

Production Scheduling Techniques at Bharat Industries Ltd, Thiruvallur

G.Thiyagarajan, M.B.A (Ph.D)

Assistant Professor- MBA, Research Scholar, Bharathiyar University, Loyola Institute of Technology, Chennai,
Tamilnadu, India

ABSTRACT: “A study on production Scheduling Techniques at Bharat industries limited, Thiruvallur” as focused on Production Scheduling for production process in the organization. This study shows how every machine as properly scheduling maintaining in the organization and its prevention from the failures and breakdown in the production process. The main objectives of this study is explored the new production planning and control concepts available for practical operations. The main principle has been defined by as to control the lengths of the queues in front of work stations on the shop floor.

Scheduling comprises the definition of starting and finishing times and the assignment of resources to each task of the set, while being restricted by several constraints, which may involve the tasks and/or the resources. The present article analyzes a wide range of approaches used for solving production scheduling problems. These approaches have been classified into two categories, traditional and modern ones. Fields of study have inspired these approaches. The traditional approaches range from simple dispatching rule; to composite dispatching rules, computer simulation, and mathematical programming. Meanwhile recent approaches range from statistical mechanics.

The type of research design used is descriptive in nature and the required data has been generated using a research instrument called the questionnaire, to a sample of 101 employees. Convenience sampling procedure is used in this survey. The structured questionnaire consists of open ended liked multiple choices, close ended etc. The period of the study is for three months. The collected data has been analyzed using various statistical tools like two-way Anova, one sample run test, and chi-square. A methodology and systems to do this at both the job release and the employee enquiry stage have been presented in previous papers. The purpose of this research is to provide a theory for workload control to assist in providing procedures for implementing input and output control. It enables dynamic capacity planning to be carried out at the customer enquiry and order entry stages for versatile manufacturing make-to-order companies.

I. INTRODUCTION

Production scheduling tools greatly outperform older manual scheduling methods. These provide the production scheduler with powerful graphical interfaces which can be used to visually optimize real-time workloads in various stages of production, and pattern recognition allows the software to automatically create scheduling opportunities which might not be apparent without this view into the data. Companies use backward and forward scheduling to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials. Forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date. Backward scheduling is planning the tasks from the due date or required-by date to determine the start date and/or any changes in capacity required.

Batch production scheduling is the practice of planning and scheduling of batch manufacturing processes. Batch production scheduling shares some concepts and techniques with finite capacity scheduling which has been applied to many manufacturing problems. The specific issues of scheduling batch manufacturing processes have generated considerable industrial and academic interest.

In this study deals how the master production scheduling is carried out a batch process can be described in terms of a recipe which comprises a bill of materials and operating instructions which describe how to make the product the batch process control standard provides a framework for describing a batch process recipe. The standard

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)
22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

provides a procedural hierarchy for a recipe. A recipe may be organized into a series of unit-procedures or major steps. Unit-procedures are organized into operations, and operations may be further organized into phases.

II. OBJECTIVES OF THE STUDY

Primary Objective

- ❖ To ascertain the effectiveness of production scheduling Techniques at Bharat industries Limited, Thiruvallur

Secondary Objectives

- ❖ To find out the awareness level of production scheduling techniques in the organization.
- ❖ To identify the mistakes and achieve zero defects in the production scheduling technique.
- ❖ To determine the effectiveness of production scheduling method of production in the organization.
- ❖ To find out the challenges of production scheduling technique in production process.
- ❖ To identify the satisfaction level of production scheduling methods in the organization.

III. NEED OF THE STUDY

- This study has to find out the various challenges and outcomes of the production scheduling techniques, concepts and methods.
- This study helps to find out the defectiveness in the production scheduling and eliminate the defective products
- This study helps to rectify the precise production problems from the employees.

IV. SCOPE OF THE STUDY

- This study provides supports to decrease the defects in the production scheduling
- This study increases the efficiency of production scheduling and eliminates defects in the preproduction process
- This study shows how the employees are involved in the production process with production scheduling concepts of production methodology

V. RESEARCH METHODOLOGY

Target respondents

- ❖ The results could be skewed because of a small sample size of 100 only.
- ❖ The target respondents were only the Bharat Industries ltd, Thiruvallur employees.

