UNIVERSITI SAINS MALAYSIA

QCU
QUALITY AND CORPORATE UNIT

SCHOOL OF MECHANICAL ENGINEERING

QUALITY & CORPORATE UNIT

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THE CONTENT

Directory of Expertise 1

Testing Service 6

Fabrication Service 12

Consultion/ Product Dev Service 15

Rental Service 18

Training Service 23

Directory of Expertise

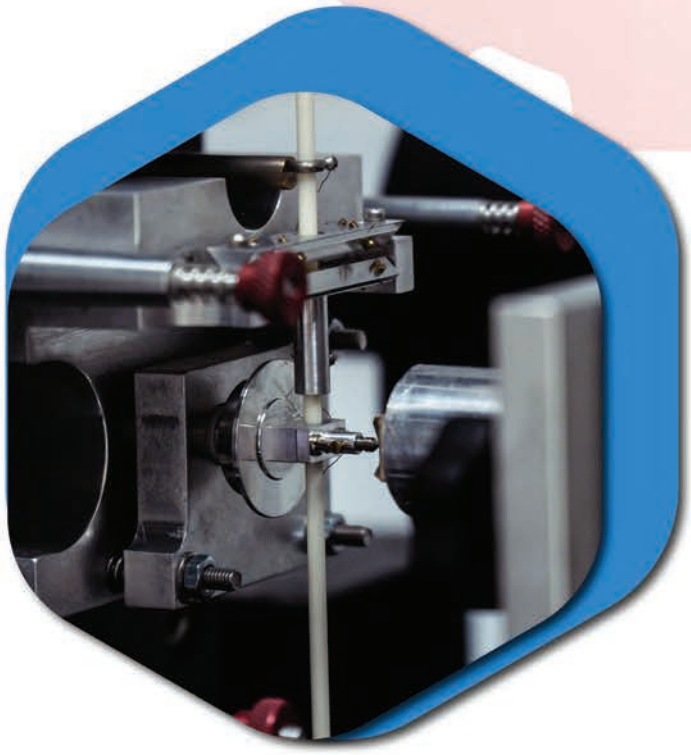
No	Name	Expertise	Email
1.	Dr. Abdul Haadi Abdul Manap	Molecular Dynamics, Nanofabrication, Nanolithography Technologies	abdulhaadi@usm.my
2.	Mr. Abdul Yamin Saad	Energy Systems, Power Plant Planning, Automotive Drive Cycle	meyamin@usm.my
3.	AP Dr. Abdullah Aziz Saad	Nonlinear Finite Element Analysis, Material Behaviour Modelling (Plasticity, Creep, Fatigue), Analysis of Electronic Packaging	azizsaad@usm.my
4.	AP Ir. Dr. Abdus Samad Mahmud	Functional Material, Shape Memory Alloy, Material Characterization, Fracture Mechanics, Coating	abdus@usm.my
5.	AP Ir. Dr. Ahmad Baharuddin Abdullah	Sheet Metal Forming, Tool and Die Design, Wire Arc Additive Manufacturing, Friction Stir Welding	mebaha@usm.my
6.	Dr. Ahmad Fikri Mustaffa	Turbomachinery, Fluid Dynamics, CFD	afikri@usm.my
7.	Dr. Ahmad Syazwan Ahmad Kamal	Nanophotonics, Plasmonics, Nanolasers, EM Waves Simulation, Nanofabrication	syazwanjuan@usm.my
8.	Dr. Ahmad Zhafran Ahmad Mazlan	Noise & Vibration, Active Vibration and Force Control, Piezoelectric Sensor and Actuator, Structural Dynamic Modification, Dynamic and Control Modelling and Simulation, Hand-arm Vibration	zhafran@usm.my
9.	Ir. Dr. Chan Keng Wai	Refrigeration & Air-Conditioning, Renewable energy, Thermodynamics, Heat Transfer, Sustainable Design	kengwai.chan@usm.my
10.	AP Ir. Dr. Chin Jeng Feng	Production Scheduling, Production Planning and Control, Lean Six Sigma, Artificial Intelligence, Computer Integrated Manufacturing	chinjengfeng@usm.my
11.	Ir. Dr. Feizal Yusof	Nonlinear Fracture Mechanics, Fatigue Crack Growth and Crack Closure, Finite Element Analysis, Digital Image Correlation, Computational Mechanics, Machine and System Design	mefeizal@usm.my

12.	Dr. Hasnida Ab Samat	Manufacturing System, Maintenance Management, Production Management, Project Management, Lean Six Sigma	hasnida@usm.my
13.	Dr. Inzarulfaisham Abd Rahim	Structural Optimization, Biomechanics, FEA, Noise and Vibration	inzarul@usm.my
14.	AP Dr. Jamaluddin Abdullah	3D Printing, Functional Material, Material Characterisation, Shape Memory Alloy (SMA), Solid State Synthesis of NiTi Alloys	mejamal@usm.my
15.	Dr. Khairil Faizi Mustafa	Internal Combustion Engines, Spraying Technology	mekhairil@usm.my
16.	AP Dr. Khairudin Mohamed	3Advanced Materials and Nanotechnology, Nanofabrication Technologies, Nanolithography Technologies, Nano-devices (MEMS/NEMS, Optical, Microfluidics, Solar Cells, SAW), Assembly & Test Manufacturing Technology for Electronic Components, Surface Mount Technology (SMT)	mekhairudin@usm.my
17.	Dr. Khaled Ali Mohammad Al-Attab	Renewable Energy, Environmental Studies, Biomass, Gasification and Pyrolysis, Biodiesel, Heat Transfer, Refrigeration & Conditioning, Heat Exchangers, Computational Fluid Dynamics (CFD), Directly and Externally Fired Micro Gas Turbines IC Engines, Stirling Engines	khaled@usm.my
18.	AP Dr. Loh Wei Ping	Data Mining, Mathematical Modelling, Applied Biomechanics	meloh@usm.my
19.	AP Dr. Mohamad Aizat Abas	Fluid-Structure Interaction (FSI), Finite Element Method, Finite Volume Method, Lattice Boltzmann Method, Electronic Packaging, Artery Bifurcation Aneurysm Problems, Porous Medium Combustion	aizatabas@usm.my

