Suggestions for equipment to support delivery of units in the

9209 Level 4 and 5 qualifications for Mechanical Engineering

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Comment

The major emphasis in the qualifications is the provision of a sound understanding of the relevant engineering science and mathematical theory required for the unit topics. Where feasible, it is desirable that this is supported with laboratory equipment that enables learners to apply the theory in laboratory settings to demonstrate and reinforce their understanding of the subject matter. Experimental activity with the equipment will also give learners the opportunity to develop and apply practical skills that are relevant to the practice of engineering and to the needs of industry. However, in order to do this properly it will be necessary to increase the hours available in the unit to accommodate the additional practical activities. As an example, in most universities, a single laboratory test would require a period of at least three hours for experimentation and report preparation. In some units, several such tests may be necessary. This should be borne in mind when deciding to include practical work in a unit. Since the experimental work is primarily intended to support the teaching programme, the learning outcomes are unlikely to need much changing. However, the aims of the unit should be revised to reflect the additional practical content.

Unit	Level	Equipment	Comment
401	4	Computers	Provide access to a mathematical software package such as Derive, Mathcad, Matlab or Maple
403	4	None	
404	4	None	
405	4	None	
406	4	Computers	Provide access to a statistical software package such as Minitab, SAS, SPSS, Excel
407	4	Computers	Provide access to a modern 3D CAD software package
418	4	None	
419	4	Computers	Provide access to a 2D CAD software package
421	4	None	
422	4	None	
423	4	None	
424	4	None	
425	4	None	
426	4	None	
427	4	None	
428	4	None	
429	4	Equipment to evaluate stress and strain and the deflection of beams	Simple tensile, torsion and bending tests

430	4	Equipment to evaluate steady incompressible flow in a pipe, and steady compressible flow in a nozzle	Simple tests to show viscous and compressible flow effects
431	4	None	
432	4	Equipment to evaluate mechanical strength, hardness and toughness of a material	Simple tests on material samples following heat treatment
433	4	CNC machining centre	To enable receipt of machining data from a CAD system and implement and edit a CNC program
434	4	Industrial robot system	Should be capable of manual programming and implementing the program for a simple task
435	4	Computers	Provide access to a statistical software package offering statistical process control capability
436	4	None	
437	4	None	
438	4	None	
503	5	Project specific	This unit should be an applications-based project with the learner given hands-on control of the project activities
504	5	Computers	Provide access to project management software
505	5	Table-top equipment for experimentation with measurement and control systems	To support developing skills with measurement systems and control system design
513	5	Computers	Provide access to mathematical software package such as Matlab, Mathcad, Maple
514	5	Equipment to enable evaluating the performance of a pump and fan	For experimental determination of the performance of incompressible and compressible fluid flow systems
515	5	Equipment to evaluate the performance of an I.C. engine, refrigeration system and/or a reciprocating compressor	To enable experimental determination of the performance of power producing and power-absorbing systems
516	5	Computers; equipment to enable determination of stress and deflection in simple components and structures when subjected to complex loading	Provide access to finite element analysis software to enable experimental verification of the predictions of elastic theory

517	5	Equipment to enable preparation and metallurgical examination of metal specimens subjected to thermo-mechanical treatments	Allows learners to verify the effects thermo-mechanical treatments and surface hardening treatments
518	5	Equipment to display and correct the effects of out of balance rotating masses	To enable learners to verify the theory of rotating balancing
519	5	Computers	Provide access to a 3D CAD software package for creating 3D models. Provide access to a finite element analysis software package to enable analysis of 3D models