## Capacity Optimization and Product Development

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1101. **Background.**

In this dynamic world, new products emerge and old ones disappear, demand shifts from one product to another, innovation alters methods of production and so on. Systems should therefore be in place for speedy and unhindered development of new products and technologies for meeting challenges such as:

a. Product matrix and quantum of outturn varying widely in Production units year after year, depending upon the growth projection and budget availability.

b. And this change is notified only during the year in question without sufficient time for advance planning.

c. Similar phenomenon witnessed in the Repair workshops, and maintenance sheds though to a lesser extent, due to change in the type/technology of rolling stock.

d. Workshops and maintenance depots handling rolling stock which were equipped with systems and technologies spanning three to four decades.

Therefore it is necessary to consciously create flexible structures with complete freedom to adopt strategies like outsourcing, flexibility with regard to deployment of manpower amongst different shops within the same unit to match capacity with demand etc. The following initiatives shall be adopted depending on the requirement.

a. Staff multi tasking and multi-skilling

b. Inter-shops staff transferability

c. Outsourcing (outside the shops)

d. Outsourcing (within shops)

1102. **Multi skilling/ tasking and Inter-shop transfers**

In a Production Unit (PU)/workshop, final assembly and production of certain critical sub-assemblies and components has to be done in-house. To match changing product mix and volume, manpower may have to be re-deployed amongst shops – within the PU/workshop. Establishment rules should provide for-

a. Multi skilling

b. Multi Tasking

c. Inter-shops transfer – with seniority protection

d. Re-training and re-development

Above will enable outsourcing of non-critical jobs and the staff that may be rendered excess in these shops to be re-deployed in assembly and critical items of work.

This strategy will provide flexibility in labour availability to meet fluctuations in outturn.

1103. **Outsourcing – need to outsource**

While it may be ideal to do most of the jobs in-house to ensure strict control over quality of inputs and processes, outsourcing the work to other agencies may become inescapable, under circumstances such as:

a. There is no possibility of getting it done in other Railway workshops with known capacity and capability for the product.
b. Sudden spurt in the requirement of components/sub-assemblies far beyond the capacity of the shops

c. Need to optimize and augment capacity of core shops (assembly shops) resulting in re-deployment of personnel from non-core to core shops (component to assembly shop) with consequent capacity reduction of component shop

d. Introduction of new material/technology for which skills/capacity/equipment may not be available within the workshop

e. Standard components that can be procured from outside or the work outsourced, resulting in lowering of cost. This is due to economy in scale of production available with the supplier.

f. Short-term / one time jobs for which permanent capacity cannot be created within the workshop

g. Need for heavy inputs of infrastructure not commensurate with the quantum of required by Railways for its production.

Under these circumstances, the shop in-charge should decide to opt for outsourcing. Outsourcing can be from either a unit outside the workshop premises or an outside agency which will be required to execute the task inside the workshop.

1104. Outsourcing to units outside the workshops.

Components and assemblies can be outsourced to unit a outside the PU through a system of tendering, keeping in view the under mentioned guidelines:

a) Decision on outsourcing shall be taken at the level of the Workshop / Factory In charge, with Finance Concurrence, except for certain critical components as excluded by the PHOD wherein criteria for outsourcing as and when needed will be finalised by HOD of Workshop for Zonal Railways only, in consultation with associate finance.

b) Pricing guidelines shall be established on the basis of in-house manufacturing-cost-excluding overheads and overheads to be added at commercial rates for cost comparison.

1105. Outsourcing or contracting for works within the Railway Premises.

In case of certain sub-assemblies, assemblies and critical items, it becomes necessary that manufacture, assembly and/or testing is carried out inside the Railway premises by the contracting party due to reasons such as:

a. Need to control of quality of raw material
b. Facilitate control of quality of workmanship through stage inspections
c. Specialized large-scale infrastructure needed for the manufacturing process may not be available with vendors.
d. Need for investment in costly specialized equipment, which are otherwise not usable by the vendor for other general products manufactured by the vendor. Since both these aspects will inflate his bid price which will ultimately get loaded on the cost of production. Special tooling required for the job
e. Component/processes forming part of an assembly line in the Production Unit or Workshop.
f. Logistical problems and disproportionate transportation costs.

1106. While outsourcing within the shop facilities, all safeguards in Para 1103 shall be ensured. In addition, to avoid contract disputes, care should be taken to see that following conditions are fulfilled and precautions taken:

a. Work area for the contractor to be separated from that of Railway staff  
b. Shared machine and equipment time available to the contractor to be clearly defined to avoid mix up  
c. Wherever raw material and consumables are to be supplied by the Railway, stock should kept separately and accounted for.  
d. Consumption norms for raw materials and consumables to be evolved for each item issued to the contractor by the Railways  
e. Documentation to be signed by both Shop Supervisor and Contractor  
f. Electric power, water and utilities including tools provided by the railways to be accounted and documented  
g. Control of quality of workmanship by in process inspection  
h. Accountal of scrap / left over material to be returned by contractor to be accounted and kept separate  
i. Industrial safety standards as prevailing in the shop shall apply to the contract workers.  
j. All relevant legal provisions and their compliance to be ensured.