20.	Dr. Mohamad Ikhwan Zaini Ridzwan	Stress Analysis, Finite Element Analysis, Orthopaedic Related Hip Joint Biomechanics, Implants and Bone, Computer-Aided Design (CAD), Computer-Aided Engineering (CAE) and Computer-Aided, Reverse Engineering (CARE)	mikhwanr@usm.my
21.	AP Dr. Mohamad Yusof Idroas	Emulsified and Hybrid Biofuel Studies, Biomass Torrefaction and Briquetting, Internal Combustion Engine, Stirling Cycle Engine	meyusof@usm.my
22.	Ir. Dr. Mohd Azmi Ismail	Electronic Cooling, Anti-Icing, Spillway dam, Computational Fluid Dynamic (CFD), Heating, Ventilation and Air-Conditioning (HVAC), Smoke Control and Staircase Pressurisation System	azmi_meche@usm.my
23.	AP Dr. Mohd Salman Abu Mansor	Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), Computer Aided Process Planning (CAPP), Reverse Engineering (RE), Advanced Manufacturing Technology & Systems Management (AMTSM)	mesalman@usm.my
24.	AP Dr. Mohd Sharizal Abdul Aziz	Computational Fluid Dynamics (CFD), Fluid-Structure Interaction (FSI), Advanced Packaging & Surface Mount Technology (SMT), Thermofluids, Rehabilitation & Biomedical Engineering	msharizal@usm.my
25.	Dr. Mohd Syakirin Rusdi	Computational Fluid Dynamics (CFD), Advanced Packaging & Surface Mount Technology (SMT), Thermofluids	syakirin@usm.my
26.	Prof. Ir. Dr. Mohd. Zulkifly Bin Abdullah	Electronic Packaging in 3D Packaging and TSV, Advanced Electronic Cooling for High Heat Flux, Porous Medium Burner for Domestic Applications	mezul@usm.my
27.	Mr. Mohzani Mokhtar	Laser Material Processing, Advanced Manufacturing Processes, Industrial Engineering, Simulation of Manufacturing Operation	mohzani@usm.my

28.	Dr. Muhammad Fauzinizam Razali	Shape Memory Alloy, Finite Element Analysis, Material Characterisation, Biomechanics in Orthodontics, Composite Structures	mefauzinizam@usm.my
29.	Ts. Dr. Muhammad Hafiz Hassan	Advanced Composite Manufacturing, Advanced Composite Machining, Innovative Cutting Tools Design, Process Improvement & Optimization, Ballistic Application	mhafizhassan@usm.my
30.	Dr. Muhammad Iftishah Ramdan	Hydraulic Hybrid Vehicles (HHV), Power Split Architecture System Optimization, Dynamic Programming, Internal Combustion Engine, Automotive Engineering, Hybrid Vehicle System, Green Energy Optimization	shahramdan@usm.my
31.	Dr-ing. Muhammad Razi Abdul Rahman	Adaptive FEM, Modelling of Microsystems; Fast Iterative Solvers, RF MEMS	mearahman@usm.my
32.	Dr. Norwahida Yusoff	Fracture Mechanics, Finite Element Analysis/Modelling, Stress Analysis, Biomechanics	menorwahida@usm.my
33.	Dr. Norzalilah Mohamad Nor	Intelligent Control, Mechanism of Robot, Mathematical Modelling	norzalilah@usm.my
34.	Dr. Nur Amalina Muhammad	Manufacturing System, Lean Six Sigma, Production Management, Knowledge Management	nuramalinamuhammad @usm.my
35.	Dr. Nur Hidayah Mansor	Computational Electromagnetics, Finite Element Analysis, Design and Optimization Procedure	menurhidayah@usm.my
36	Dr. Nurul Farhana Mohd Yusof	Tribology, Surface Wear and Friction, Finite Element Analysis of Surface Contact, Rolling Element Bearing Vibration and Condition Monitoring	mefarhana@usm.my
37.	Dr. Ooi Lu Ean	Noise & Vibration, Vibration Isolation and Analysis, Damping Measurement Rubber Characterization and Testing, Optimization and Design	ooiluean@usm.my

