



School of Mechanical and Manufacturing Engineering

MMAN2130 Design and Manufacturing

Term 3 – 2019

Week 1

David Lyons CEng GCULT – Course Convenor

david.lyons@unsw.edu.au

MMAN2130

Our Team

UNSW:

David Lyons – *Course Convenor, Lecturer (Tuesdays)*

To be announced – Lecturer (Thursdays)

Alex Lau – *Head Demonstrator*

Isabella Yan – *Demonstrator*

Carlo Pane - *Demonstrator*

Leigh Huang - *Demonstrator*

Ben Quinn – *Demonstrator*

Kevin Tian - *Demonstrator*

Weber Ting – *Demonstrator*

TAFE NSW:

Jon Jackson – *Assistant Head Teacher, Fitting and Machining and Jon Jackson's team.*

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Your lecturers - Tuesdays:

David Lyons CEng GCULT

- Chartered Engineer

Student of engineering → Graduation: BE(Hons) → STAGE 1: practise under supervision; election as Member → *min.* 3-5 years experience → STAGE 2 → Chartered: supervise others → Election as Fellow of professional body (eg. Engineers Australia) → Continuing Professional Development (CPD) and further study – lifelong learning...

Useful links:

STUDENT: <https://www.engineersaustralia.org.au/Membership/Membership-Benefits/Student-Membership-Benefits> (Student membership)

GRADUATION (STAGE 1): <https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-03/Stage%201%20Competency%20Standards.pdf> (hint: it's in your MMAN2130 Course Outline! Also the focus of your Industrial Training!)

TOWARDS CHARTERED (STAGE 2): <https://www.engineersaustralia.org.au/Chartered>

- 32 years industry experience: Design | Management | Naval architecture | Composites
- University learning and teaching: 19 years experience (14 P/T, 5 F/T), GCULT

<https://teaching.unsw.edu.au/gcult>

- Member, Engineers Australia; RPEQ; Fellow – The Royal Institution of Naval Architects

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About:

Your lecturers:

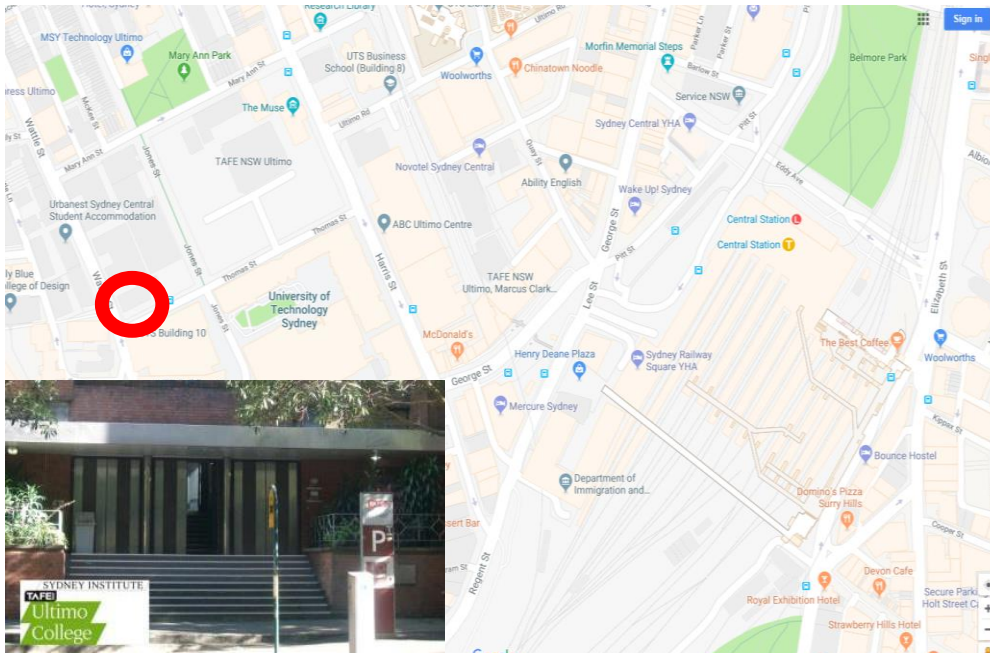
Thursdays

To be announced

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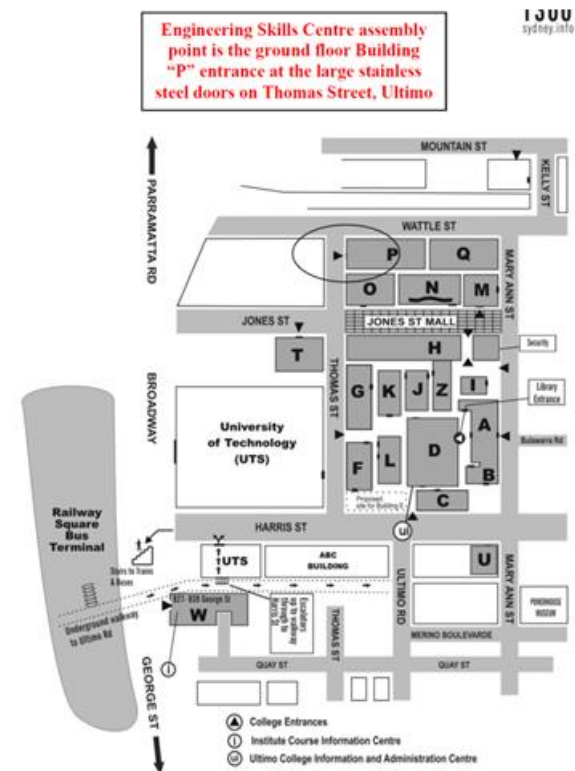
TAFE NSW @ Ultimo

https://moodle.telt.unsw.edu.au/pluginfile.php/4491041/mod_resource/content/1/Engineering%2520Skills%2520Center%2520Info%2520Booklet%25202014%2520v3.pdf



ALLOW PLENTY OF TIME! ~10-15 MIN WALK FROM CENTRAL STATION

Parking: forget about it – take public transport



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TAFE NSW – Info Booklet



ENGINEERING SKILLS CENTRE

Fitting & Machining

Toolmaking

CNC & CAM

Fluid Power

UNIVERSITY INFORMATION BOOKLET 2014 (v3)

PPE

- **Hair net or beret** (if hair cannot be restrained)
- **Beards** – cut short otherwise excluded!
- **Safety glasses** conforming to Australian Standard AS1337..:



Enclosed leather upper boots/shoes, with steel toe cap to Australian Standard AS 2210 part 1 – 2010, having a solid leather upper (top) which:-
o does not melt when hot (so is suitable when welding or machining)
o does not allow sharp swarf or pointed objects to penetrate the top of the shoe or boot

[Home](#) / [Shop](#) / [Mens](#) / [Mens Work Boots](#) / Raben Elastic Side Safety Boot



RABEN ELASTIC SIDE SAFETY BOOT

New Arrival Safety Boot..!!

- Steel cap toe
- Comfort Lining
- Water resistant upper
- Electrical Hazard & slip resistant
- Resists Oil/Acid
- Available in Black & Wheat Husk

RABEN FOOTWEAR-CITY CENTRAL STATION

ADDRESS:
793 George Street, Cor Quay Street.

CONTACT DETAILS:
(02) 9211 1813

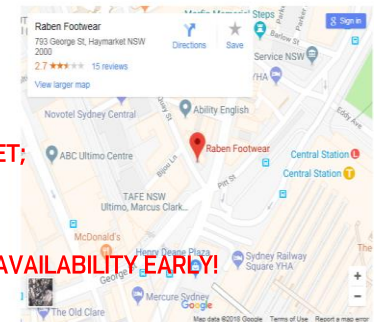
STORE HOURS:
Monday 9:00am – 6:00pm
Tuesday 9:00am – 6:00pm
Wednesday 9:00am – 6:00pm
Thursday 9:00am – 6:00pm
Friday 9:00am – 6:00pm
Saturday 9:00am – 6:00pm
Sunday 9:30am – 6:00pm



OR BIG FEET;

CHECK AVAILABILITY EARLY!

