

Appendix B-4

What is "Plan to Cost"?

"Plan to Cost" is a link in the chain "Design to Cost." The procedure shown below is similar to that for DTC.

1. Plan to Cost Connection with Design to Cost (Fig. 1)
2. Operation of Plan to Cost (Fig. 2)
3. Details of the Steps for Plan to Cost (Table 1)
4. Trade Study Example During The Manufacturing Plan (Table 2)
5. Example of Cost Driving Factor During Manufacturing Planning (Table 3)
6. Concept Image of Breaking Point of Manpower If Increasing Tolerance (Fig. 3)
7. Example of Checklist for Manufacturing Drawing (Table 4)

Fig. 1 Plan to Cost Connection with Design to Cost

Upper stream of plan to cost is design to cost, down stream of plan to cost is manufacturing cost are shown below.

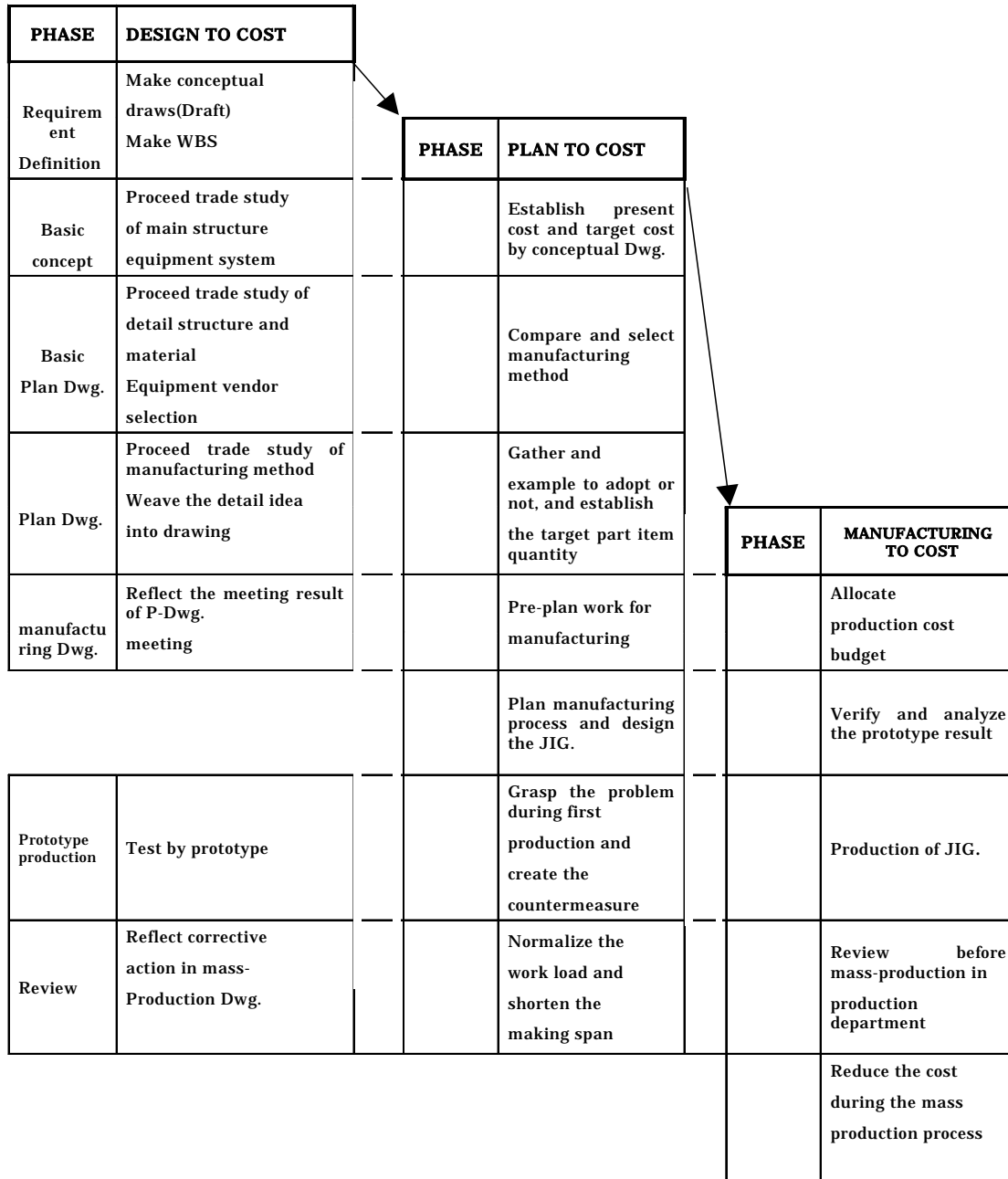


Fig. 2 Organization of Plan to Cost

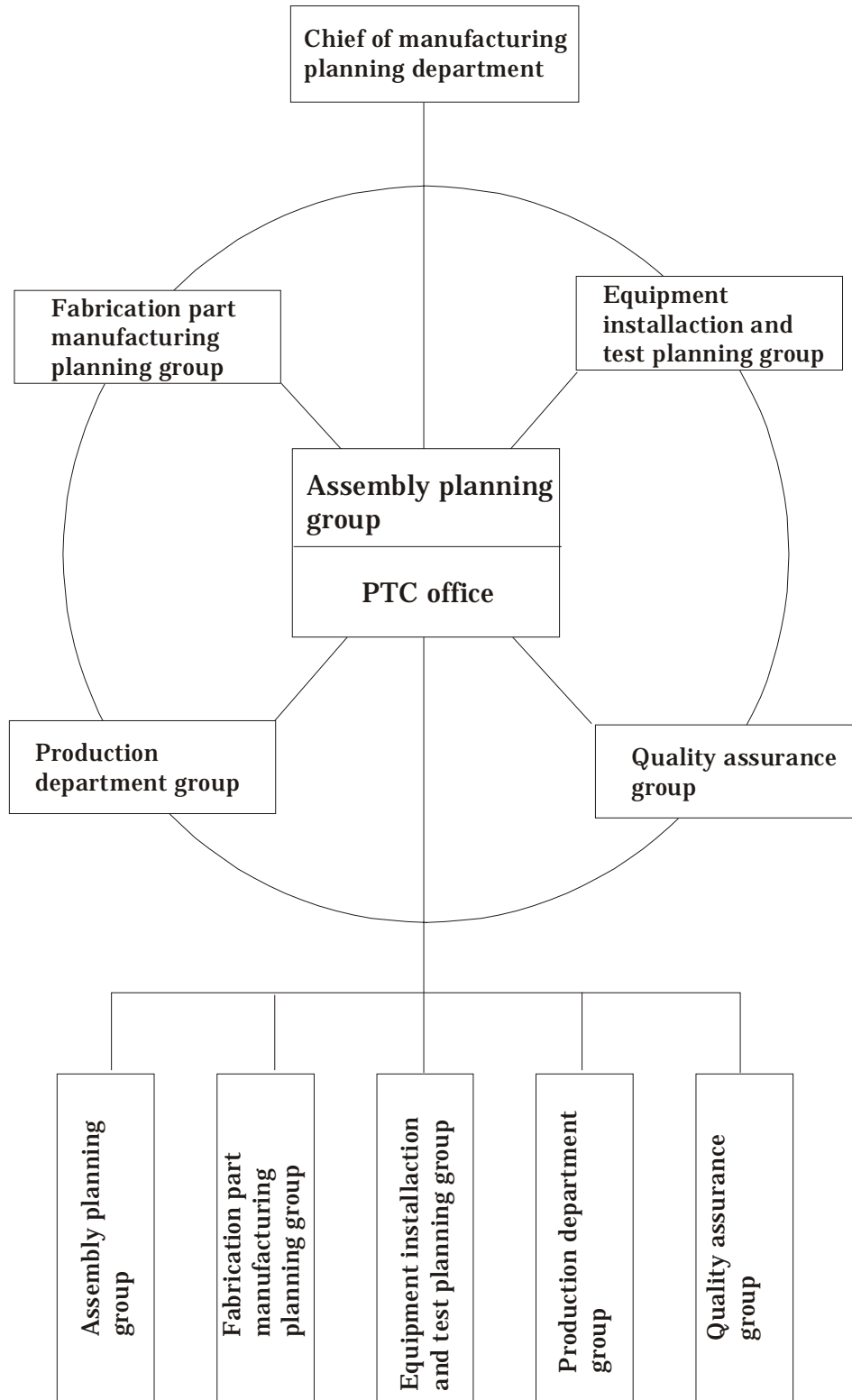


Table 1 Details of Steps in Plan to Cost

Phase () means DTC output	Step contents	Input		Output		Notes conditions	Output approval level
		Item	Pre-assurance activity	Item	Post assurance activity		
Original Concept (Basic concept Dwg.)	Establishment of the Present cost and the target cost by conceptual Dwg.	<ul style="list-style-type: none"> Concept Dwg(Draft) Required Performance Related matter 	Estimation work by the conventional design and manufacturing method	<ul style="list-style-type: none"> Present cost Target cost(Draft) Implementation plan of PTC PTC cost schedule graph 	<ul style="list-style-type: none"> Decide the target cost Decide conceptual Dwg. 		<ul style="list-style-type: none"> Design chief Manufacturing planning chief Project manager Factory chief
Break down structure (Basic plan drawing)	Selection of manufacturing method concept	<ul style="list-style-type: none"> Experiences of past productions Conceptual Dwg. DTC cost scheduled curve 	Selection of manufacturing method concept	<ul style="list-style-type: none"> Item list of wants and idea to be weaved into drawing Item list of wants and idea to be weaved into manufacturing plan Manufacturing Type/concept concept(plan), basic plan drawing 	Decide concept of manufacturing type by trade study.