38.	Dr. Ramdziah Md. Nasir	Tribology of Engineering and Biomedical Materials, Raman Spectroscopy, Manufacturing Engineering Materials	ramdziah@usm.my
39.	Dr. Sareh Aiman Hilmi Abu Seman	Finite Element Analysis, Multi-scale Modelling, Material Characterization, Composite Structures, Impact Mechanics of Materials	sarehaiman@usm.my
40.	Dr. Siti Sarah Kamaludin	Mechanics of Material, Numerical Method	sarahkamaludin@usm.my
41.	AP Dr. Teoh Yew Heng	Combustion & Fuel Engineering, Biofuels, Automotive, Internal Combustion Engines, Control Systems Engineering	yewhengteoh@usm.my
42.	Ir. Dr. Yen Kin Sam	Machine Vision, Pattern Recognition	meyks@usm.my
43.	Dr. Yu Kok Hwa	Microfluidics, Superhydrophobic Surface, Turbulent Flow, Flow Stability, Heat Transfer, HVAC	yukokhwa@usm.my
44.	Prof. Dr. Zaidi Mohd Ripin	Noise & Vibration, Finite Element Analysis, Design for Modularity, Rubber Seal Technologies, Thermal Stress Analysis & Reliability, Analysis for Electronic Packaging	mezaidi@usm.my



01 | Testing Service

No	Testing	Equipment / Method	Price (RM) Without SST / Per sample
1. Mill, Lathe & Welding (Workshop)			
-	NA	-	-
2. Engineering Material Lab (SM 0.07)			
1	Hardness Test	Rockwell & Vickers Hardness Testing Machine	150.00/ sample (5 points)
2	Microhardness Test	Shimadzu Microhardness Tester	150.00/ sample (5 points)
3. Heat Transfer Lab (SM 0.10)			
1	Bom Calorimeter Test	Bom Calorimeter	150.00/ sample
4. Energy Conversion Lab (SM 0.15)			
1	Material Moisture Analysis	Moisture Analyzer	350.00/ sample
5. Engine Lab (SM 0.19)			
1	Engine Performance Test	Type of engine testing: 1. Performance test 2. Constant speed, varying load 3. Constant load, varying speed Engine Power: - Single Cylinder, Diesel Direct fuel injection, pump-line-nozzle, rated power 4.5kW @3000 rpm. - Multi Cylinder, limited to 130 kW of power	900.00/ fuel sample for single cylinder engine test 1800.00/ fuel sample for multi cylinder engine test
2	Emissions Test	- Autocheck 5-gas analyser (i.e., CO2, CO, HC, NOx, O2) for exhaust gas measurement - Autocheck smoke analyser	800.00/ fuel sample

6. Applied Mechanics Lab (SM 0.25)			
1	UTM Instron 3367 Capacity = 30 kN Min speed = 0.005 mm/min Max speed = 500 mm/min Vert. test space = 1193 mm	Method: 1. Tension 2. Compression 3. Bending	200.00/ sample
2	UTM Instron 8874 Force Capacity +/-25kN Torque Capacity +/-100 Nm Max cyclic – 100 Hz Vert. plunger stroke & angle = 100 mm & +/-130° Vert. test space = 1051 mm	Method: 1. Tension - cyclic 2. Compression - cyclic 3. Torsion – cyclic 4. Combined tension-compression- torsion- cyclic	500.00/ sample
3	Tabletop Torsion Test	Torsion	200.00/ sample
4	Beam Test	Bending	200.00/ sample
5	Creep Test	Creep	200.00/ sample
6	Charpy Test	Impact	200.00/ sample
7	Split Hopkinson pressure bar – Compression	Impact	200.00/ sample
8	Split Hopkinson pressure bar - tension	Impact	200.00/ sample
9	Crack mouth opening displacement (CMOD) gauge following ASTM E399	Fracture	200.00/ sample
10	Strain Gauge Measurement Machine	Strain	200.00/ sample
11	Dewesoft Data Acquisition system (Dewe-43A USB)	Various sensors e.g. -Strain sensor -Digital sensor -Impact sensor	200.00/ sample

7. Reverse Engineering Lab (SM 0.33)			
-	NA	-	-
8. Vibration Lab (SM 0.48)			
1	Vibration Testing: - Experimental Modal Analysis (EMA) - Time and Spectral (3-axis, Uni-axis) - Operational Deflection Shapes (ODS) - Hand-arm Vibration - Rotating Unbalanced - Self-excitation	- LMS SCADAS and Software - iMC Device and Software - Vibration Meter - SCHENCK Smart Balancer - Shaker (X-Y axis, Uni-axis)	300.00/ sample
2	Noise/Sound Testing: - Sound Absorption & Transmission Loss - Sound Pressure Level (SPL) - Sound Intensity and Mapping	- Impedance Tube System - Microphone (GRAS, BSWA) - Dome - Microflown - Anechoic Box	300.00/ sample
3	Force Measurement (3-axis, Uni-axis)	Static and Dynamic Load Cell	300.00/ sample
4	Moment Measurement	Dynamic Load Cell	300.00/ sample
5	Order Analysis	LMS SCADAS and Software	300.00/ sample
6	Rubber Characterization	LMS SCADAS and Software	300.00/ sample
7	Structural Dynamic Modification (SDM) Analysis	LMS SCADAS and Software	300.00/ sample
9. Fabrication and CNC Machining (SM 0.53)			
-	NA	-	-
10. Metrology and Precision Engineering Lab (SM 0.57)			
1	Surface Roughness Testing	SURFTEST SV-3100	150.00/ sample
2	Dimension Measurement	Crysta-Plus M443 Coordinate Measuring Machine (CMM)	200.00/ sample
3	Roundness Test	Surfcom130A	200.00/ sample

