## Matlab worksheets for Electrical Machines

### Marketing description

This work book takes students through the use of Matlab for controlling industrial systems – in this case based on a DC motor and variable resistance dynamometer.

The workbook is split into three sections:

1. In the first section students are given basic Matlab programmes that experiment with DC motor drives. Students are tasked with understanding the Matlab programme and making modest alterations to the programmes.
2. In the second section students are asked to look at a Mathematical model for the DC motor/Dynamometer and to explore the differences between the model and the actual results with regards to speed/torque and PID characteristics and to alter the parameters and observe the effects.
3. In the last section students are tasked with constructing their own Matlab/Simulink models of the system using the data they have gathered.

A full suite of Matlab compatible API calls is available which allows the Matrix Electrical Machines unit and dynamometer to be used with Matlab whilst working on this workbook.

### Learning objectives / experiments

* Control of motor systems
* Matlab programming
* Constructing models in Matlab
* PID characteristics (based on motor velocity)

### What is going on here?

We have the Electrical Machines hardware and software. A Matlab API programme has been written for the hardware. I believe that all is needed is for the documentation to be brought together.

A key focus for us is Unit 45 of the BTEC Higher National. This will necessitate experiments in speed and position control using PID. For the BTEC National they need to observe this – not necessarily derive it. I understand that for position control we need a gearbox. I still am not convinced this is 100% true. I need to see the guys do it. Even if it is not good then that is a learning outcome in itself. The guys are thinking about doing position control well – that’s not necessarily the objective. Understanding the problems with position control and making a recommendation as to how to improve the system is an outcome – not doing position control well.

### Where does the curriculum come from?

The basics of this is done. It just needs putting into a better format. It is also a bit brutal: there may need to be some additional hand holding to make it work well.

### Approximate work plan

Approximately 5 days work.