Chapter 1
Various Aspects of Material Handling

ABSTRACT
This chapter presents various aspects of material handling devices. At first, brief guidelines about the way to select various material handling devices is provided, followed by various material handling tasks and equipment. Based on the subject matter of this book, this chapter provides an overview of various intelligent techniques which have been applied to various aspects of intelligent vehicles. The last section provides overviews of all the subsequent chapters.

1. INTRODUCTION
Material handing involves the movement, storage, tracking, distribution and disposal of various types of materials, tools and pallets during manufacturing operations. Therefore, material handling should get significant focus among various other manufacturing supports since material handling may occupy 10% - 70% of the total production cost depending on the type of production and some other factors. Thus, material handling plays a very important role in manufacturing environment. However, the basic objectives of material handling systems should be the transportation of materials safely (since humans are prone to fatigues and machines wear out and have breakdown occurrences), efficiently (with low cost) and effectively (that is, the timely and accurate material transportation). The materials which are generally carried by material handling devices include the following.

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- Raw materials, for example, sheet metals, bar stocks and so on
- Parts purchased from vendors
- Work-in-progress (semi-processed parts)
- Finished products
- Rework
- Scrap
- Disposed materials
- Tooling
- Spare parts
- Office supplies

Industrially, material handling devices are generally classified into powered and non-powered devices based on the power system. Non-powered material handling devices are run manually by a human operator. Therefore, the method of controlling, pulling, and pushing of these vehicles depends on the skill and intelligence of the human operator who handles the device. This type of manual device is either two-wheeled or multiple wheeled. Since this type of device is operated manually, therefore, the load carrying capacity for these types of devices is generally low.

The material handling devices in general, can be categorized into the following types:

- Manually operated vehicles
- Industrial trucks
- Automated Guided vehicles (AGV)
- Industrial Robots
- Conveyors
- Casters and wheels
- Cranes
- Other material transporting ways such as Pipelines

2. SELECTION OF MATERIAL HANDLING DEVICE

Selection of a material handling system depends on several factors like:

- Type of material to transport.
- Rate of flow of material.
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