Proposed sampling method

Convenience sampling has been used in this study. Convenience sampling is used for selection of homogeneous sample for the study. It refers to selecting a sample of study objects on convenience

Research Design

Descriptive Research Design used in this project

Tools for analysis

- Two Way ANOVA Test
- Chi – square test
- One sample run test
- Karl pearson's correlation co-efficient

VI. STATISTICAL TOOLS

Test No. 1 TWO WAY ANOVA

AIM:

Perform two ways ANOVA between different experienced respondents towards PRODUCTION SCHEDULING techniques supports to employees.

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)

22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

Table No 1. TWO WAY ANOVA

POKE-YOKE TECHNIQUES SUPPORTS EMPLOYEES TO	Below 5 yrs	6 to 10 yrs	11 to 15 yrs	16 to 20 yrs	Above 20	Total
Identify mistakes	3	4	7	4	3	21
Reduce wastages	2	6	7	3	3	21
Increase production	5	5	5	1	4	20
Protect from defects	2	4	15	3	2	26
None of above	1	1	3	3	5	13
Total	13	20	37	14	17	101

HYPOTHESIS

Null Hypothesis (H₀): There is a no significant difference among the different experienced respondents towards production scheduling techniques supports to employees.

Alternative Hypothesis (H₁): There is a There is a no significant difference among the different experienced respondents production scheduling techniques supports to employees.

Table no. 2 TWO WAY ANOVA TABLE CALCULATION

Source of variation	Degrees of freedom	Sum of square	Mean sum of square	F- Ratio	F-table (4,20)
CSS	4(k-1)	76.56	19.19(76.56/4)	3.288(19.19/5.8)	2.87
ESS	20(n-k)	116.4	5.82(116.4/20)		
TSS	24	192.96			

VII. RESULT

Calculated value < Tabulated value
3.288 < 2.87
Accept the H₁.

VIII. CONCLUSION

There is a significant difference among the different experienced respondents towards production scheduling techniques supports to employees.

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)

22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

Test No.2 ONE SAMPLE RUN TEST

AIM:

Find out that production scheduling supports future innovation in the company.

HYPOTHESIS

Null Hypotheses (H₀): production scheduling supports future innovation in the company

Alternative Hypotheses (H₁): production scheduling supports future innovation in the company

SEQUENCES:

YYY NNN YY N YYYYY N YY N YYYYYY N YYYYY NN YYYYY N YYY N YYY N Y N Y NN Y N Y N YYY
NN YYY NN YYY N YY N YY N YYY NNN YY N Y N YY N Y NN YYY N YY N YYY N.

- n₁ (Yes) = 66
- n₂ (No) = 35
- r (No of sequence) = 52

$$\text{Mean of r-statistic } (\mu_r) = \frac{2n_1 n_2}{n_1+n_2} + 1$$

Calculated |Z| = 1.16

Table |Z| @ 5% level of significance = 1.96

CONCLUSION:

Table |Z| is greater than Calculated |Z| so H₀ is accepted and H₁ is rejected.

DECISION:

Production scheduling always supports future innovation in the company

Test No. 3 CHI SQUARE TEST

AIM: Chi square analysis between department's employees and supports to complete the task

Table No.3 Chi Square Test

POKE YOKE SUPPORTS TO COMPLETE THE TASK	Quality	Production	Packing	South	Total
Rewards & awards	5	11	3	7	26
Setting challenging goals	6	11	6	7	30
Work culture	1	4	3	3	11
Responsibilities	3	9	3	2	17
Others	6	6	2	3	17
Total	21	41	17	22	101

HYPOTHESIS:

Null Hypothesis (H₀):

There is no association between departments' employees and supports to complete the task

Alternative Hypothesis (H₁):

There is an association between departments' employees and supports to complete the task

FORMULA:

$$\text{Calculated } \chi^2 = \frac{\sum (O_i - E_i)^2}{E_i} = 6.5186$$

Degree of freedom: = (C-1) (R-1)
= (4-1) (5-1) = 12

Level of Significance = 5%

Table value at 5% Level of Significance = 21.026

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)

22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

Calculated value = 6.518

Test No.4 Karl pearson’s correlation co-efficient

AIM: Find out the correlation coefficient between production scheduling increases motivation and reduces workload.

