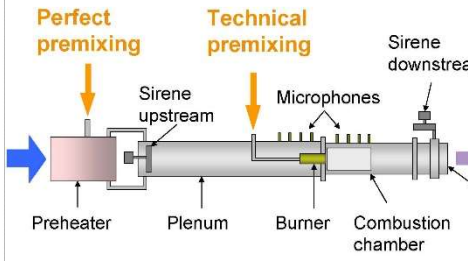
## SURGERY

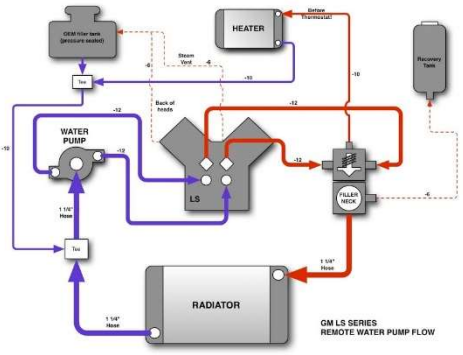


# Preparing for the Surgery

- Discuss the project with your supervisor
- Has a similar FYP been done before?
- If so, does the necessary equipment already exist?
- Try to establish what you are hoping to carry out, and what support is needed for this to be done



# Final Project Description sheet

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Department of Mechanical Engineering
ME40321 – Engineering project
Academic year 2015/16

BATH

**Project ID:** ME004

| | |
|---|---|
| **Student name:** Student 4 | **Supervisor:** Dr David Cleaver |
| **Technician:** Technician 4 | **Assessor:** Assessor 4 |
| **Project type:** Experimental | **Project areas:** Aerodynamics / fluid mechanics |

**Project title: Experimental Investigation of Optimal UAV Aerodynamics**

**Project description:** The goal of this project is to first refine the aerodynamic design for the Bath 2016 UAV aircraft, test this design in the department's large-section wind tunnel and then improve the design through suitable research-level technologies. This project has three phases: (i) Refine the optimal aerodynamic shape using theoretical / panel code methods in collaboration with the CFD FYP student. (ii) Manufacture and then test a semi-span model in the large-section closed-loop wind tunnel, recording steady-state lift and drag measurements across a wide range of angles of attack / freestream velocity. Compare these baseline results with the theoretical / panel code / CFD (from a separate FYP) predictions. (iii) Improve on this performance through novel flow control techniques / by addressing stall behaviour / advanced controls. This project combines many elements including theoretical, practical design, and experimental aerodynamics with research-level content and there is great scope for ideas / concepts / suggestions from the student. In addition it will benefit from the enhanced financial and technical support of the UAV team. It is open to all students but the student will be expected to engage with the UAV team and take part in the 2016 ImechE UAS Competition.

**Resource required:** Large wind tunnel

**Support required:** Medium

# Surgery specialist technical areas

Technician skills required: Composites manufacture, Instrumentation, Wind tunnel testing

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| | | | |
|---|---|---|---|
| **3d printing/ laser cutting** Gary Barter | ☐ | materials | ☐ |
| | | Sizes, files | ☐ |
| **Advanced imaging** Clare Ball | ☐ | DIC, microCT | ☐ |
| | | fixtures | ☐ |
| | | components | ☐ |
| | | instrumentation | ☐ |
| **Assembly (rigs/fixtures)** Dave Wood Andy Church | ☐ | fixtures | ☐ |
| | | components | ☐ |
| | | machining | ☐ |
| | | instrumentation | ☐ |
| **Composites manufacture** Steve Thomas Mark Wellman | ✓ | mould manuf. | ☐ |
| | | Layup & materials | ☐ |
| | | Bagging materials | ☐ |
| | | Cure cycle | ☐ |
| | | Autoclave | ☐ |
| | | Trimming & dressing | ☐ |
| | | bonding | ☐ |
| **Engine preparation & testing** James Cansell | ☐ | Test cell | ☐ |
| | | Rolling road | ☐ |
| | | Instrumentation | ☐ |
| | | Fixtures | ☐ |
| | | Fuel | ☐ |
| **Fluid Power** Graham Rattley John Robbins | ☐ | Test rig | ☐ |
| | | Components | ☐ |
| | | instrumentation | ☐ |
| **Metrology** | ☐ | CMM, talysurf | ☐ |
| | | Laser tracker | ☐ |
| **Biomechanics** Jack Howell | ☐ | Test rig | ☐ |
| | | Components | ☐ |

| | | | |
|---|---|---|---|
| **Instrumentation** Vijay Rajput ✓ | ☐ | Sensors | ☐ |
| | | Data acquisition | ☐ |
| | | Programming | ☐ |
| | | Wiring | ☐ |
| | | Strain gauging | ☐ |
| | | Micro-controller | ☐ |
| **Machining** Guy Brace Luke Brodhurst | ☐ | CNC machining | ☐ |
| | | fixtures | ☐ |
| | | Tools | ☐ |
| | | Materials | ☐ |
| | | Metrology | ☐ |
| | | Welding | ☐ |
| **Materials testing** Clare Ball Matt Ball | ☐ | Instron testing | ☐ |
| | | Fixtures/ test rig | ☐ |
| | | Components | ☐ |
| | | Instrumentation | ☐ |
| **Specimen prep (incl chemical handling)** Matt Ball | ☐ | Components | ☐ |
| | | Materials | ☐ |
| | | fixtures | ☐ |
| **Wind / water tunnel testing** Jack Howell ✓ | ☐ | fixtures | ☐ |
| | | Instrumentation | ☐ |
| | | Model preparation | ☐ |
| **Computation** | ☐ | Special software | ☐ |
| | | Hardware | ☐ |
| | | Network | ☐ |
| **Turbomachinery** Andy Langley | ☐ | Test rig + assembly | ☐ |
| | | Components | ☐ |

