

3.7: Process Selection

Vikispace: “Chapter 14, Summary: MRP and ERP

Manufacturing resource planning and enterprise resource planning. Both are useful within the organization. Resources are necessary to manage faces is the decision of resource utilization. Pay attention to the benefits and requirements. Review the questions at the end of the chapter answers to the author's answers.

Demand is derived from plans to make certain products (things like raw materials, parts, and assemblies). Example: The parts and demand tends to be “lumpy” whereas independent demand is fairly stable. **MRP** is a computer program that translates finished product into dependent demand items. The Bill of Materials, one of the three primary inputs of MRP, is useful because it is a list of all the materials that are needed to produce one unit of a finished product.

Comparison of ERP, which has an MRP core. **ERP**, which stands for “Enterprise Resource Planning” provides an expanded effort to integrate information sharing among numerous dimensions of a business in order to direct the system more effectively. An ERP system typically has all components that communicate on a local area network.

Determining a lot size to order or produce in independent and dependent demand items. **Lot sizing** refers to choosing a lot size for independent demand items. Managers use economic order sizes and economic production quantities. For dependent demand systems managers can choose lot sizes. Independent demand tends to be sporadic or “lumpy”. The goal of independent demand and dependent demand systems is to minimize the

Master schedule, bill-of-materials file, and an inventory records file. **Master schedule** relates to product demand and timeline. It states what is needed and how much are needed. **Bill of materials** relates to product composition. It lists all of the raw materials, parts, sub-assemblies, and one item. **Inventory records** relate to inventory. They consist of status information on an item sorted by time period. Status information includes receipts and expected amount on hand.

Management with a wide range of outputs. These typically include primary reports and secondary reports. Primary Reports – production and inventory reports. They usually include: Planned orders – a schedule indicating the amount and timing of future orders; Order releases; Order quantities/ cancellation of orders. Secondary reports and exceptions belong to secondary reports. They include: Inventory status reports, as well as providing info that can be used to assess cost performance. Material requirements planning contracts and data for future assessment of material requirements. The report such as errors in overdue or late orders, etc. pg 661

For a given order size, know when to release orders for each component, and to be alerted when items need attention. Other benefits of

Controlled by a given master schedule

Backflushing.

Bill of materials (BOM) is periodically exploded to determine the quantities of the various components that were used to make the product. The system in a typical manufacturing company are production managers, purchasing managers, inventory managers, and customer service. The use of computer to maintain up-to-date information on material requirement.

to maintain up-to-date and accurate information. In order to implement and operate an effective MRP system, it is necessary to have:

- handle computations and maintain records
- materials, Inventory records

the 1980s after manufacturers realized MRP had additional needs. MRP II expanded the use of MRP by adding features essential to enable the use of short-range capacity requirements. Material requirements are essential for the use of MRP II. MRP II systems allow managers to make decisions i.e., to foresee the consequences of their options and other alternatives. With the new function areas added, the manufacturing process is more integrated. MRP generates the materials needed and schedules the requirements, where managers can obtain a more detailed capacity of determining short-range capacity requirements.

period that is at least equivalent to the *cumulative lead time* (the sum of the lead times that sequential phases of a process require, from raw material assembly.)

due to bottleneck processes causing shortages, shortages caused by late orders and/or fabrications, or assembly lines are longer than

orders must be completed well ahead of schedule to eliminate the probability of shortage.

• set equal to the demand for that period.

• minimum costs if usage of item is fairly uniform.

• predetermined number of periods.

• quantity and/or timing can render material requirements plans virtually useless.

• is.

and nature of MRP processing, as well as describing the applications of MRP in different industries. The chapter then describes the evolution of materials planning. MRPII gave managers the ability to ask “what if” questions, and provided them with a more precise decision-making tool. ERP (enterprise resource planning) or the “third generation,” is also described. ERP gave companies the ability to incorporate all departments and functions. The benefits of ERP are substantial; however, it must be noted that high training, maintenance, and initial start up costs are too high.

considered lot sizing. p.g. 662

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usage is fairly uniform is: p.g. 662

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chedule where all products are listed by demand.
records where all components are listed by status.

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lity to have large amounts of unorganized information readily accessible.

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ises problems in an MRP system?

f materials
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the master production plan, what else is the financial department in charge of?

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make changes to the orders/production. What is this called?

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chedule according to

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r the machine, if 150 units of Product A are scheduled, when the machines standard time is 1.9 hours and labor standard time of 2.3

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capacity, but it also has a downfall. What is it?

