

3.2 The Details of the Steplist Method and Advanced Analysis

3.2.1 Introduction

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3.2.1 Introduction

In section 2.2 of Chapter 2, the author described the basic idea of Steplist Management, the procedure to use it and ways of applying it. In this section, the author would like to touch on a specific example in which this method is made into a hierarchy.

This specific example is drawn from the implementation of the Design to Cost technique in the process of developing a very large system, which will be described later. However, this example can be applied to small and medium-sized companies if the technical terms used here are replaced by those of the industry in question. Because several companies were working together to establish the system described below, the process was broken down into three levels with each level connected.

3.2.2 Specific Examples of Steplists in an Airplane Development Project

3.2.2.a Hierarchy Found in the Example

The hierarchy found in the example is as shown in Figure 3.2-1 and the three levels are:

- Integrated System Level (the level at which the system is integrated)
- Equipment Specifications Level (the level at which equipment specifications are determined based on the integrated system level)
- Equipment Vendor Level (the level at which equipment is designed and manufactured)

based on the equipment specifications)

3.2.2.b

The contents of the implementation plan at each level are virtually the same. A basic model is shown in Figure 3.2-1. Vary the contents according to conditions at each level.

3.2.2.c Including the Steplist Management Method in the Implementation Plan and Its Effect

(1) Make a complete steplist following the procedures described in section 2.2 of Chapter 2. Then, make list item no. 7 in the implementation plan (Figure 2.7-2) as described in section 2.7.

(2) The implementation plan (in this case, the cost control implementation plan) is to be approved in the first phase of the steplist (the phase in which one decides one's own positioning). The development project is to be managed based on the implementation plan.

As a result, the people in charge come to perform, on a daily basis, the precise jobs that are consistent with the evaluation standard set for the input and output of each level, and the implementation process is carried out from one level to another.

(3) In development projects implemented by government agencies, the verification and evaluation documents are drafted as supplements so that the evaluation standard and other standards are more precise and objective.

The verification document shows the premises and procedures to verify the appropriateness of the output of each level (In this case, the cost verification document states what type of materials should be used and how they should be used in order to verify the appropriateness of the cost).

3.2.3 Steplists at the Integrated System Level

Table 3.2.2-1 shows a steplist for aircraft development at the integrated system level [5] which was made based on the previous analysis. This steplist is not only intended to manage the development project, but also to include the Design to Cost method so that the

average unit production cost of an aircraft at the point of mass production is integrated with the targeted cost.

The column labeled "Content of Step" in Table 3.2.2-1 shows preliminary titles created when this steplist was made. Table 3.2.2-2 shows how these preliminary titles correspond to each phase of standard steplists.

3.2.4 Steplists at the Equipment Specifications Level

Table 3.2.3-1 shows a steplist of the equipment specifications level. This steplist corresponds to Phase I-2 "Establishment of Basic Concept" through Phase III-1 "Production of Aircraft for Test and Examination Completion" of Table 3.2.2-1. The column labeled "Contents of Step" in Table 3.2.3-1 corresponds to the eight basic phases of the standard steplist as shown in Table 3.2.3-2.

3.2.5 Steplists at the Equipment Vendor Level

Table 3.2.4-1 is a steplist at the equipment vendor level.

This steplist can be roughly divided into two parts, namely "Preparation to Join the Project" and subsequent phases. Table 3.2.4-2 shows how Table 3.2.4-1 corresponds to the eight basic phases of a steplist.

3.2.6 Reciprocal Relationships between the Three Steplists

Table 3.2-5 shows the reciprocal relationships between the integrated system level (Table 3.2-2), the equipment specifications level (Table 3.2-3), and the equipment vendor level (Table 3.2-4).

3.2.7 Considerations

When the Steplist method was officially applied in national development projects, the following effects were observed ([5] pp. 271-278, pp. 345.35).

3.2.7.a Effects Found in the Implementation Process of Development Projects

1) It is possible to appropriately break the implementation process into phases.

It became possible to precisely accomplish the idea of "positioning the implementation plan between two organizations" described in Figure 2.7-1.