11. Electronic Packaging Lab - SMT (SM 0.62)			
1	Solder Composite Test	Reflow soldering	500.00/ sample
2	Solder Printing	Solder printer	500.00/ sample
12. Nanofabrication and Advanced Functional Material Lab (SM 1.01)			
1	Differential Scanning Calorimetry (DSC)	DSC used for measuring melting temperature, glass transition and phase transformation temperature and enthalpy. Temperature range is -200C to 400C.	200.00/ sample
2	Thermogravimetry Analysis (TGA)	TGA used to determine material thermal stability and its fraction of volatile components by measuring the weight change during heating at controlled rate.	200.00/ sample
3	Tube Vacuum Furnace	Heat treatment test with 1000c to 1500c max capacity.	200.00/ sample subjected to test condition requirement (heating rate etc)
13. Microscopy and Micro Analysis Lab (SM 1.06C)			
1	Pin on Disk Wear Test	Ducom Rotary Tribometer	300.00/ sample
2	Four Ball Tester	Ducom's Four Ball Tester	300.00/ sample
3	Scratch Test	NanoTest Vantage System	400.00/ sample
4	Nano Indentation	NanoTest Vantage System	400.00/ sample
5	Impact Test	NanoTest Vantage System	400.00/ sample
6	Energy-dispersive X-ray Spectroscopy (EDX Analysis)	Scanning Electron Microscope (SEM)	350.00/ sample
7	Morphology and Microstructure Analysis	Scanning Electron Microscope (SEM)	300.00/ sample
8	Area, volume & Roughness Measurement	Alicona IFM – Optical 3-D Surface Metrology	100.00/ sample

14. Automation Lab (SM 1.28)			
-	NA	-	-
15. Measurement and Instrumentation Lab (SM 1.30C)			
-	NA	-	-
16. Robotic Lab (SM 1.34)			
-	NA	-	-
17. Biomotion Capture Lab (SM 3.39)			
-	NA	-	-
18. Bio-Energy Lab (SM BE)			
1	Syngas Determination	Gas Chromatograph	150.00/ sample
2	Carbonization Sampling	Tube Furnace [1000 C max]	200.00/ min/ sample subjected to test condition requirement [heating rate etc.]
3	Moisture Content Testing	Oven [200 C max]	100.00/ min/ sample subjected to test condition requirement [different test material, heating duration etc.]
4	Proximate Analysis	Thermal Gravimetric Analyzer (TGA)	150.00/ min/ sample subjected to test condition requirement.

19. CAD and High-Performance Computer (HPC) Lab (SM 1.06)			
-	NA	-	-
20. Forging Lab (SM FC)			
1	Forming Limit Diagram (FLD) Note: including sample preparation	Dome Test	500.00/ sample
2	Twist forming	Torsion Machine	150.00/ sample
21. School Facilities			
-	NA	-	-

02 Fabrication Service

No	Fabrication	Equipment / Method	Price (RM) Without SST / Per sample
1. Mill, Lathe & Welding (Workshop)			
1	Lathe	Harrison 600, Model M300. Over Bed 330mm, 3kW, 40-2500 rpm	150.00/ hour
2	Mill	Fexac, Model Up. Table (mm) 1100 x 240, 3kW, 48-1500 rpm	150.00/ hour
3	Gas Welding	15 stations, portable sets and fixed with direct gases supply.	150.00/ hour
4	MIG/TIG Welding	Migweld 280E. 415V 3-phase, 50-280Amps.	150.00/ hour
5	Laser Welding	Model Lanlyn HW 1500. Laser power 2000 W, laser wavelength 1070 nm, operating power adjustable.	200.00/ hour
2. Engineering Material Lab (SM 0.07)			
-	NA	-	-
3. Heat Transfer Lab (SM 0.10)			
-	NA	-	-
4. Energy Conversion Lab (SM 0.15)			
-	NA	-	-
5. Engine Lab (SM 0.19)			
-	NA	-	-
6. Applied Mechanics Lab (SM 0.25)			
-	NA	-	-
7. Reverse Engineering Lab (SM 0.33)			
-	NA	-	-
8. Vibration Lab (SM 0.48)			
1	3D Printing	3D Printer (CreatBot, Ender) – 2 stations	50.00/ hour

9. Fabrication and CNC Machining (SM 0.53)			
1	3D Scanning	3D Scanner	200.00/ hour + depends on part size and shape.
2	5-Axis CNC Machining	5-Axis CNC Machine	150.00/ hour + setup or programming charges if applicable.
10. Metrology and Precision Engineering Lab (SM 0.57)			
-	NA	-	-
11. Electronic Packaging Lab - SMT (SM 0.62)			
-	NA	-	-
12. Nanofabrication and Advanced Functional Material Lab (SM 1.01)			
-	NA	-	-
13. Microscopy and Micro Analysis Lab (SM 1.06C)			
-	NA	-	-
14. Automation Lab (SM 1.28)			
1	3D Printing	3D Printer (Ender) – 2 stations	50.00/ hour
15. Measurement and Instrumentation Lab (SM 1.30C)			
-	NA	-	-
16. Robotic Lab (SM 1.34)			
1	3D Printing	3D Printer (CreatBot, Ender) – 6 stations	50.00/ hour
2	Automation Welding	Kuka Robot	150.00/ hour
17. Biomotion Capture Lab (SM 3.39)			
-	NA	-	-

