Chapter 1
Introduction

1.1 Introduction

Intelligent Manufacturing is a completely new concept of production system. It concerns with the integration of the information technology and various kinds of intelligent machines to create a new production system which is completely 24-hour unmanned, flexible and easy-to-operate operation.

With Intelligent Manufacturing Systems (IMSs), all kinds of machines will be "information oriented" which could bring an ordinary production system to a world class or global intelligent manufacturing. This mean, in the near future, products must be produced close to consumers, or in a place where the production cost is low enough to compensate for the cost of transportation. The production sites are likely to be scattered throughout the world.

1.2 Statement of the Problem

In order to gain high precision, high flexibility, and high productivity of 24 hour unmanned operating capability, the demand for IMS has been growing considerably.

However, for the industries in Thailand, this new concept of production systems which is fully equipped with various kinds of advance manufacturing devices may not be an appropriate solution because of high investment.

To help the manufacturing to consider the feasibility of introducing the IMSs, in terms of machine modification and investment, to their production system, this research will develop a classification methodology for evaluating the level of intelligence of a machine, cell, and the entire system. The purposed methodology is devised to provide a clear boundary for the IMSs and also can broadly answer how higher levels of intelligence can be reached from lower levels in terms of hardware and software investments.

1.3 Objective

The objective of this research is to develop a classification methodology of intelligent manufacturing system.

1.4 Scope of the Research

- This research will design a set of machine's intelligence level by using machine's capability, type of sensors equipped with it and any other devices which make a machine gain some particular capability. A set of rules used for classifying each metal cutting machine tool into each level of intelligence will be developed. Finally, the level of intelligence of a manufacturing cell and a total intelligent manufacturing system will be determined.

- The methodology developed from this research will be used for evaluating the level of intelligence of a stand-alone machine tool, a

manufacturing cell, and the entire manufacturing system. The evaluation result will help the manufacturers to determine the current level of intelligence of manufacturing resources and make decisions about how to introduce higher-level intelligent equipment in terms of hardware/software upgrading and investment.

- This research only pay attention to metal cutting machine tools and the machining industry. Any other industries and machines are not covered.

1.5 Steps of Work

1. January 1997 – March 1997 : Study the concepts of Intelligent Manufacturing Systems and related fields.

2. April 9, 1997 – August 31, 1997 : Study the IMSs and how to implement them at Nagao-Mitsuishi's laboratory, The University of Tokyo, Japan.

3. September 1997 – March 1998 : Develop a conceptual design of intelligence classification methodology and conventional rules for classifying the IMS.