2) It is possible to match the steps that are thought to be most appropriate and complementary in each phase with each phase of decision-making process.

3) It is possible to appropriately connect steps by utilizing connecting points of phases as connecting points of multi-step processes.

4) In order to make decisions based on the output of each phase, especially in the first four phases of the steplist, it is necessary to compare more than two plans. This requirement was made a mandatory part of the process by having a mechanism that requires creative activities that result in more than two plans, and by allocating a part of the budget to these creative activities.

5) It is possible to objectively set "evaluation standards for the output of each phase" in detail so that the implementation process is carried out from one phase to another. Therefore, it is easier to clarify which things need to be done in each phase than with conventional methods.

6) As shown in Figure 3.2-3, it is possible to create better integrated plans and procedures by combining the aforementioned characteristics of the Steplist method with the characteristics of the PERT method and the Gantt Table (The scores shown in the Table were given by a person who has used these methods).

7) If the PMD method and the Steplist method are used in managing development projects, it is possible to make implementation plans and related instructions that physically enable implementations of the following managerial functions:

- Risk Control (including cost and schedule perspectives)

- Quality Control in the broad sense (especially implementing the requirements for design control found in ISO 9000 and ISO 14000)
- Cost Control (previous management of mass production costs, development costs, and lifecycle costs)
- Schedule Control

3.2.7.b The Relationship between the Steplist Method and the Basic Principles of Conventional R&D

The following are the well-known basic principles for how program/project management should proceed:

- The Department of Defense of the United States of America: MIL-STD-499A System Engineering [6]
- NASA: NBH-7121.4 Guidelines for Project Planning [7]

Both require engineering plans that assure the precise and integrated management of technical programs. Both also require implementation procedure documents that set guarantees and evaluation standards for engineering plans.

It is possible to make concise procedure documents and related instructions that physically enable one to realize the above requirements if the Design to Cost method [2] and the DTCN method [1], which is the combination of the PMD method and the Steplist method, are combined.

3.2.7.c Important Notes

1) The following are Important notes in applying the Steplist method to development projects:

Approximately 3% of the development cost, or 10% of the total man-hours of development engineers (See Note) should be allocated to managing the development project, including the creation, comparison and selection of comparative plans and cost control (which attempts to optimize the lifecycle cost of the particular output being developed and the

development cost). The parties who requested the R&D project should call on those in charge of development to present reports on their activities.

(Note) Both figures are based on past experience.

2) With this, those in charge of development are made to perform within the allocated budget. As a result, the output, as an effect of budget investment, will be optimized.

3) In this section, the Steplist method is described in relation to ordinary development projects. Therefore, for wider-ranging development projects or new development projects, it is necessary to collect knowledge about the width and depth of thinking and actions from the experts and parties involved before starting an R&D project. For this purpose, "A new technique to create the Domains of Thinking and Consensus among the parties involved in R&D," which is described in section 3.1, is useful. More specifically, insert methods to materialize knowledge and the wisdom extracted through this new technique into a steplist broken down into phases.

4) Once a steplist is made for a certain level of an R&D project, it is easy to make steplists for other levels of the project, either from the top down or from the bottom up. In this sense, the Steplist method can be applied to making national policies for technology and administration.

3.2.7.d Future Perspectives

1) It is possible to format the Steplist method and examples of its application, and to compile them as computer software so that this information can be reused. It is also important to revise the contents whenever necessary, and compile the revised contents accordingly. It is necessary to preserve data, such as the figures that are obtained through planning and control, using steplists.

2) It is necessary to standardize formatted information according to the types of project, and use this standard as a guideline. By doing so, software applications can be created. At the same time, it is necessary to combine the achievements of this method with existing software and knowledge of management methods in science and engineering, and to

develop integrated software and groupware.

3) As the formatting and compiling process proceeds, it is feasible to establish an active database that can be used for creating technology and administrative policies. In this case, one important premise would be to include rules of periodic revision (every two years is adequate) through the 3-5 Phase Improvement technique of the implementation plan in question because technology, including software, and the environment constantly change.

