

## Importance of Cellular Manufacturing System

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### Abstract

This paper presents a brief note on importance of cellular manufacturing system that overcomes the previously and presently (in developing and underdeveloped nations) used traditional manufacturing for meeting customers demand which has got a new direction since the industrial revolution has emerged. The nature of customer's demands has changed; it is very dynamic in nature. Ever changing demands of customers has become a major problem for traditional manufacturing organizations.

Unlike before, the manufacturing needs to be flexible so that it can respond quickly and profitably to demands of customers. Various companies following traditional manufacturing system failed to satisfy the global and dynamic market. This forced the researches to come up with new technique which is flexible and capable of responding pro-actively to demands of customers, this technique is called cellular manufacturing.

**Keywords:** Cellular Manufacturing, Importance, Dynamic, Market

### 1. INTRODUCTION

The customer demands change continuously is creating a requirement for new technology of manufacturing systems. In order to survive in competitive and dynamic markets, Industries should have sufficient flexibility to produce a range of products on the same platform (Datta et.al. 1992). In this way, cellular manufacturing systems are required to scrutinize economical background as well as engineering concerns; without it they will not be able to get a remarkable share of competitive market to prove their investments. cellular manufacturing systems (CMSs) are fabricated to

continuously produce different product families in the shortest time and with different machine cells at the lowest cost without compromising with the quality (Ahuja and Khamba, 2008). The major characteristic of such systems is called flexibility, which is the ability of manufacturing and changing manufacturing items directed at tailoring the new environmental and technological changes. Similarly, manufacturing flexibility has shortly become a new solvent principle along with humanistic objectives such as low cost and high quality (Sundharam et al., 2013).

There are various issues described by many researchers and scientists in the field of cellular manufacturing for detailed and systematic description of cellular manufacturing. And with the help of these issues, one can implement cellular manufacturing techniques step by step in traditional manufacturing organisation and can achieve flexibility in well planned and systematic manner. There are various scientists who want to provide a firm structure for future works in the field of cellular manufacturing. The literature available on cellular manufacturing has been classified based on the nature and the focus of cellular manufacturing enablers which include criteria such as strategies, technologies, systems and people. A classification scheme based on the nature and application of the models is proposed for easy understanding of the research work on Cellular manufacturing. (Gunasekaran et al.1999)

Soon after the the principles of cellular manufacturing were formalized, several researchers have identified the criteria that would establish cellular manufacturing environment. Most of these researchers enumerated management oriented criteria for attaining flexibility in organisation. Some researchers have enumerated both management and technology oriented criteria for effecting flexibility in organisation .keeping these contributions as the basis, the conceptual characteristics of cellular manufacturing paradigm are depicted (Wemmerlov & Hyer, 1987).

## **2. IMPORTANCE OF CELLULAR MANUFACTURING SYSTEM**

From the contributions of the researchers, twenty criteria were drawn to design the twenty criteria cellular manufacturing system. The issues are as follows:

- Organisational structure: It describes the flow of responsibility at various level in organisation.
- Flexibility: It describes the range of production means how many parts can be produced with same set up.
- Devolution of authority : It describes the there should not be rigid set of rules for each level so that each ones ideas can be listened.
- Manufacturing set-ups : It tells about the machines set-up and workplace layout.
- Quality-It tells about the quality of products and services.
- Productivity-It gives information of productivity of an organisation.
- Employee's status-This criterion tells about the knowledge and skills of employee.
- Employee Training : This is the programme under which skills of the employees are enhanced.

- Employee’s involvement-It tells about up to what extent employees are ideas and suggestions are considered in organisation.
- Nature of management-It tells about the rules and regulations of an organisation under which the management design it policies.
- Customer response adoption –It tells about the response of an organisation towards customer feedback, complaints and suggestions.
- Product life cycle-It tells about the life span of the product without failures.
- Product service life-It tells about the operating condition of the product and how much time is taken for its restoration of the product after its failure during its life span.
- Design improvement –It tells about the improvement in design of product with time.
- Production methodology-It tells about whether the components of the product are manufactured within the organisation or brought from outside (other manufacturing plant).
- Manufacturing planning-It tells about the planning for manufacturing of the product with consideration of cost of bill of material.
- Cost management-It tells about the management of cost of raw material and various operations performed for obtaining finished product.
- Automation type-It tells about the manufacturing automation use of work shop for product manufacturing.
- Change in business process-This criterion tells up to what extent any change in business can be incorporated in the organisation.
- Time management-It tells about the time management in various activities in an organisation

### 3. COMPARISION OF TRADITIONAL AND CELLULAR ORGANISATION

A bird eye view of this model can be had by pursuing the contents of Table 1. As this table also distinguish between the activities carried out in traditional and cellular manufacturing companies.