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<tr>
<th>Sl. No.</th>
<th>Precaution to be taken</th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>1</td>
<td>Has separate work area for contractor been earmarked</td>
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<tr>
<td>2</td>
<td>Has requirement of Railway supplied consumables – like special electrodes, water, electricity etc. been computed and listed</td>
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<td></td>
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<tr>
<td>3</td>
<td>Has material requirement for outsourced job been separately worked out</td>
<td></td>
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<tr>
<td>4</td>
<td>Has machine hours for use of Railway equipment for the job been computed and listed</td>
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<tr>
<td>5</td>
<td>whether payment to contract workers is being made through bank, in a transparent manner</td>
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<tr>
<td>6</td>
<td>Have contractor’s workers been issued separate ID</td>
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<tr>
<td>7</td>
<td>Is an accounting system in place for contractor supplied items, raw materials and consumables</td>
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<tr>
<td>8</td>
<td>Has workshop supervision been organized to check on the work</td>
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<tr>
<td>9</td>
<td>Has the contractor complied with all legal provisions required under law, for which the Railway has an onus of responsibility</td>
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**Note:** The answer to all the items is to be ‘yes’, Before outsourcing Contract is awarded.

1107. ERP Based production management

ERP based systems for production Management optimizes resource allocation and utilization ERP has become a powerful tool in cost optimization. ERP based
system should be developed specifically to cover various aspects on Material Management, M&P and Assets Management, Progress of work and Quality in all workshops & major LCDs, in order to achieve cost optimization. Details are covered in chapter 9:

1108. **RDSO’s role in vendor approval and product inspections/ development**

RDSO is the technology center of Indian Railways and has to perform the role of R&D. Industries usually spend 2 to 3% of their turn over on R&D. To concentrate on this core function, RDSO should confine themselves to approval of new types of rolling stock, new technologies and new systems. Subjects like new manufacturing systems/related technologies should be left to the Design & Development wing of PUs.

In order that RDSO’s role is focused on product / process research and in areas of new technologies and new materials, their involvement in vendor development/inspection should be restricted to important items of wagons only. Further RDSO should play the key role in development of selected new products including prototype approval, as directed and monitored by Railway Board.

1109. **Innovation**

In a competitive environment, the survival of an organization depends on innovation to a significant extent. Innovation helps attainment of

a. Cost optimization  
b. Higher productivity  
c. Quality enhancement and safety  
d. Ease of maintenance

The above objectives are relevant in the context of Railways facing increasing competition from Road and Airways in both freight and passenger segments. The areas of focus for innovation are:

a. Process improvement through advanced technologies  
b. Productivity enhancement through process modification / simplification/ reengineering  
c. Cost reduction through new material, technology and material substitution  
d. Worker motivation through improved environment ergonomics transportation cycle time and effort reduction  
e. Reduction of wastages, inter-shop movements and reduction in material usage  
f. Reduction in rejections and consequent savings in cost of re-working and/or wastage  
g. Reduced maintenance through design enhancement and quality enhancement

1110. **Strategies for innovation**

a. Employee participation  
b. user and the manufacturer  
c. Interaction between Design office and the production shop.  
d. Suggestion schemes  
e. Reward schemes for successful innovative practices  
f. Study of new technologies and material science
g. Continuous and focused market watch/research, to observe emergence of new technologies, materials, practices
h. Effective inter-change of information amongst different workshops
i. Focused R&D effort
j. Creation of cross functional teams for innovative suggestions.
k. Encourage patenting by railway employees for all inventions including those used in railways.
l. Railway Workshops to provide reasonable prototyping support to innovative personnel who have registered for patents relating to railways while permitting reasonable rights to the inventor to promote the spirit of invention for perpetuating technological development and growth.
m. Institutionalizing the process of assimilation of new patented technologies developed by inventors amongst railway men by assigning this responsibility to a senior official.

1111. Utilization of surplus shop capacity

Surplus capacity can arise in a Production Unit or Workshops due to downward fluctuation of loads, addition of new equipment or induction of new technology. Many production units in the public sector are augmenting revenue by taking short run orders from private parties to utilize such capacities. Outside jobs can be undertaken by Railway units provided:

a. Full capacity utilization is not achieved by existing Railway jobs on hand
b. Advanced production against Railways’ requirement for succeeding years cannot be undertaken now due to budgetary constraints
c. Not taking extra orders would result in idle man-hours and idle machine-hours

1112. Process of procuring outside orders.

Before setting out to exploit the surplus shop capacity, following action must be taken:

a. Classify the types of jobs to be undertaken
b. Advertisements are issued specifying types of jobs that can be undertaken and production facility available
c. Decision based on
   i. “Available capacity”
   ii. “Capacity job match”
d. Man-hour rate and machine hour rate excluding overheads should be computed.
e. Cost of support services like power, water, compressed air to be computed in unit consumed basis
f. Cost of consumable materials like electrodes, lubricants, cleaning items etc. to be computed on unit basis
g. Records to be maintained for each jobs for all the above on actual utilization basis.
h. Correlation between consumable items and man-hour and machine hour to be worked out as a standard for costing

1113. Profitability:

Wherever Railway overheads are high, cost of undertaking jobs to outsiders inside the Railway Workshops would be uncompetitive and un-remunerative for potential clients. In such cases, principles laid down at Para 723 for costing of export
should be followed to establish the bottom line so that viability is ensured both to the potential client and the PU/workshops.

**1114. Annual Maintenance Contracts for M&P**

The millwright organization in production units/ workshops and open line takes care of M&P maintenance. Over the years, with increasing sophistication and extended use of electronics based control systems in M&P, the skills of millwright staff have not been upgraded to keep pace with maintenance requirements. The maintenance cover for M&P therefore should be adequately provided by way of annual maintenance contracts with the original equipment manufacturers (OEMs) or their authorized agents, where feasible, to ensure that the assets is productively utilized with adequate uptime. Such annual maintenance contracts can also be concluded at the time of purchase of M&P item by factoring-in the AMC cost along with the purchase price. The objective of AMCs shall be to provide a high up-time for the M&P items by providing a reliable maintenance support.

**1115. General**

The contents of this chapter are applicable to all establishments of Rolling Stock Production and Maintenance i.e Production Units, workshops & LCDs of open line establishments.