Primary:

Additional support:

# Completed Surgery sheet

Technician skills required: Composites manufacture, Instrumentation, Wind tunnel testing

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| | | | |
|---|---|---|---|
| **3d printing/ laser cutting** Gary Barter | ☐ | materials | ☐ |
| | | Sizes, files | ☐ |
| **Advanced imaging** Clare Ball | ☐ | DIC, microCT | ☐ |
| | | fixtures | ☐ |
| | | components | ☐ |
| | | instrumentation | ☐ |
| **Assembly (rigs/fixtures)** Dave Wood Andy Church | ☐ | fixtures | ☐ |
| | | components | ☐ |
| | | machining | ☐ |
| | | instrumentation | ☐ |
| **Composites manufacture** Steve Thomas Mark Wellman | ✓ | ~~mould manuf.~~ | ☐ |
| | | ~~Layup & materials~~ | ☐ |
| | | ~~Bagging materials~~ | ✓ |
| | | Cure cycle | ✓ |
| | | Autoclave | ☐ |
| | | Trimming & dressing | ☐ |
| | | bonding | ☐ |
| **Engine preparation & testing** James Cansell | ☐ | Test cell | ☐ |
| | | Rolling road | ☐ |
| | | Instrumentation | ☐ |
| | | Fixtures | ☐ |
| | | Fuel | ☐ |
| **Fluid Power** Graham Rattley John Robbins | ☐ | Test rig | ☐ |
| | | Components | ☐ |
| | | instrumentation | ☐ |
| **Metrology** | ☐ | CMM, talysurf | ☐ |
| | | Laser tracker | ☐ |
| **Biomechanics** Jack Howell | ☐ | Test rig | ☐ |
| | | Components | ☐ |

| | | | |
|---|---|---|---|
| **Instrumentation** Vijay Rajput ✓ | ☐ | ~~Sensors~~ | ✓ |
| | | Data acquisition | ☐ |
| | | ~~Programming~~ | ☐ |
| | | Wiring | ☐ |
| | | Strain gauging | ☐ |
| | | Micro-controller | ☐ |
| **Machining** Guy Brace Luke Brodhurst | ☐ | CNC machining | ☐ |
| | | ~~fixtures~~ | ☐ |
| | | ~~Tools~~ | ✓ |
| | | Materials | ☐ |
| | | ~~Metrology~~ | ☐ |
| | | Welding | ☐ |
| **Materials testing** Clare Ball Matt Ball | ☐ | Instron testing | ☐ |
| | | Fixtures/ test rig | ☐ |
| | | Components | ☐ |
| | | Instrumentation | ☐ |
| **Specimen prep (incl chemical handling)** Matt Ball | ☐ | Components | ☐ |
| | | Materials | ☐ |
| | | fixtures | ☐ |
| **Wind / water tunnel testing** Jack Howell ✓ | ☐ | fixtures | ☐ |
| | | ~~Instrumentation~~ | ☐ |
| | | Model preparation | ☐ |
| **Computation** | ☐ | Special software | ☐ |
| | | Hardware | ☐ |
| | | Network | ☐ |
| **Turbomachinery** Andy Langley | ☐ | Test rig + assembly | ☐ |
| | | Components | ☐ |

Primary:
Additional support:

✓ Tick areas under control

Ring areas that require significant work

Red Ring areas that require too much work

# Getting the best from your technician

- Good Communication
- Help yourself – don’t expect technician to do it all
- Preparation for surgery to explain requirements
- Early discussion (week 8)
- Early drawings to avoid disappointment
- Machining opportunity during exam period (Jan)
- Technicians cannot do miracles
- Ordering parts and components early
- No good leaving it till mid March!!

## Mechanical Engineering Laboratories Homepage

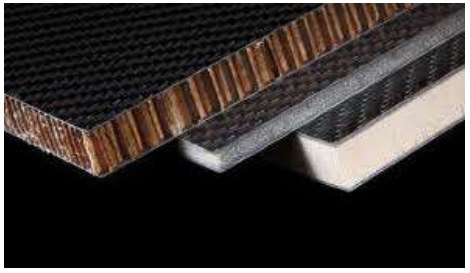
- https://wiki.bath.ac.uk/display/Mchenglabs/Mechanical+Engineering+Laboratories+Homepage
- Card access for certain Labs
- General working information
- Contact details for technicians
- Equipment booking (eg Instron test machines)
- Health and Safety Documents incl. example risk assessments

# Typical time line for FYP requiring Machining

- Design discussion and review with technician
- Amendments and new drawings
- Ordering non-stock materials and tooling
- Typical material delivery ( from 2 days to 2 weeks)
- Technician & machine availability
- Blocking up, multiple machining operations depending on complexity of parts.
- CNC components require CAD and programming time.
- Part inspection and fitting depending on tolerances

# Typical time line for FYP requiring Composites manufacture

- Initial discussion with Composites technician including sketch/ drawing
- Amendments and new drawings as required
- Mould / Tooling block ordering
- Pre-preg composite material ordering
- Typical materials delivery ( from 1 to 5 weeks)
- CNC machining of pattern profile
- Mould manufacture
- Layup, debulking and final bagging – very time consuming activities
- Curing in autoclave (up to 24 hours)
- Trimming of components, potting, assembly & bonding
- Plasma edge treatment
- Mechanical coupon and component testing on Instron



# Ordering supplies

- If you need to order items for your project you need to use the order form which can be downloaded from Moodle.
- Your supervisor needs to e-mail the completed form to the Faculty Finance Office and use the project code BA-ME2FGN.
- There is a limit of £250 per student per project.