**Table 1:** Comparison of Traditional and Cellular Manufacturing Company

| Criterion no. | Criterion                | Traditional manufacturing company           | Cellular manufacturing company  |
|---------------|--------------------------|---|---|
| 1             | Organisational structure | Vertical, Traditional and line organisation | Flattened, and team managed organisation  |
| 2             | Flexibility              | Very Poor flexibility                       | Flexible and easily collapsible manufacturing set-ups which can quickly respond to the changes. |

|    |                             |  |  |
|----|-----------------------------|--|--|
| 3  | Devolution of authority     | Lack of empowerment, centralised and informal authority  | Self-autonomous and empowered authorities  |
| 4  | Manufacturing set-ups       | Rigid and long lasting manufacturing set-ups which are intolerable to changes.   | Flexible and easily collapsible manufacturing set-ups which can quickly respond to the changes.                                |
| 5  | Quality                     | Customer satisfaction is the target  | Customer delight is the target   |
| 6  | Productivity                | Stagnant productivity with no reasonable evaluation and improvement  | Rapid increase in productivity with practically feasible evaluation, productivity and quality are integrated                   |
| 7  | Employee's status           | Existence of specialists. Employees are not exposed to other functions and skills. Employees are inflexible and ignorant to changes. | Learning employees, multi-skilled and multi-functional and self committed  |
| 8  | Employee Training           | Employees training is not or scarily provided  | Employee training is provided in regular interval of time as per requirements  |
| 9  | Employees involvement       | Very little involvement of employees in decision making. Ideas and knowledge of employees are seldom shared or utilised.             | Fully empowered employees, ideas and knowledge of employees are fully utilised   |
| 10 | Nature of management        | Autocratic and stagnant style of management.   | Participation based management which is susceptible to changes and improvements.   |
| 11 | Customers response adoption | Customer response adoption takes place very slowly due to beauracracy  | Very fast and 100% response achieved   |
| 12 | Product life cycle          | Products produced have long life span but frequent failures and ineffective operations are encountered                               | Produced products have short life span but are free from failures and are effectively operated.                                |
| 13 | Product service life        | In case of failure of products it takes long time to repair. thus these products have long mean down time (MDT)                      | In case of failure of products it takes very little time to restore the status que. Thus, these products have no or short MDT. |
| 14 | Design improvement          | Design improvement is very rarely practised. Generally only modifications are made to the existing design.                           | Design improvement is very frequently and systematically practised by conducting experiment.                                   |
| 15 | Production methodology      | Production is dominated by internal manufacturing.   | Production is dominated by main assembly of components, external manufacturing and outsourcing.                                |

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|----|----------------------------|--|--|
| 16 | Manufacturing planning     | Manufacture planning is carried out for a long period which is cost ineffective in nature.     | Manufacturing planning is carried for short period with the focus to adopt just in time (JIT) purchase with zero or little capital investment. |
| 17 | Cost management            | Traditional costing procedure is adopted (with classification namely prime and overhead cost). | Cost is managed using activity, strategy, quality and productivity based costing system.   |
| 18 | Automation type            | Direct and rigid automation is adopted.  | Flexible, smart and adaptable automation is adopted.   |
| 19 | Change in business process | Very difficult to incorporate change in business processes, it is a almost impossible task.    | The flexible set-up enables to effect changes in business processes economically and quickly.  |
| 20 | Time management            | Time is managed very efficiently.  | Time is managed very efficiently.  |

#### 4. CONCLUSION

Cellular manufacturing has been able to successfully satisfy the dynamic demands of customers over the period of time. Many of the organisations have adopted cellular manufacturing and have been benefited by it in every possible ways. The philosophy of cellular manufacturing is dynamic and it's touching every aspect of organisation from management to production floor, quality to customer relation. Cellular manufacturing has provided organisations a platform to excel and react proactively to demands of customers.

Though, there are organisations which are not completely suitable because of this reason implementation of cellular manufacturing is not possible. Surely, the dynamic nature of customer needs and innovation driven technology is going to force such organisation in coming years to adopt cellular manufacturing.

#### REFERENCES

- [1] Ahuja, I.P.S. and Khamba, J.S. 2008 '*Total productive maintenance – literature review and directions*', International Journal of Quality and Reliability Management, Vol. 25, No. 7, pp. 709–756.
- [2] Datta, V., Samasivarao, K.V., Rambabu, K. and Deshmukh, S.G. 1992. '*Multi-attribute decision model using the AHP for justification of manufacturing systems*', International Journal of Production Economics, Vol. 28, pp.227–234.
- [3] Gunasekaran,A.(1999) '*Agile manufacturing: A framework for research and development*', *International Journal of Production Economics*, vol. 62 pp. 87-105.

- [4] Sundharam, V.N., Sharma, V. and Thangaiah, I.S.S. 2013 '*An integration of BSC and AHP for sustainable growth of manufacturing industries*', International Journal of Business Excellence, Vol. 6, No. 1, pp.77–92.
- [5] Wemmerlov, U. & Hyer, N. 1987, "*Research Issues in Cellular manufacturing*", International Journal of Production Research, Vol. 25 No.3, pp.413-431.