IF YOU HAVE tiny



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TAFE NSW @ Ultimo

<https://www.facebook.com/Fitting-Machining-Ultimo-TAFE-454441737959396/>

The screenshot shows the Facebook page for 'Fitting & Machining Ultimo TAFE'. The page header includes the URL and navigation links like 'myUNSW Portal...', 'Course: S1 2018 ...', and 'Search all UNS...'. The page name 'Fitting & Machining Ultimo TAFE' is displayed at the top. The left sidebar contains the Sydney TAFE logo and a navigation menu with options: Home, About, Notes, Photos, Videos, Events, Posts, Community, and a 'Create a Page' button. The main content area features a post from 'Fitting & Machining Ultimo TAFE' dated June 1, 2015, with the text 'Here is a small sample of UNSW students manufacturing their project here at Ultimo TAFE.' and a photo of students working on a lathe. The right sidebar includes a 'Send Message' button, 'Sports & Recreation in Ultimo, New South Wales', 'Community' section with 'Invite your friends to like this Page', '331 people like this', and '324 people follow this', and an 'About' section with contact information: '(02) 9217 4205', 'Send Message', 'sydneytafe.edu.au/careers/metal-engineering', 'Sports & Recreation · Education · Professional Service', and 'Suggest Edits'. Below the 'About' section is a 'Pages liked by this Page' section listing 'Metal Fabrication & W...', 'Adda Tool Engineerin...', and 'TAFE! TAFE NSW'. At the bottom, there are links for 'English (US)', '中文(简体)', '한국어', 'Español', and 'Português (Brasil)', along with 'Privacy · Terms · Advertising · Ad Choices' and 'Cookies · More'.

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TAFE NSW @ Ultimo

T3-2019 Timetable – TAFE groups of 15 members each

TAFE “OTHER” at Ultimo Weeks 1-9 (Wed classes); 1-3,5-10 (Mon class): See Moodle for address TAFE PPE safety rules apply: see Moodle	Monday	5pm-9pm	Ultimo, OR
	Wednesday	12noon-4pm	Ultimo, OR
	Wednesday	5pm-9pm	Ultimo
<u>Note: On UNSW timetable, TAFE shows 1 hour earlier start to allow for travel time to Ultimo</u>			

OTH	M16A	8269	Rel	Full	70/70	100%	Mon 16-21 (w1-3,5-9,11, See School)
OTH	W12A	8270	Rel	Open	68/70	97%	Wed 12-17 (w1-9, See School)
OTH	W16A	8271	Rel	Open	31/45	69%	Wed 16-21 (w1-9, See School)

- (i) **You CANNOT swap CAD or TAFE classes week to week. No “make-ups” possible for TAFE as you must work in your Pump Group.**
- (ii) **You cannot miss more than one TAFE lesson (during weeks 2 to 10) – attendance for safety briefing in Week 1 at TAFE is compulsory. TAFE takes the roll and issues a certificate for the TAFE component of MMAN2130.**

Sporting fixtures, personal reasons etc. are not acceptable reasons for missed attendances. (See (ii) above).

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TAFE NSW @ Ultimo

MONDAY Groups – 5 TAFE Groups

TAFE Week	38	39	40	41	42	43	44	45	46	47
Monday	16-Sep	23-Sep	30-Sep	7-Oct	14-Oct	21-Oct	28-Oct	4-Nov	11-Nov	18-Nov
Monday Night 17:00-21:00 (5pm-9pm)										
NM2-1	Measure	TURN 1	TURN 2	Public Holiday	Mill	Temp 1	Temp 2	Project	Project	Project
	PG02	PLG01	PLG01		PLG01	PG02	PG02	Week 1	Week 2	Week 3
NM2-2	Measure	TURN 1	TURN 2		Temp 1	Temp 2	Mill	Project	Project	Project
	PG02	PLG01	PLG01		PG02	PG02	PLG01	Week 1	Week 2	Week 3
NM2-3	Measure	Mill	Temp 1		Temp 2	TURN 1	TURN 2	Project	Project	Project
	PG02	PLG01	PG02		PG02	PLG01	PLG01	Week 1	Week 2	Week 3
NM2-4	Measure	Temp 1	Temp 2		TURN 1	Mill	TURN 2	Project	Project	Project
	PG02	PG02	PG02		PLG01	PLG01	PLG01	Week 1	Week 2	Week 3
NM2-5	Measure	Temp 1	Mill		TURN 1	TURN 2	Temp 2	Project	Project	Project
	PG02	PG02	PLG01		PLG01	PLG01	PG02	Week 1	Week 2	Week 3