18. Bio-Energy Lab (SM BE)			
1	Fabrication Services related to Biomass Energy Equipment, Rigs, and Apparatuses.	- Gasifier - Torrefier - Carbonizer - Combustor - Water Scrubber - Biomass Burner - Biogas Engine - Briquetting and Pelletizing machines	Based on customer requirement
19. CAD and High-Performance Computer (HPC) (SM 1.06)			
-	NA	-	-
20. Forging Lab (SM FC)			
1	Metal Marking	Electro-chemical Etching	50.00/ sample
21. School Facilities			
-	NA	-	-

0 3 | Consultation / Product Development Service

No	Consultation / Product	Function	Price (RM) Without SST / Per unit
1. Mill, Lathe & Welding (Workshop)			
1	Design and Fabrication of Metal related Equipment and Tools	Fabrication of equipment or tool, designed according to customer requirement that can involve cutting, machining, shaping, threading, welding, and assembly. Spacious space for assembly and test.	Based on customer requirement
2. Engineering Material Lab (SM 0.07)			
-	NA	-	-
3. Heat Transfer Lab (SM 0.10)			
1	CFD simulation for Heating, Ventilation and Air Conditioning	Consultation services	Based on customer requirement
2	Ventilation for Agriculture	Consultation services	Based on customer requirement
3	CFD simulation for smoke control system and staircase pressurisation for fire safety	Consultation services	Based on customer requirement
4. Energy Conversion Lab (SM 0.15)			
-	NA	-	-
5. Engine Lab (SM 0.19)			
-	NA	-	-
6. Applied Mechanics Lab (SM 0.25)			
1	Fracture Toughness Testing following ASTM E1820	Characterize fracture toughness of materials	1000.00/ sample
2	Digital Image Correlation Testing	Characterize material behaviour	500.00/ sample

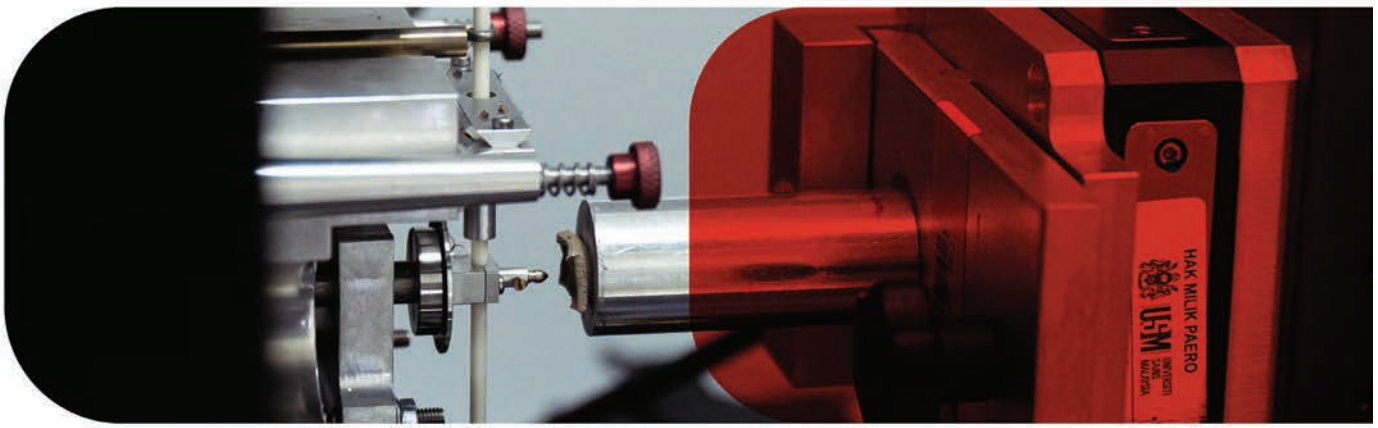
7. Reverse Engineering Lab (SM 0.33)			
1	Reverse Engineering & Computer Aided Design	Reverse engineering of parts using 3D design software	Based on customer requirement. 300.00/ hour
8. Vibration Lab (SM 0.48)			
1	Universal Adaptor for Grass Trimmer	Reduce hand-arm vibration during operation	35.00/ part
9. Fabrication and CNC Machining (SM 0.53)			
1	Computer Aided Design (Solid Modelling)	Design of parts using 3D design software	Based on customer requirement. 300.00/ hour
2	Fabrication of Components	CNC machine, Wire Cut, 3D printing	Based on customer requirement. 300.00/ hour
10. Metrology and Precision Engineering Lab (SM 0.57)			
-	NA	-	-
11. Electronic Packaging Lab - SMT (SM 0.62)			
1	Computational Mechanics (Fluid & Solid)	Fluid and Structure computational simulation	Based on customer requirement.
2	Heat transfer & Thermal Analysis	Thermal - Fluid Structure Interaction using computational method	Based on customer requirement.
3	Thermal Mechanical Management	Heat management and product Cooling performance for Printed Circuit (PCB) and electronics components. (Experiment & Simulation)	Based on customer requirement.
12. Nanofabrication and Advanced Functional Material Lab (SM 1.01)			
-	NA	-	-
13. Microscopy and Micro Analysis Lab (SM 1.06C)			
-	NA	-	-
14. Automation Lab (SM 1.28)			
-	NA	-	-