(e.g. structural breakdown, special process and its type)	Estimate the present cost and allocate the target cost first time.	<ul style="list-style-type: none"> Manufacturing planning chief Design chief
Basic matter Basic design (Plan drawing)	Examination to adopt or not the wants/Idea to be weaved into drawing and manufacturing plan. Decision of target number of part items.	Item list of wants and ideas to be weaved into drawing	Examination Meeting (Decision group) Adopt or not (Man of planning group)	Plan drawing of adopted wants/ideas	Grasp the number of part items by plan drawing and decide the target number of part items	Estimate budget for JIG making *Everything must be real base	<ul style="list-style-type: none"> Design chief Manufacturing planning chief
Detail matter Detail design (Manufact uring drawing)	Pre-plan work	<ul style="list-style-type: none"> Plan Dwg. P-Dwg. meeting schedule PTC scheduled Curve 	<ul style="list-style-type: none"> Exact wants and ideas by looking at plan drawing among the concerned people. P-Dwg. Meeting. And pre-plan work by draft of manufacturing drawing 	<ul style="list-style-type: none"> Decided item to be weaved into drawing Estimated part items and its number Item list of planning improvement 	Estimate present cost of each plan drawing. Divide the cost reduction by design and manufacturing method	Proceed plan work by considering cost driving factor of manufacturing process and work.	<ul style="list-style-type: none"> Planning chief
Implement ation (Prototype production)	Main planning work	Item list of planning improvement	<ul style="list-style-type: none"> Weave the improvement ideas into shop order, tool order, tool design order. Estimate the improved cost effect 	<ul style="list-style-type: none"> Estimated man hour for prototype 	Difference analysis between estimated M/H and target M/H and estimation M/H of counter measure	Proceed plan work by considering cost driving factor of manufacturing process and work.	<ul style="list-style-type: none"> Planning chief