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TAFE NSW @ Ultimo

WEDNESDAY Afternoon Group – 5 TAFE Groups

TAFE Week	38	39	40	41	42	43	44	45	46	47
Wednesday	18-Sep	25-Sep	2-Oct	9-Oct	16-Oct	23-Oct	30-Oct	6-Nov	13-Nov	20-Nov
Wednesday 12:30-16:30 (12:30pm-4:30pm)										
NW2-1	Measure	TURN 1	TURN 2	Mill	Temp 1	Temp 2	Project	Project	Project	
	PG02	PLG01	PLG01	PLG01	PG02	PG02	Week 1	Week 2	Week 3	
NW2-2	Measure	TURN 1	TURN 2	Temp 1	Temp 2	Mill	Project	Project	Project	
	PG02	PLG01	PLG01	PG02	PG02	PLG01	Week 1	Week 2	Week 3	
NW2-3	Measure	Mill	Temp 1	Temp 2	TURN 1	TURN 2	Project	Project	Project	
	PG02	PLG01	PG02	PG02	PLG01	PLG01	Week 1	Week 2	Week 3	
NW2-4	Measure	Temp 1	Temp 2	TURN 1	Mill	TURN 2	Project	Project	Project	
	PG02	PG02	PG02	PLG01	PLG01	PLG01	Week 1	Week 2	Week 3	
NW2-5	Measure	Temp 1	Mill	TURN 1	TURN 2	Temp 2	Project	Project	Project	
	PG02	PG02	PLG01	PLG01	PLG01	PG02	Week 1	Week 2	Week 3	

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TAFE NSW @ Ultimo

WEDNESDAY Evening Group – 3 TAFE Groups

TAFE Week	38	39	40	41	42	43	44	45	46	47
Wednesday	18-Sep	25-Sep	2-Oct	9-Oct	16-Oct	23-Oct	30-Oct	6-Nov	13-Nov	20-Nov
Wednesday Night 17:00-21:00 (5pm-9pm)										
NW2-6	Measure	TURN 1	TURN 2	Mill	Temp 1	Temp 2	Project	Project	Project	
	PG02	PLG01	PLG01	PLG01	PG02	PG02	Week 1	Week 2	Week 3	
NW2-7	Measure	Mill	Temp 1	Temp 2	TURN 1	TURN 2	Project	Project	Project	
	PG02	PLG01	PG02	PG02	PLG01	PLG01	Week 1	Week 2	Week 3	
NW2-8	Measure	Temp 1	Temp 2	TURN 1	Mill	TURN 2	Project	Project	Project	
	PG02	PG02	PG02	PLG01	PLG01	PLG01	Week 1	Week 2	Week 3	

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CAD Labs

Getting to grips with

Solidworks software

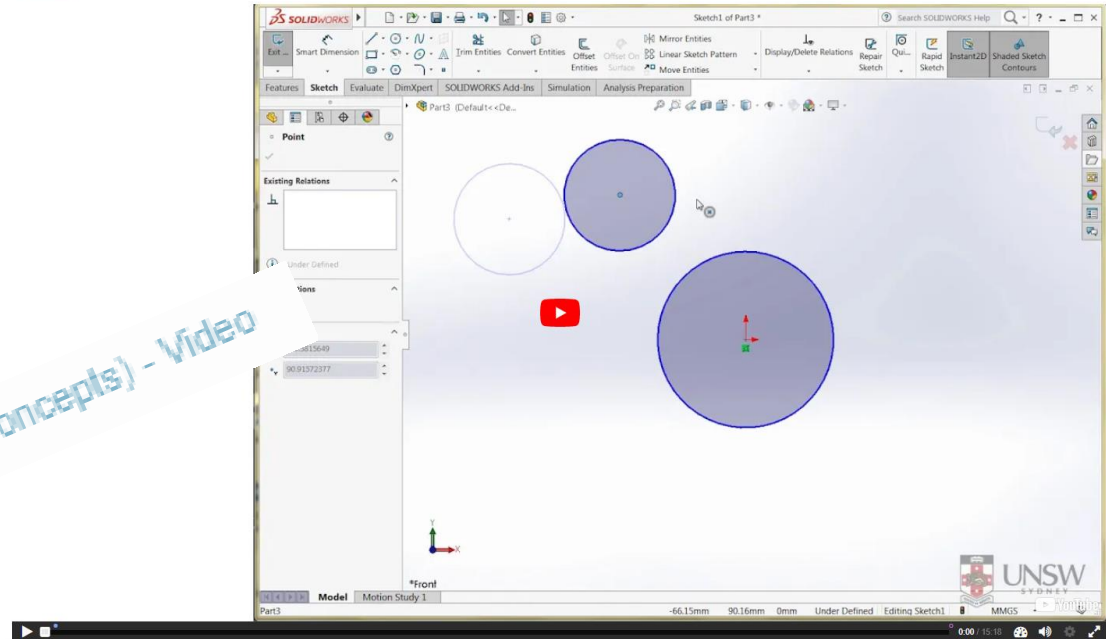
H5P videos: review

before your

CAD

Session!

