



FACULTY OF MECHANICAL ENGINEERING

B. ENG. (HONS) MECHANICAL ENGINEERING

FINAL YEAR PROJECT REPORT  
ON  
"CONDITION MONITORING OF BEARINGS USING  
VIBRATIONS"

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## ABSTRACT

The use of sophisticated machines has become essential to the highly technical industries. Cost of breakdown and maintenance for these machines becomes extremely prohibitive. Bearing is an important element in the operation of these machines. Therefore, to reduce the cost of maintaining the machine, the monitoring of the bearing condition is becoming increasingly important.

This project was mainly carried out to design the in house test rig for conducting the bearing testing. Experiments have been conducted to establish the 'baselines' that can be used for identifying the bearing faults. The monitoring of the bearing condition is done by using the FFT Dual Channel Portable Signal Analyzer Type 2418 (Brüel & Kjær).

Chapter 1, introduces the need to monitor the bearings and why vibration measurement is used in monitoring. Also, it describes the objectives of this project.

In Chapter 2, is the literature review about bearing, its applications and the instrumentation that need to take into considerations on conducting the testing.

Chapter 3 gives an idea of the basic theory on condition monitoring such as vibration transducer, vibration testing, misalignment and fault detection in rotating machinery. Frequency spectrum and its relationship to condition monitoring and spectrum interpretation for the results is also given in this chapter.

Design of the test rig, experimental procedures and program used are given in Chapter 4. This section also describes the experiments that were carried out and the procedures that need to be followed to achieve the objectives.

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## 1 INTRODUCTION

### 1.1 Introduction

Historically, maintenance activities have been regarded as a necessary evil by the various management functions in an organisation. However, this attitude is changing these days where the maintenance function is regarded as a strategic issue in the organisation. The developments which contributed to this change include: environmental concerns, safety issues, warranty and liability factors, regulatory matters, ageing plant and equipment, drive for cost reduction and the like. To live up to the new expectations demanded of maintenance activities, maintenance programmes are being developed to ensure that physical assets will continue to fulfil their intended functions at a minimum expenditure of resources.

Breakdown maintenance is a reactive practice that responds to machine failure in order to reinstate the operational integrity of the system. It is generally associated with precipitous or catastrophic failure and results in the machine's failure to perform according to operator inputs. Some cases require troubleshooting to discover the cause of failures. But in the vast majority of cases, identification of the failed component is obvious to trained maintenance personnel.

Preventive maintenance is one level higher than breakdown maintenance since in this case, the machine system is still functioning but performance has degraded or likely to be degraded to the point of impending failure. Preventive maintenance achieves its purpose through inspections, servicing, and minor and major overhauls. Workers can perform such maintenance activities according to two philosophies:

- On-condition - reflects the strategy that *if it works don't touch*. This is maintenance performed if and when the equipment needs it. The value of this