Table no. 4 Karl pearson’s correlation co-efficient

POKE YOKE INCREASE MOTIVATION/ REDUCES WORKLOAD	Strongly agree	Agree	Agree nor disagree	Disagree	Strongly disagree	Total
Strongly agree	15	14	1	0	0	30
Agree	4	23	17	1	0	45
Neither agree nor disagree	0	2	14	4	1	21
Disagree	0	0	0	2	0	2
Strongly disagree	0	0	0	0	3	3
Total	19	39	32	7	4	101

Table No.5 Karl pearson’s correlation co-efficient calculation

X	Y	dx =X-X̄	dy=Y-Ȳ	d _x ²	d _y ²	d _{xy}
30	19	9.80	-1.20	96.04	1.44	-11.76
45	39	24.80	18.80	615.04	353.44	466.24
21	32	0.80	11.80	0.64	139.24	9.44
2	7	-18.20	-13.20	331.24	174.24	240.24
3	4	-17.20	-16.20	295.84	262.44	278.64
101	101	0	0	1338.80	930.80	982.80

$$X̄ = \frac{\sum X}{n} = \frac{101}{5} = 20.20$$

$$Ȳ = \frac{\sum Y}{n} = \frac{101}{5} = 20.20$$

$$r = 0.88$$

RESULT:

The correlation value is positive (0.88) and it is between 1 and 0.

CONCLUSION:

There is a highly positive correlation between production scheduling increases motivation and reduces workload.

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)

22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

IX. FINDINGS

- ❖ 100% respondents are known about the production scheduling Production process.
- ❖ 30% respondents are strongly agree, 34% are agree, 20% are neither agree nor disagree, 9% are disagree and 7% are strongly disagree that quality increases after implemented production scheduling
- ❖ 60% are told that Increase production rate, 15% are told that decrease production rate and 25% are told that no changes in production scheduling technique.
- ❖ 24% are told increase quality, 25% decrease quality, 26% are supports quality, 20% are told reduce defects.
- ❖ 100% are told that the organization is provides production scheduling training to all the employees.
- ❖ 48% are agreed, 16% are neither agree nor disagree that production scheduling techniques changes product quality.
- ❖ 35% are told that Identify mistakes, 32% are told that reduce wastages, 8% are told that increases productivity, 16% are told that protect from defects and 9% are told that none of above.
- ❖ 76% of employees are saying agree, 14% of employees are saying neither agree nor disagree and 1% of employees are saying disagree regarding for poke yoke reduce workload for employees
- ❖ 57% of employees are saying agree, 13% of employees are saying neither agree nor disagree and 1% of employees are saying production scheduling increase motivation.
- ❖ 39% of employees are reduced their stress, 30% of employees are increased performance and 9% of employees are increased their confidence level due to production scheduling training program.
- ❖ 25% of respondents are told rewards and awards are supports to complete the task, 10% of respondents are told are things are supports to complete the production scheduling to complete the tasks.
- ❖ 75% of respondents told poke yoke supports to future innovation. 25 % of the respondents told not support the future innovations.

STATISTICAL FINDINGS

- ❖ There is a significant difference among the different experienced respondents towards production scheduling techniques supports to employees.
- ❖ Production scheduling always supports future innovation in the company
- ❖ There is no association between departments' employees and supports to complete the task.
- ❖ There is a highly positive correlation between production scheduling increases motivation and reduces workload.