2D Sketching (Concepts) - Video



Start Week 2:

Introduction to SolidWorks and 2D sketching

3D Operations

Engineering drawing. CAD test.

Holes and hole wizard.

Assemblies. CAD test.

Fasteners

Additional techniques: Patterning & Mirroring. CAD test.

CAD summary

Week 10 is final CAD test (others in weeks 6 & 8 – 3.33% each)

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CAD Labs – Timetable and group allocations

CAD Labs “TLB” Weeks 2-10	Monday	10:30am-12noon	Ainsworth (J17) 204, <u>OR</u>
	<u>Monday</u>	<u>12noon-1:30pm</u>	<u>Ainsworth (J17) 204, OR</u>
	<u>Monday</u>	<u>2:00pm-3:30pm</u>	<u>Ainsworth (J17) 204</u>

TLB	M10A	8266	Enr	Open	49/61	80%	Mon 10:30-12 (w2-3,5-11, Ainswth204)
TLB	M12A	8267	Enr	Open	65/69	94%	Mon 12-13:30 (w2-3,5-11, Ainswth204)
TLB	M14A	8268	Enr	Open	55/65	85%	Mon 14-15:30 (w2-3,5-11, Ainswth204)

CAD LAB group allocation questions? First, check Moodle, only then email
Head Demonstrator, Alex Lau at alex.lau@unsw.edu.au

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Time out ...

- What is DESIGN ?
- What is MANUFACTURING ?
 - How do they relate?

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The Pump Project (Group-based design, build, test and report)

Pump groups usually have 5 members; course staff will allocate you

- **Functional requirements:**

FUNCTIONAL SPECIFICATION for the PP175 Vertical Displacement Pump

Pump requirement Specification v2.pdf

- **Sketching concepts (weeks 2 & 3), then**
- **Drawing in Solidworks (weeks 3-8), then**
- **Manufacture (TAFE weeks 7-9)**



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Pump testing **Week 11 (Tuesday – to be confirmed)**

Tue 14-18 (w10, UGLAb116A)

Thu 14-18 (w10, UGLAb116A)

THIS IS WRONG in TIMETABLE!

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Weekly structure

pre-LEC: **Go to Moodle and go through the *H5P Pre-seminar Activities***

LEC:

First hour is a weekly topical presentation and discussion of the H5P

Second hour is a *Design Conclave* with lecturer and tutors in your Pump Groups

conclave [kon-kleyv, kong-] noun 1. a private or secret meeting. 2. an assembly or gathering, especially one that has special authority, power, or influence: e.g. a conclave of design engineers!

