International Core Journal of Engineering Volume 6 Issue 3, 2020
ISSN: 2414-1895 DOI: 10.6919/ICJE.202003_6(3).0015

Study on the Method of Unlimited Capacity Scheduling in Workshop Planning

Xingchen Zhou

School of Southwest Petroleum University, Chengdu 610000, China.

Abstract

This paper introduces the principle infinite ability oriented workshop production scheduling and its selection principle, in the key technology involved in the process of concrete production scheduling, such as the division of work center, processing center of the actual capacity calculation, which has some reference value to the implementation of the plan, the research of discrete manufacturing industry in our country successfully implement MRPⅡ workshop work plan and control the generality and the reference value.

Keywords

Shop floor control; Unlimited capacity scheduling;MRPⅡ.

1. Introduction

MRP is a system for calculating material demand and demand time. The consumed material generally refers to raw materials, work-in-process, purchased parts and products. The basic idea of MRP is to organize manufacturing resources around material transformation to achieve on-time production as required. And MRP II involves not only the material, but also involves the production capacity and all manufacturing resources, is a kind of extensive resources to coordinate system. Enterprises in the production of various materials was determined by the MRP, purchasing plan, the next step you also need to change the enterprise homemade parts production plan for each team, each staff, each device work tasks, its content includes not only determine the workpiece machining sequence, but also determine the machine start and finish time of each workpiece. Therefore, in order to improve production efficiency and productivity, only a detailed work plan.

2. Production scheduling method and application

The main task of workshop production scheduling is to determine the start and finish time of each workpiece. According to the relationship with capacity demand plan, workshop production scheduling can be divided into two categories: unlimited capacity scheduling and limited capacity scheduling. The former does not take into account the capacity of each work center when scheduling production. All workshop ordering processes are planned independently to determine the start time and completion time of each process. If the capacity required by the task of the processing workshop exceeds the daily capacity limit of the work center, the queuing time shall be adjusted manually. In the latter, when scheduling the workshop tasks, the limited load scheduling should be carried out on the key work center, that is, the load arranged on the key work center should not exceed its capacity. Generally, compressed queuing time and other scheduling tools are used to arrange the load on the date when the key work center is capable, so as to ensure the timely completion of the order. The production scheduling methods in the workshop plan are mainly Scheduling, Backward Scheduling, Parallel Scheduling, bias method, covering method and so on. The following are briefly introduced.

ISSN: 2414-1895 DOI: 10.6919/ICJE.202003_6(3).0015

2.1 Scheduling

The forward arrangement method is to calculate the start and finish date of each process by the order date of the parts to the future.

2.2 Backward Scheduling

Backward Scheduling is by the latest completion date of the parts according to the order of the reverse process line, the beginning of each process and the completion date.

2.3 Parallel Scheduling

The Parallel Production scheduling method is similar to the inversion method, but it does not consider the relationship between the same process route and the previous process. In this method, the order end date is taken as the end date of the last process in the basic process path. All parallel process paths must have the same end date, and this date will be the start date of the basic process path. At the same time, all parallel paths must be carried out first.

2.4 Bias method

The offset method adopts the inversion logic, which is an improvement of the inversion method. It provides an offset for the end time of each process and the end time of the workshop task, and then calculates the start time of each process according to the inversion method. The key is to determine a reasonable offset to control the appropriate displacement of the start and end dates of the process.

2.5 Covering method

The overlay method is similar to the positive discharge method, except that the next process starts before the end of the previous process and the transition time is a negative value.

Because the order issued by the inverted method is the latest start date, if later than this date, the parts can not be completed on schedule: according to the order issued by the positive method is the earliest start date, before this part processing conditions are not available. Is, therefore, arranged the schedule with some rich of time, in case for task tardiness affect delivery on schedule, the downside is increased in the products and extend the manufacturing lead time: inverted choreography is rich of time, can reduce the products and shorten the production lead time, its disadvantage is that there are risks of delayed delivery due to job tardiness. In the selection of scheduling method, the following aspects should be considered: Manufactured products; (3) company type; (4) product bill of materials level; Key resources and so on.

3. Production scheduling method oriented to unlimited capabilities

When the production is arranged according to the infinite capacity, the load of each working procedure of each part is accumulated to the processing work center, and the time needed to process the working procedure is calculated according to the capacity of the work center. Even if the capacity of the work center has been occupied by another batch of tasks and no longer has the ability to process these tasks, the system still ACTS as a work center capable of processing and scheduling, that is, assuming that the capacity of the work center is infinite. Specific production scheduling steps are as follows.

(1)Quota capacity. The quota capacity of the work center is calculated according to the following formula: quota capacity = the number of machines or the number of operators ×the number of hours per shift ×the number of shifts per day ×the efficiency ×the utilization rate of the work center.

(2) Practical ability. In practical application, the calculation of practical ability of work center plays a crucial role in the accuracy of production scheduling. A work center can be composed of several processing equipment of the same nature, or a processing unit composed of several processing equipment of different processing nature can be divided into a work center. The actual capacity of a process, sometimes referred to as historical capacity, is determined by recording the output of a work center in a production cycle. The total output in a given time period is multiplied by the fixed number of hours in the process document and the total number of workshop days in that time period is

ISSN: 2414-1895 DOI: 10.6919/ICJE.202003_6(3).0015

removed to obtain the actual capacity of the process per day. Then divide the actual capacity by 8 to get the number of machines actually used to process the part and the process.

$$P = NM/T$$

P——practical ability; N——the actual number of parts produced in a given week; M——processing hours; T——actual processing days.

In actual arrange production, can use the actual ability of each working procedure of each part only to arrange production to each working procedure, and cannot use the rated capacity of the working center to arrange production to the working procedure, otherwise will lead to the wrong conclusion.

4. Summary

At present, in order to give full play to the potential of workers and adapt to the fierce competition in the market, enterprises are learning and introducing a variety of advanced management methods. For the discrete manufacturing enterprises in China, it is very important for the enterprises to adapt to the market competition how to make the production plan according to the market demand and what kind of scheduling method to adopt. This study has a good reference value for enterprises to successfully implement the production scheduling method oriented to infinite capacity in the workshop operation plan.

References

[1] ZHANG Jie,QIN Wei,SONG Daili. Rolling Scheduling Method for Mixed Flow Shop with Uncertain Working Hours [J]. Journal of Mechanical Engineering 2015 ,51(11): 99-108.

[2] WANG Hsiao fang, WU Kuang yao. Modeling and Analysis for Multi period, Multiproduct and Multiresource Production Scheduling [J]. Journal of Intelligent Manufacturing,2003(14):297-309.

[3] WEN Haijun, HOU Shiwang, LIU Zhaohua,An Optimization Algorithm for Integrated Remanufacturing Production Planning and Scheduling System [J]. Chaos, Solitons and Fractals, 2017,105:69-76.

[4] ZHANG Rui,ONGS K,NEE AYC. A Simulation-based Genetic Algorithm Approach for Remanufacturing Process Planning and Scheduling[J]. Applied Soft Computing,2015,37 :521-532.