Review	Problem extraction by prototype and counter measure plan	<ul style="list-style-type: none"> List of counter measures List of key question 	Extract the problem thru prototype production and counter measure of problem	Item list and its effect to be improved in mass-production planning	Approval		<ul style="list-style-type: none"> Production department chief Planning chief Design chief
Normalizat ion of work load	Normalizing of work load and shortenig the making span	Prototype Manufacturing assemble part list	Normalize work load by simulation	Manufacturing assembly parts list for mass-production	Make part order list for mas-production		<ul style="list-style-type: none"> Production department chief Manufacturing planning chief

Table 2 Trade Study Example During the Manufacturing Plan

	Upto plan drawing phase	Manufacturing drawing phase	Production phase
Common and Assembly	<ol style="list-style-type: none"> 1. Assembly breakdown and sequence. 2. Tact line breakdown structure. 3. Concept of assembly Jig. 	<ol style="list-style-type: none"> 1. Working posture of work man in Assembly line. 2. Breakdown structure of Jigs. 3. Effectiveness of power tool.. 	<ol style="list-style-type: none"> 1. Trade study of counter measure investment effectiveness(Do or not). 2. Trade study of counter measure wants/idea.
Fabrication Part	e.g. Cutting speed trade the effectiveness and necessary investment money	<ol style="list-style-type: none"> 1. Trade study of which fabrication or Forming is totally effective. 2. Trade study between preciseness of tool and reduction of man hour (e.g. Number of stiffener between frames) 	<ol style="list-style-type: none"> 1. Measures to prevent the distortion or ward of parts.