pre-TUT: **Go to Moodle and go through the H5P CAD Video**

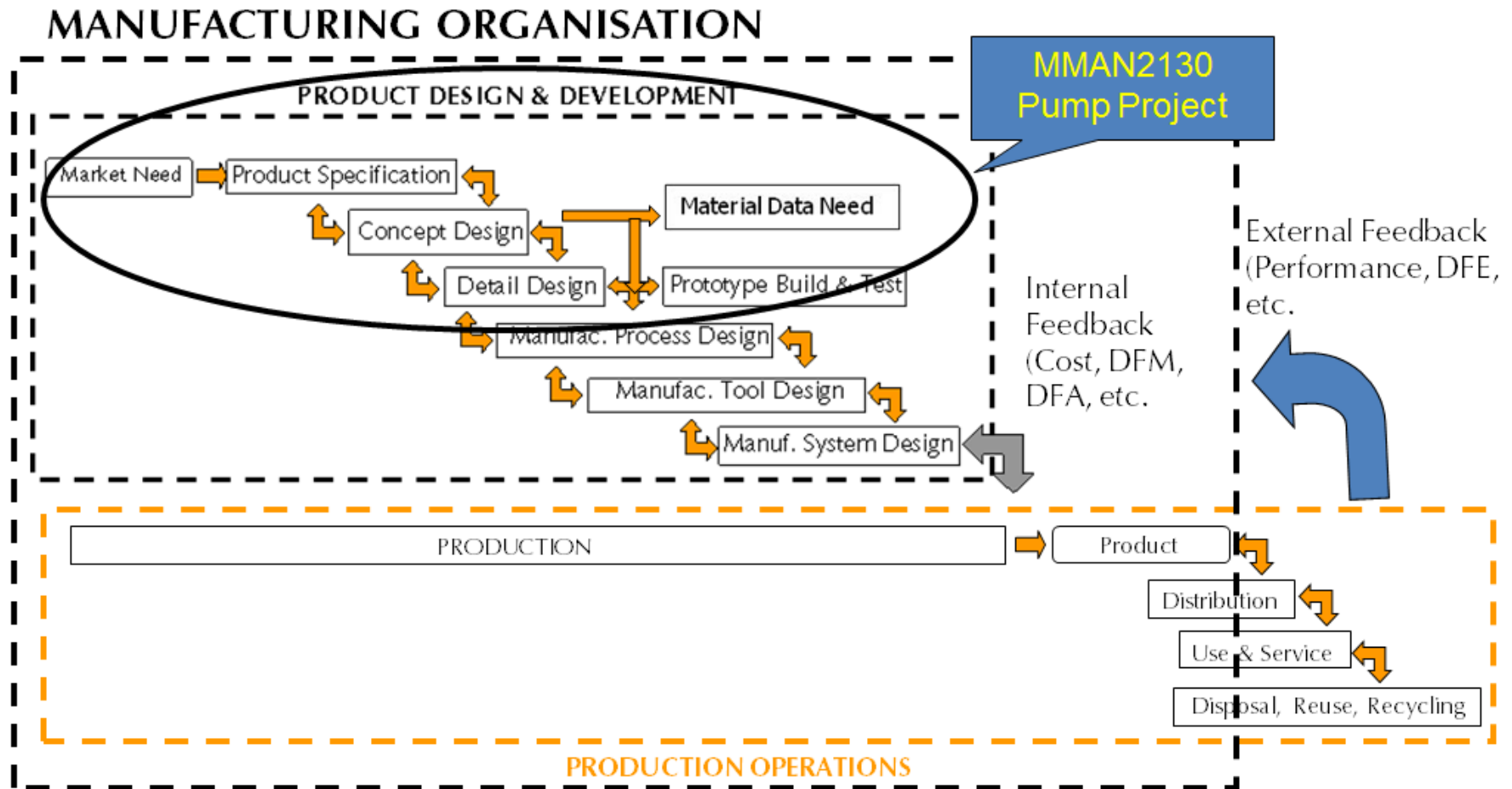
TUT: CAD labs with guided progress and tests in weeks 4, 6, 8 & 10.
Develop your pump component drawings and ask for help.

OTHER:

TAFE Week 1-Intro/safety/PPE, Weeks 2-6 Guided activities, Weeks 7-9
Manufacturing your pump component, Week 11 Pump testing in J18 UTL

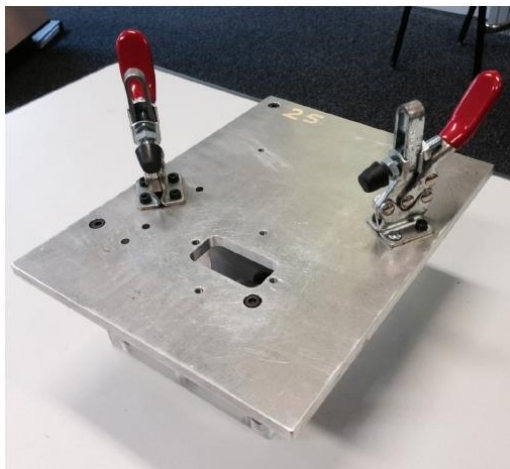
MMAN2130 Pump Project

Why are we doing this?



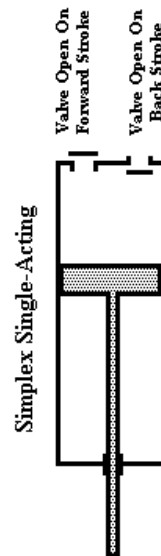
Courtesy Prof S Kara (UNSW, 2017)

- We will be mimicking a real product development project
- Project-based
- We will be engineering (i.e. designing and fabricating) a positive displacement, single acting, simplex, reciprocating pump
 - Groups of 5 members (randomly assigned)
 - Each group member allocated a component/sub-assembly
- <https://www.animatedsoftware.com/pumpglos/simplex.htm>
- The fixture and motor are provided to you in Week 11 during pump testing



Courtesy Prof S Kara (UNSW, 2017)