15. Measurement and Instrumentation Lab (SM 1.30C)			
-	NA	-	-
16. Robotic Lab (SM 1.34)			
1	IoT Monitoring System	To monitor environmental condition using IoT system (Eg: Temperature, Humidity, Vibration, Noise, Pressure etc.)	Based on customer requirement.
17. Biomotion Capture Lab (SM 3.39)			
1	Data Management-Qualitative/quantitative	Planning of experiments, questionnaire design, qualitative or quantitative data collection management	Based on customer requirement.
2	Mathematical Modelling Analysis	Predictive data modelling, estimation, and forecasting	
3	Statistical Data Analysis	Statistics techniques	
4	Data Mining and Knowledge Discovery Analysis	Data preparation, transformation, analysis & interpretation	
18. Bio-Energy Lab (SM BE)			
1	Consultation Services related to Biomass Energy Equipment and Product Development	Consultant from the aspect of design, specification, and testing.	Based on customer requirement.
19. CAD and High-Performance Computer (HPC) (SM 1.06)			
-	NA	-	-
20. Forging Lab (SM FC)			
-	NA	-	-
21. School Facilities			
-	NA	-	-

No	Space / Equipment	Capacity / Function	Price (RM) Without SST / Per unit
1. Mill, Lathe & Welding (Workshop)			
1	Forklift (Inclusive driver with license)	Toyota, Model 30. Capacity 3 tonne	500.00/ day
2. Engineering Material Lab (SM 0.07)			
-	NA	-	-
3. Heat Transfer Lab (SM 0.10)			
-	NA	-	-
4. Energy Conversion Lab (SM 0.15)			
-	NA	-	-
5. Engine Lab (SM 0.19)			
-	NA	-	-
6. Applied Mechanics Lab (SM 0.25)			
1	ABAQUS Research license multi-physics software	25 tokens (5 licenses)	5000.00/ project
2	Lenses (Various)	Conduct macro-imaging	50.00/ unit
3	Lighting (Guided)	Support materials testing	50.00/ unit
4	Travelling Microscope	Support materials testing	50.00/ unit
5	Wire and Cables Tension and Bending Testing fixtures following ASTM E8 standard	Tension and bending	200.00/ sample
7. Reverse Engineering Lab (SM 0.33)			
-	NA	-	-
8. Vibration Lab (SM 0.48)			
-	NA	-	-
9. Fabrication and CNC Machining (SM 0.53)			
-	NA	-	-
10. Metrology and Precision Engineering Lab (SM 0.57)			
-	NA	-	-

11. Electronic Packaging Lab - SMT (SM 0.62)			
-	NA	-	-
12. Nanofabrication and Advanced Functional Material Lab (SM 1.01)			
-	NA	-	-
13. Microscopy and Micro Analysis Lab (SM 1.06C)			
-	NA	-	-
14. Automation Lab (SM 1.28)			
-	NA	-	-
15. Measurement and Instrumentation Lab (SM 1.30C)			
1	Arduino (80 pcs) and Raspberry Pi (10 pcs) kits, Oscilloscope (10 pcs), DC Power Supply (15 pcs), Digital Multimeter (20 pcs), Agilent DAQ version 8.5 (15 pcs, Computer with Window XP (15 pcs) Can accommodate a training up to 15 pax, SENSOR (PIR, Touch, Accelerometer, PH, Flame, Moisture, Ultrasonic, Current, Gas, Flowmeter, Sound, Water, IR) - Tables and chairs (30 pcs)	Training	Based on customer requirement.
16. Robotic Lab (SM 1.34)			
-	NA	-	-
17. Biomotion Capture Lab (SM 3.39)			
-	NA	-	-
18. Bio-Energy Lab (SM BE)			
1	PERKIN Genset	Capacity 20 kW / Electrical power generation	250.00 per day (excluding transportation)

19. CAD and High-Performance Computer (HPC) (SM 1.06)			
1	Rental for High Performance Computing (HPC)	HPC License charges (Hourly rate) - 16 Cores (2 x 8 Cores Intel® Xeon® E5-2670, 64 GB RAM 12 Cores (2 x 6 Cores Intel® Xeon® E5-2620, 64 GB RAM	**0.60 per core/ hour** 38.40 (rent for 4h, 16 cores)
		HPC License charges (Hourly rate) - 40 cores (4 × 10 Cores Intel Xeon Silver 4210R 2.4G, 10C/20T, 9.6GT/s, 13.75M Cache, Turbo), 64 GB RAM RDIMM, 3200MT/s, Dual Rank	72.00 (rent for 3h, 40 cores)
		HPC License charges (Daily rate) (Includes Full Version of Ansys Commercial Parallel – 64 cores license)	192.00 (rent for 24h, 16 cores)



2	Rental for ANSYS	ANSYS Commercial License Rental 1. Engineering simulation solvers based on the commercial ANSYS CFD (Flow Simulation), Mechanical (Structural Simulation), HFSS and Maxwell Products (High & Low Frequency Electromagnetic) 2. Concurrent Usage: 5 tasks for CFD and Mechanical, 1 task each for low-frequency and high-frequency electromagnetics 3. Includes shared access to SpaceClaim, DesignModeler, DesignXplorer, Meshing, Turbo Tools, EnSight, Optimetrics and Simplorer 4. Up to sixteen CPU cores parallel processing supported per task (can go 64 cores if combine 4 licenses) - Manuals provided online in compiled HTML and PDF formats (softcopy)	3,000.00/ month @ 120.00/ day