Table 3 Example of Cost Drawing Factor During Manufacturing Planning

Category	Factor to be reduced	Factor to be increased	Note
Process plan	<ol style="list-style-type: none"> 1. Number of process 1. Number of person for one process 2. Number of crane/lift at necessary Scene 4. Number of excess trim work 5. Number of paint 6. Number of writing document 7. Number of functional test 8. Number of posture to up ward 9. Number of harness board 10. Number of inspection 11. Number of soldering 	<ol style="list-style-type: none"> Number of parallel working Net trim number Number of low price purchase than implant cost 	<ol style="list-style-type: none"> 1. Number of order means In wide sense: Number of load center in narrow sense: In narrow sense: Number of settings 2. No bench test before installation but provide the harness for trouble shooting
Tool design (Including tooling manual)	<ol style="list-style-type: none"> 1. Number of fastening 2. Number of fastening action 3. Number of adjustment 4. Weight of tool 	<ol style="list-style-type: none"> Number of scaffoldings Number of scribing line in Jig 	<ol style="list-style-type: none"> 3. Standard weight · Up to 10kg for one person · Up to 40kg for two person work Increase scaffoldings to go to next scaffolding The many scribble line in the Jig, the better and quick corrective action
Facility Examination	<ol style="list-style-type: none"> 1. Waiting time before starting work and closing time before stopping the machine 2. Cycle time of process 3. Operating time of crane or lift 4. Number of person to operate the crane 	<ol style="list-style-type: none"> Number of automatic machine number of power tools 	<ol style="list-style-type: none"> 2. Reduction of cycle time must include cutting speed, depth of cutting etc.
Examination of handtool	<ol style="list-style-type: none"> 1. Weight of hand tool 	<ol style="list-style-type: none"> Number of power tools Number of one man operating tool 	<ol style="list-style-type: none"> Example and allocate the scene which is necessary to have special tools before purchase

Fig. 3 Concept Image of Breaking Point of Manpower if Tolerance Increases

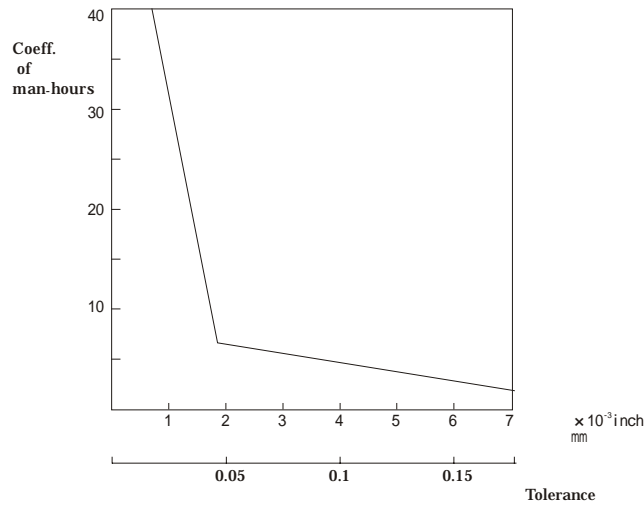


Table 4 Example of Checklist for Manufacturing Drawing

DTC checklist for manufacturing drawing (Examine the idea from statement of function shown in plan drawing)		Drawing No.	Check ed by	Group leader/r	Section Leader	Department chief
PHASE (Check plan drawing before making each manufacturing drawing)			Date			
1 . Did you request and receive the wants and ideas by showing the plan drawings?						
2 . Are there any parts in common?						
3 . Are there any themes or parts to be integrated into one part or function?						
4 . Are there any parts which can be substituted by a lower costing part?						
5 . Are there any places where the cost driving factors can be reduced?						
6 . Is it possible to realize the target number of parts allocated for each plan drawing if you approve this drawing?						
7 . Did you record the scheduled theme to be examined in the mass-production phase drawing?						
PHASE (Before pre-planning)			Date			
1 . PHASE -Does this drawing involve the theme examined in Phase I.						
2 . Did you realize the target number of parts allocated. If not, did you ? the potential theme to be examined at mass-production drawing phase						
PHASE (After pre-plan work)			Date			
1 . Did you finish examining all proposed items from the manufacturing and quality departments?						
2 . Are there any additional themes to be examined in the mass- production drawing phase?						