X. SUGGESTIONS AND RECOMMENDATIONS

- ❖ Production scheduling is a complex system of information flow, decision-making, and problem-solving. It is not simply an optimization problem. It is hoped that the strategy presented here will help engineers, analysts, and managers recognize and understand this complexity and successfully improve their production scheduling. An analysis of these perspectives suggests that they form a hierarchy. This, in turn, motivates an integrative strategy for improving production scheduling that begins with considering the production scheduling system, then looking at the scheduler's decision-making process Systems.
- ❖ A solid production schedule should help in determining whether delivery dates can be met and can identify predictable downtime for maintenance schedules. A proper production schedule also gives production and other personnel an explicit statement of what is expected and in order that supervisors and managers can measure productivity and performance. The production-scheduling system is more than a schedule-generation process, be it manual or automated. This system should not be a piece of software, but it should interact with all departments and provide information that all managers need for other planning and supervisory functions. After the schedule is generated do the manufacturing operations and processes begin.

XI. CONCLUSION

- ❖ A plant's production-scheduling system continues to develop over the years, evolving through the mistakes and miscalculations recognized and corrected. Remember, common sense is one of the most important aspects of effectively simple production scheduling. The layout of the production-scheduling board traditionally would be in

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 5, April 2018

1st International Conference on Recent Innovation in Civil Engineering and Management (ICRICEM '18)

22nd March 2018

Organized by

Department of Civil Engineering & MBA, Loyola Institute of Technology, Chennai, Tamilnadu, India

a calendar-month format. Each delineated section is one day's worth of production for that specific machine. Each section on the board will be the location of that machine's daily jobs. Each job will be earmarked with a job card. The job card has all the details of the work to be done and is created at the order-entry stage. Pertinent information for the job is included on the card: customer, design, number of colors, substrate and, most important, due date.

- ❖ The production schedule is a work in progress and changes continually. A daily schedule and requisitions for art, receiving, screen and ink is created by each department head, determined by the main scheduling needs. There are numerous advantages to the integration of process planning and production scheduling. It must be incorporated with other systems and interactive with real-time changes and adjustments. The objective is that production scheduling is a part of a complex flow of information and decision making. It is expected that a scheduling system should incorporate all relevant constraints in the printing process and should perform suitable activities for a changeable environment.

REFERENCES

Books referred:

1. Askin R. G., Standridge C. R. Charity Robey (eds.) (1993), *Modeling and Analysis of Manufacturing Systems*, John Wiley & Sons, New York.
2. Bukchin, J. Dar-El, E.M. and Rubinovitz. J. (2002), "Mixed-model assembly line design in make-to-order environment," *Computers and Industrial Engineering*, **41**, 405-421.
3. Waldner, Jean-Baptiste (1992). *CIM: Principles of Computer Integrated Manufacturing*. Chichester: John Wiley & Sons. p. 46. ISBN 0-471-93450-X.
4. Ptak, Carol & Smith, Chad (2011). *Orlicky's MRP 3rd edition*, McGraw Hill, New York ISBN 978-0-07-175563-4
5. Hill, Joyce (2006). *Capacity Requirements Planning*.
6. Krajewski, Lee J.; Ritzman, Larry P. (2005). *Operations Management: Processes and Value Chains*, Upper Saddle River, New Jersey: Prentice Hall.
7. Lazowska, Edward D. (1984). *Quantitative System Performance*. Prentice-Hall. ISBN 0-13-746975-6.

Journals referred:

8. Becker C. and Scholl, A. (2004) 'A survey on problems and methods in generalized assembly line balancing', *European Journal of Operations Research*, in press.
9. Falkenauer, E. and Delchambre, A. (1992) 'A Genetic Algorithm for Bin Packing and Line Balancing', *Proceedings of the 1992 IEEE International Conference on Robotics and Automation*, May 10-15, 1992, Nice, France. IEEE Computer Society Press, Los Alamitos, CA. Pp 1186-1192. Conference proceedings.
10. Falkenauer, E. (1997) 'A Grouping Genetic Algorithm for Line Balancing with Resource Dependent Task Times', *Proceedings of the Fourth International Conference on Neural Information Processing (ICONIP'97)*, University of Otago, Dunedin, New Zealand, November 24-28, 1997. Pp 464-468. Conference proceedings

Web sites:

11. <http://sbinfoCanada.about.com/od/Production.html>
12. http://www.mindtools.com/pages/article/newHTE_92.html
13. <http://en.wikipedia.org/wiki/Production> Scheduling
14. http://stress.lovetoknow.com/Definition_of_Production scheduling