20. Forging Lab (SM FC)			
-	NA	-	-
21. School Facilities			
1	Lecture Hall: - MEK 1, 2	Up to 100 pax / Lecture or Event	200.00/ day
	- MET 1, 2, 3, 4	Up to 30 pax / Lecture or Training	50.00/ day
2	CAD/Computer Lab	Up to 100 pax / Lecture or Training	300.00/ day
3	Conference Room	Up to 40 pax / Meeting	100.00/ day
4	Drawing/Exam Hall	Up to 200 pax / Lecture or Exam	250.00/ day
5	Seminar Room	Up to 40 pax / Lecture or Training	100.00/ day
6	Interactive Room (MEK 3)	Up to 30 pax / Lecture or Training	100.00/ day
7	Banquet Room	Up to 40 pax / Lecture or Training	50.00/ day
8	Viva Room	Up to 10 pax / Meeting	50.00/ day
9	QCU Meeting Room	Up to 15 pax / Meeting	50.00/ day
10	Studio Room	Video Recording	100.00/ day

05 | Training Service

No	Title	Method / Duration	Price (RM) Without SST / Per training
1. Mill, Lathe & Welding (Workshop)			
-	NA	-	-
2. Engineering Material Lab (SM 0.07)			
1	Surface Hardness Measurement and Data Analysis	Introduction to several methods of hardness measurement i.e., conventional, micro, and nano-indentation testing. – 1 day	1,000.00/ pax/ day
3. Heat Transfer Lab (SM 0.10)			
-	NA	-	-
4. Energy Conversion Lab (SM 0.15)			
-	NA	-	-
5. Engine Lab (SM 0.19)			
-	NA	-	-
6. Applied Mechanics Lab (SM 0.25)			
1	Introduction to ABAQUS	Workshop	700.00/ pax/ day
2	Advance ABAQUS	Workshop	700.00/ pax/ day
3	Basic to Advance ANSYS	Workshop	700.00/ pax/ day
4	Fortran	Workshop	700.00/ pax/ day
5	MATLAB	Workshop	700.00/ pax/ day
7. Reverse Engineering Lab (SM 0.33)			
-	NA	-	-

8. Vibration Lab (SM 0.48)			
1	Vibration Measurement and Data Analysis	Introduction to several methods for vibration measurement, instrumentation, and data analysis – 2 days	1,300.00/ pax/ day
2	Noise/Sound Measurement and Data Analysis	Introduction to several methods for noise/sound measurement, instrumentation, and data analysis – 2 days	1,300.00/ pax/ day
3	Rubber Characterization Method	Introduction to rubber characterization method and data analysis – 2 days	1,300.00/ pax/ day
4	Structural Vibration Control using AVC Method	Introduction to AVC method, instrumentation, and data analysis – 1 day	1,300.00/ pax/ day
9. Fabrication and CNC Machining (SM 0.53)			
1	5-Axis CNC Machining	CNC programming and machining of parts - 2 Days	1,200.00/ pax/ day
2	CNC Wire-Cut Machining	CNC Wire-cut operation - 2 Days	1,200.00/ pax/ day
3	3D Printing Operation	Object 3D printing Operation - 1 Day	1,200.00/ pax/ day
10. Metrology and Precision Engineering Lab (SM 0.57)			
1	Basic introduction on geometric dimensioning and tolerancing	Able to know what criteria is of evaluating a shaft/part after machining process. Able to perform and use all the facilities that has in this lab.	1,500.00/ pax/ day

11. Electronic Packaging Lab - SMT (SM 0.62)			
1	Computational Fluid Dynamics (CFD) Short Course	Introduction to CFD, Theory and workshop - 4 days	1,000.00/ pax/ day
2	Short Course on Surface Mount Technology (SMT) & Fluid-Structure Interaction (FSI)	Thermal Analysis, Introduction to FSI, theory and workshop - 4 days	1,000.00/ pax/ day
3	Introduction to Molecular Dynamics Simulation	Introduction to Linux and workshop using LAMMPS software - 2 days	750.00/ pax/ day
12. Nanofabrication and Advanced Functional Material Lab (SM 1.01)			
1	DSC training	Differential scanning calorimetry is a thermoanalytical method in which the difference in the amount of heat required to increase the temperature of a sample and reference is measured as a function of temperature. Both the sample and reference are maintained at nearly the same temperature throughout the experiment. It analyses and enable the measurement of the transition such as a glass transition, melting and crystallisation. It can also be used to identify the contaminants and the solvent in the thermal analysis as the shifting in the melting temperature signal.	800.00/ pax/ day