- How do I design and build such a pump?
 - Single acting: only draws or pumps fluid with every cycle
 - Simplex: only one piston
 - Reciprocating: moves backwards and forwards in a straight line (on a vertical axis)



<https://www.youtube.com/watch?v=AkFx7Ssmqpw>

Courtesy Prof S Kara (UNSW, 2017)

- Core engineering skills that you'll learn in this course:
 - **Theory**
 - Engineering drawing standards – AS1100
 - Process planning (eg. BOM, assembly chart, work method sheet)
 - Material considerations and selection
 - Design for high volume manufacturing
 - **Practical Skills**
 - Concept sketching
 - CAD – 2D/3D using Solidworks
 - Measuring, templating, cutting, turning, milling, drilling (TAFE)

Courtesy Prof S Kara (UNSW, 2017)

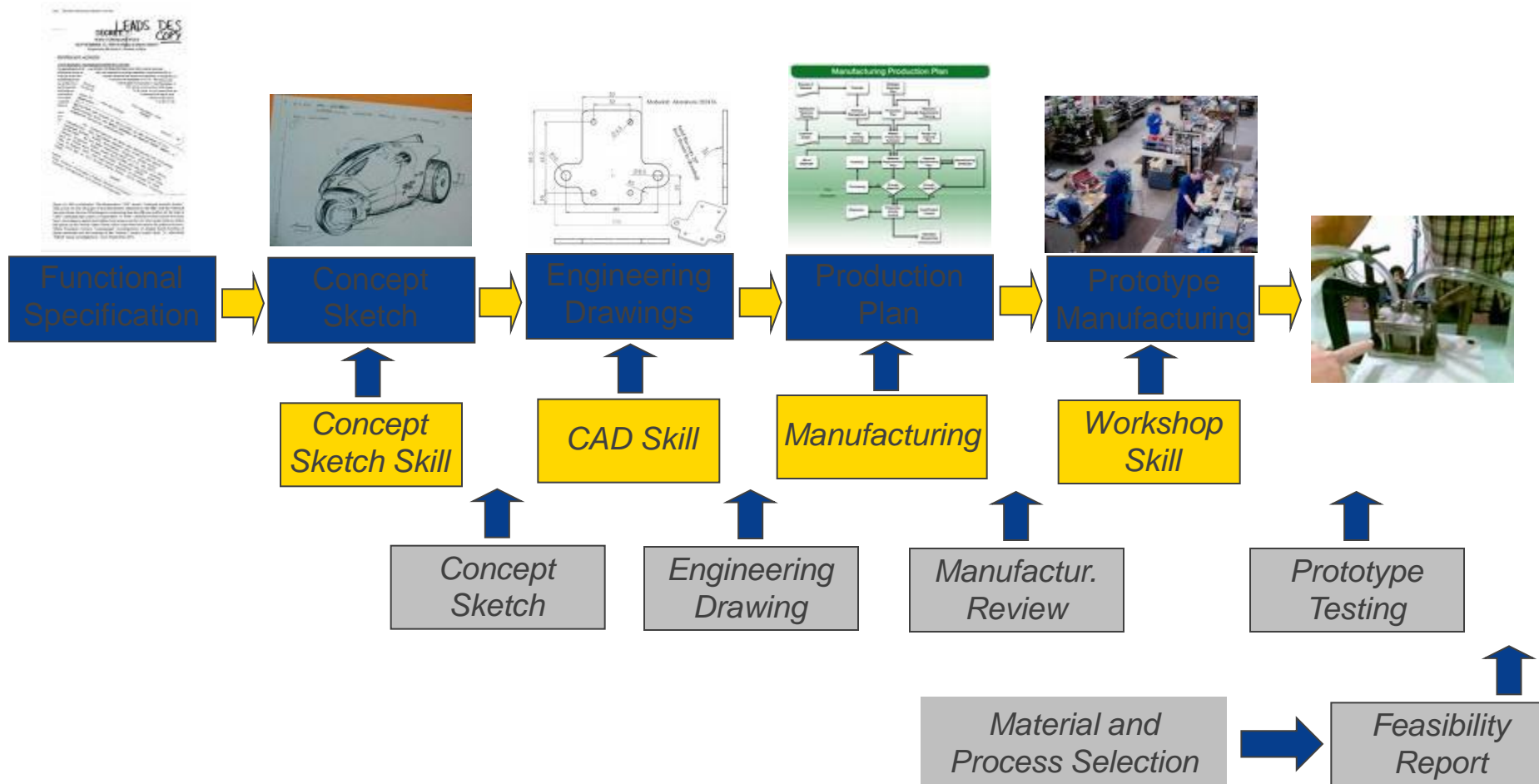
Australian Standard AS1100 via the university library SAI Global subscription:
<http://subjectguides.library.unsw.edu.au/engineering>

Go to Standards tab on right-hand side; Australian standards (via SAI Global).
Log in with zPass, search Australian Standard AS1100 *Technical drawing* in
several parts – ensure you access current version.