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chedule and a nonfeasible schedule.
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used within a manufacturing organization. This source provides information about these types of production. Pay particular attention

however, all production methods can be assisted with CAM and CAD equipment (Computer Aided Manufacture and Computer Aided

with the labor of one or few workers and is scarcely used for bulk and large scale production. It is mainly used for one-off products or
atly enhanced with job production compared to other methods. Individual wedding cakes and made-to-measure suits are examples of
action before they get a chance or have the means to expand. Job Production is highly motivating for workers because it gives the
and take pride in it.

Manufacturing is suitable for the production of very small to small batches, i.e. orders of a few units up to several dozens of similar
boutique Manufacturing entity can be a mixture of both jobbing and batch production but involves higher standardization than job
zed with single workplaces or production cells carrying out a number of subsequent production steps until completion of certain
ly lines are generally not used. The flexibility and variety of products able to be produced in the entity therefore are much higher than
on.

process any product in groups or batches where the products in the batch go through the whole production process together. An example
e of bread separately and each object (in this case, bread) is not produced continuously. Batch production is used in many different
a quality/quantity balance. This technique is probably the most commonly used method for organizing manufacture and promotes
es a small number of persons. Batch production occurs when many similar items are produced together. Each batch goes through one
ext stage.

common method of production. Flow production is when the product is built up through many segregated stages; the product is built
xt stage where it is built upon again. The production method is financially the most efficient and effective because there is less of a

Computer Aided Design

A range of computer-based software tools that assist engineers and architects alike.

Production works in a manufacturing environment. This is important because often operations managers must make choice about what of the business.

7, seven days per week with infrequent maintenance shutdowns, such as semi-annual or annual. Some chemical plants can operate for 1st furnaces can run four to ten years without stopping. **Continuous production** is a flow production method used to manufacture, continuous production is called a **continuous process** or a **continuous flow process** because the materials, either dry bulk or fluids that undergoing chemical reactions or subject to mechanical or heat treatment. Continuous processing is contrasted with batch production.

g:

only work in rotating shifts.

well as economic reasons. Most of these industries are very capital intensive and the management is therefore very concerned about

processes typically results in off quality product that must be reprocessed or disposed of. Many tanks, vessels and pipes cannot be left full settling of suspended materials or crystallization or hardening of materials. Also, cycling temperatures and pressures from starting up (e.g., blast furnaces, pressure vessels, etc.) may cause metal fatigue or other wear from pressure or thermal cycling.

Shut down and start up procedures that must be carefully followed in order to protect personnel and equipment. Typically a start up or

and control operational variables such as flow rates, tank levels, pressures, temperatures and machine speeds.

Manufacturing that can be easily shut down and restarted are today considered semi-continuous. These can be operated for one or two

process for producing pig iron. The blast furnace is intermittently charged with ore, fuel and flux and intermittently tapped for molten pig iron. The iron and silicon and later oxidizing the silicon is continuous.

The manufacturing of cigarettes, were called “continuous” when they appeared.

ally batch operations.

is one of the earliest of the industrial revolution era continuous manufacturing processes. It produced a continuous web of paper that previously paper had been made in individual sheets.

res flour mill (ca. 1785), which was fully automated.

ie in batches until process control was sufficiently developed to allow remote control and automation for continuous processing. 3th century. By the early 20th century continuous processes were common.

are also when process modifications are performed. These include installing new equipment in the main process flow or tying-in or nt that can be installed while the process is operating.

s or months of planning. Typically a series of meetings takes place for co-ordination and planning. These typically involve the various , safety and operating units.

schedule that incorporates the various trades involved, such as pipe-fitters, millwrights, mechanics, laborers, etc., and the necessary rs, welding machines, scaffolding, etc.) and all supplies (spare parts, steel, pipe, wiring, nuts and bolts) and provisions for power in n one or more outside contractors perform some of the work, especially if new equipment is installed.

shutdowns. Other safety measures include providing adequate ventilation to hot areas or areas where oxygen may become depleted or other enclosed areas for adequate levels of oxygen and insure absence of toxic or explosive gases. Any machines that are going to be through the motor starter, so that it cannot operate. It is common practice to put a padlock on the motor starter, which can only be langered by performing the work. Other disconnect means include removing couplings between the motor and the equipment or by moving. Valves on pipes connected to vessels that workers will enter are chained and locked closed, unless some other means is taken