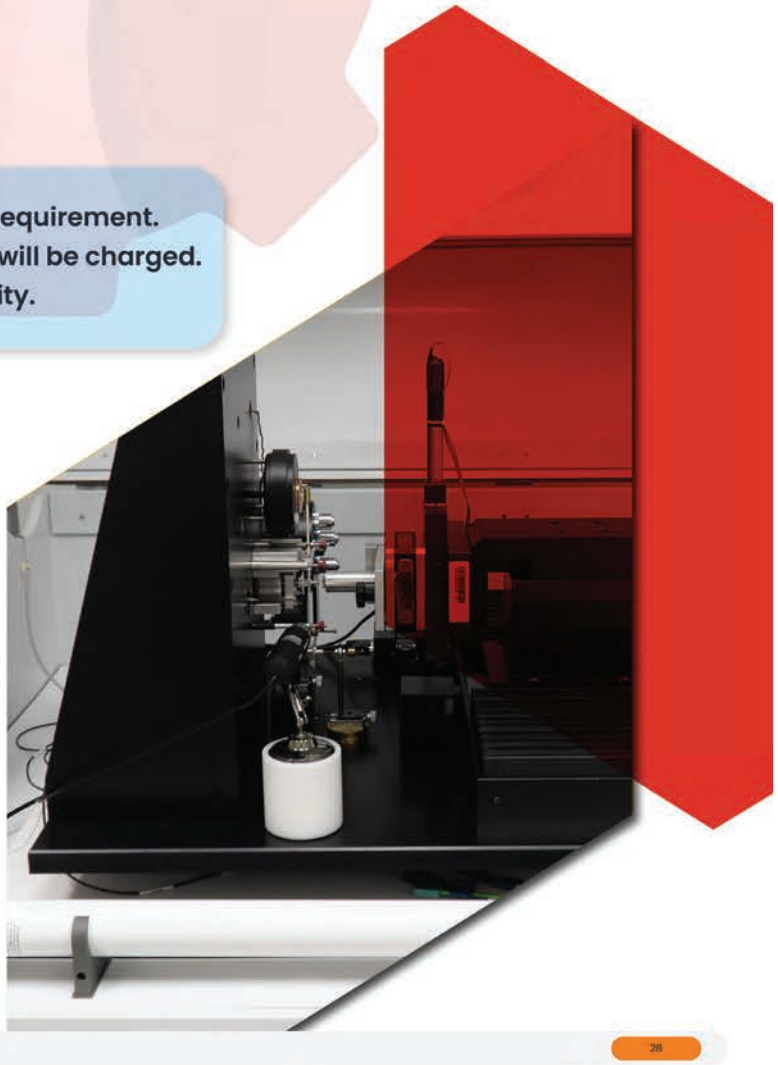
2	TGA training	BASED ON ASTM E1131, Thermogravimetric (TGA) analysis provides determination of endotherms, exotherms, weight loss on heating, cooling, and more. Materials analyzed by TGA include polymers, plastics, composites, laminates, adhesives, food, coatings, pharmaceuticals, organic materials, rubber, petroleum, chemicals and biological samples. TGA uses heat to force reactions and physical changes in materials. TGA provides quantitative measurement of mass change in materials associated with transition and thermal degradation. TGA records change in mass from dehydration, decomposition, and oxidation of a sample with time and temperature. Characteristic thermogravimetric curves are given for specific materials and chemical compounds due to unique sequence from physicochemical reactions occurring over specific temperature ranges and heating rates. These unique characteristics are related to the molecular structure of the sample.	800.00/ pax/ day
3	Training Tube Vacuum Furnace	The training on the usage of tube vacuum furnace during heat treatment to acquire heat and energy dissipated during heating.	1,000.00/ pax/ day
13. Microscopy and Micro Analysis Lab (SM 1.06C)			
1	Basic understanding on NanoTest- Beginner	Able to know any function of NanoTest (e.g., Nano Indentation, Nano Scratch, Nano impact and Wear Test)	1,000.00/ pax/ day

14. Automation Lab (SM 1.28)			
-	NA	-	-
15. Measurement and Instrumentation Lab (SM 1.30C)			
1	Introductory training for measurement / instrumentation using low-cost hardware and sensors.	Will depends on instructors' module	1,000.00/ pax/ day
16. Robotic Lab (SM 1.34)			
1	Kuka Robot Training	Basic operation on Kuka Robot (Welding / Pick and Place) – 2 days	1,300.00/ pax/ day
2	Introduction to PLC System	Basic operation of cylinder and motor using PLC system – 2 days	1,300.00/ pax/ day
17. Biomotion Capture Lab (SM 3.39)			
1	Statistics Analysis with SPSS Workshop	1 day (7 hrs) - Online	300.00/ pax
2	Data Mining Fundamentals Workshop	1.5 day (10 hrs) - Online	500.00/ pax
3	Mathematics Motivation Workshop	1 day (6 hrs) - Online	200.00/ pax
4	Business Statistics Workshop	2 days (14 hrs) - Online	1000.00/ pax
5	Digital Safety and Appropriate Use of Technology Workshop	2 days (14 hrs) - Online	1000.00/ pax

18. Bio-Energy Lab (SM BE)			
1	Training on Biomass Gasification System	Physical Training - 3 days	300.00/ pax
19. CAD and High-Performance Computer (HPC) (SM 1.06)			
1	ANSYS Training (Daily)	Fluid-Structure Interaction Module (6 hours) - (RM 250/ hour)	1500.00/ pax
20. Forging Lab (SM FC)			
-	NA	-	-
21. School Facilities			
-	NA	-	-

Notes:

- All prices subjected to change based on client requirement.
- For urgent results (within 3 days), double price will be charged.
- All services depend on the instrument availability.



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