The screenshot displays the SAI Global search interface. At the top, there is a search bar containing the text '1100' and a 'Search' button. Below the search bar, there are radio buttons for 'Australian' (selected) and 'All', and a checkbox for 'With' (unchecked). A tooltip box is visible next to the 'With' checkbox, containing the text 'Limit your search to only Australian publications'. To the right of the search bar, there are links for 'Help' and 'Terms and conditions'. Below the search bar, there is a grid of logos for various standard organizations, including ISO, IEC, ETSI, nsai, JSA, AAMI, AFAM, ANSI, API, ARI, and others. The logos are arranged in a grid with labels 'search by »' and 'access level »' next to them.

MMAN2130 – Course Structure

- Entire course structured around your pump project:

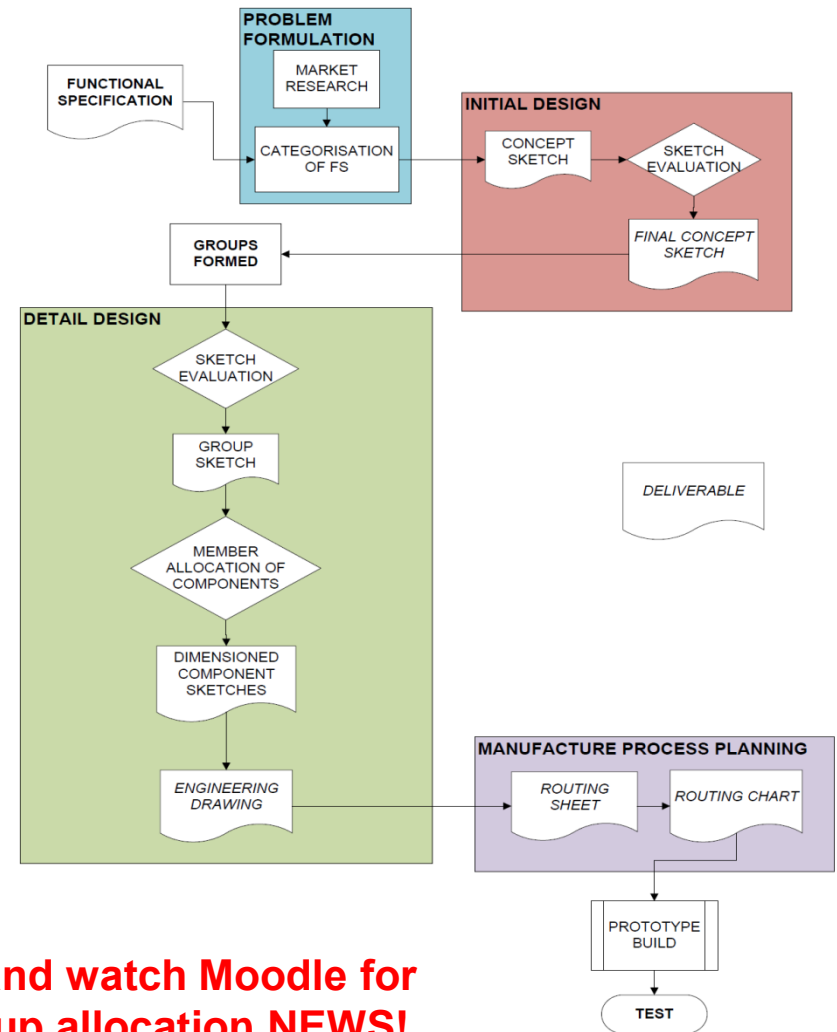


Courtesy Prof S Kara (UNSW, 2017)

FUNCTIONAL SPECIFICATION for the PP175 Vertical Displacement Pump

Pump requirement Specification v2.pdf

- Start researching how piston pumps work! What kind of valve will you use?



... and watch Moodle for group allocation NEWS!