Continuous Processor. Continuous Processors are designed to mix viscous products on a continuous basis by utilizing a combination 1 the mixing chamber (barrel) are mounted on two co-rotating shafts that are responsible for mixing the material. The barrels and s create a self-wiping action between themselves minimizing buildup of product except for the normal operating clearances of the o optimize the mixing cycle. Unlike an extruder, the Continuous Processor void volume mixing area is consistent the entire length of sure build up. The Continuous Processor works by metering powders, granules, liquids, etc. into the mixing chamber of the machine. ie versatile for a wide variety of mixing operations:

of product within mixing chamber)

esses:

nixing capabilities but, it has proven its ability to mix:

of batch processing in a manufacturing company. Consider how batch processing is used in today's manufacturing environments.

ams ("jobs") on a computer without manual intervention.

hout human interaction. All input parameters are predefined through scripts, command-line arguments, control files, or job control programs which prompt the user for such input. A program takes a set of data files as input, processes the data, and produces a set of d as "batch processing" because the input data are collected into *batches* or sets of records and each batch is processed as a unit. The ation.

computing resources are less busy.

ute-by-minute manual intervention and supervision.

tizes the computer, especially an expensive one.

nteractive and non-interactive work.

o process one transaction each time, batch processes will run the program only once for many transactions, reducing system overhead.

ne computers since the earliest days of electronic computing in the 1950s. There were a variety of reasons why batch processing most urgent business problems for reasons of profitability and competitiveness were primarily accounting problems, such as billing. ented business process, and practically every business must bill, reliably and on-time. Also, every computing resource was expensive, rds matched the resource constraints and technology evolution at the time. Later, interactive sessions with either text-based computer e more common. However, computers initially were not even capable of having multiple programs loaded into the main memory.

puting, but practically all types of computers are now capable of at least some batch processing, even if only for "housekeeping" oft Windows, Mac OS X (whose foundation is the BSD Unix kernel), and even smartphones. Even as computing in general becomes s significance.

ons in large part because many common business processes are amenable to batch processing. While online systems can also function ot typically optimized to perform high-volume, repetitive tasks. Therefore, even new systems usually contain one or more batch he day, generating reports, printing documents, and other non-interactive tasks that must complete reliably within certain business

h frameworks such as Jem The Bee, Spring Batch or implementations of JSR 352 written for Java, and other frameworks for other nce and scalability required for high-volume processing. In order to ensure high-speed processing, batch applications are often a batch job over a large number of processors, although there are significant programming challenges in doing so. High volume batch em and application architectures as well. Architectures that feature strong input/output performance and vertical scalability, including batch performance than alternatives.

along with batch processing.

activity”, when the computer system is able to run batch jobs without interference from online systems.

cessing, so jobs could be run any time within a 24-hour day. With the advent of transaction processing the online applications might be running two shifts available for batch work, in this case the batch window would be sixteen hours. The problem is not usually that the conflict between online and batch work, but that the batch systems usually require access to data in a consistent state, free from online updates until the batch window closes.

Jobs include interest calculation, generation of reports and data sets to other systems, printing statements, and payment processing.

To support globalization, the Internet, and other business requirements the batch window shrank and increasing emphasis was placed on making the batch window available for a maximum amount of time.

With the advent of database updates and automated transaction processing, as contrasted to interactive online transaction processing (OLTP) applications. The data warehouses is inherently a batch process in most implementations.

Operations with digital images such as resize, convert, watermark, or otherwise edit image files.

Converting computer files from one format to another. For example, a batch job may convert proprietary and legacy files to common standard formats.

Environments

Scheduling of complex job scripts. Windows has a job scheduler. Most high-performance computing clusters use batch processing to schedule jobs.

IBM mainframe has arguably the most highly refined and evolved set of batch processing facilities owing to its origins, long history, and ability to support hundreds or even thousands of concurrent online and batch tasks within a single operating system image. Technologies that include Job Control Language (JCL), scripting languages such as REXX, Job Entry Subsystem (JES2 and JES3), Workload Manager (WLM), Resource Management Facility (RMF), Query Services (RRS), DB2 data sharing, Parallel Sysplex, unique performance optimizations such as HiperDispatch, I/O channel

that wants to manufacture high-end bicycles. The owners of the new business have designed a bike that can be sold to cyclists that is both safe and reliable. Use the information from this unit to write a recommendation to the owner of the new business on the evaluation and recommendation of the best manufacturing process.

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