<References>

- [1] Michihiko Esaki, Sankasya no Sozosei wo Hikidasu Kenkyu/Kaihatsu/Gutaika no Hoho: Design to Customers' Needs (DTCN) no Hoho, Kenkyu/Keikaku Gijutsu Gakkaishi 5 (2), pp. 161-182 (1990).
- [2] Michihiko Esaki, Design to Cost no Atarashii Kangaekata to Sono Tejun, Sangyo Noritsu Daigaku Syuppanbu (1984).
- [3] National Space Development Agency, Japan, NASDA-STD-4 Design to Cost Jisshi Hyojun (1985).
- [4] Michihiko Esaki, Kenkyu Kaihatsu Kankeisyakan no Domain of Thinking no Chusyutsu to Sore niyoru Consensus no Keisei no Shinsyuhou, Kenkyu Kaihatsu Gakkaishi (proofreading completed)
- [5] Kokuuchukogakukai, Koku Uchu Kogaku Binran, Maruzen, pp. 346-347 (1992).
- [6] The Department of the Defense of the United States of America, MIL-STD-499A System Engineering (1974).
- [7] NASA, NBH-7121.4 Guidelines for Project Planning (1972).

Figure 3.2-1 Hierarchy of DTC Activity including Vendor (Ref. [5])

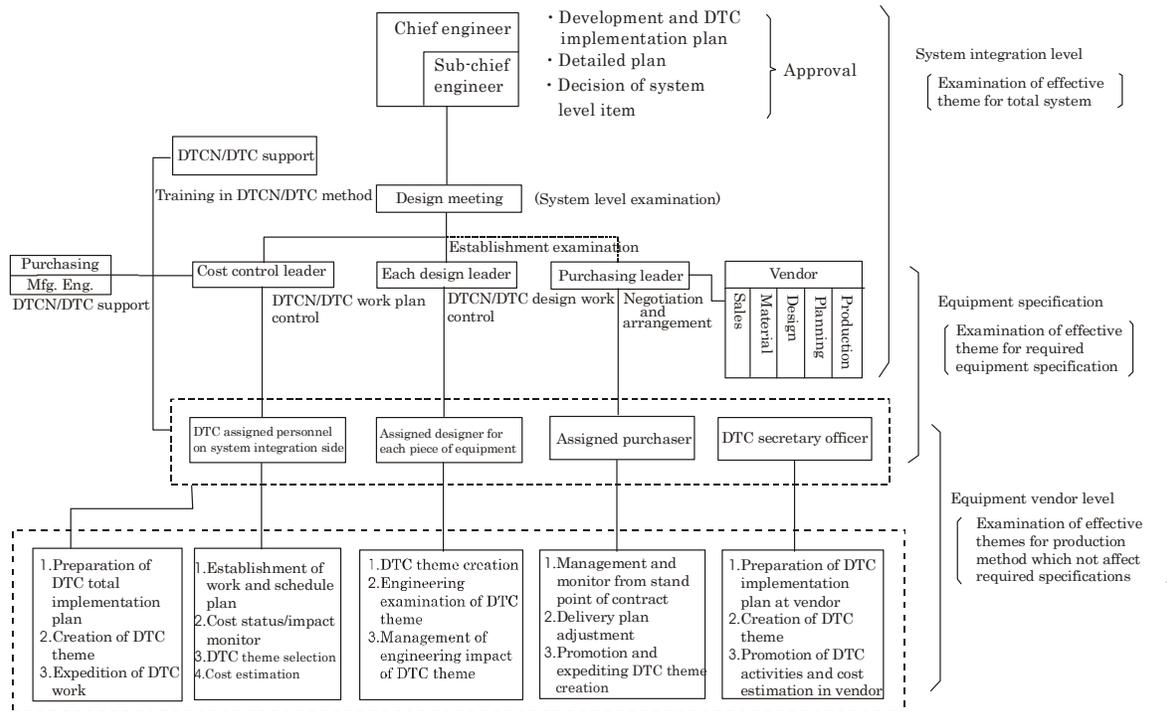


Figure 3.2-2 Hierarchical Example of Implementation Plan for Development and DTC/Cost Control

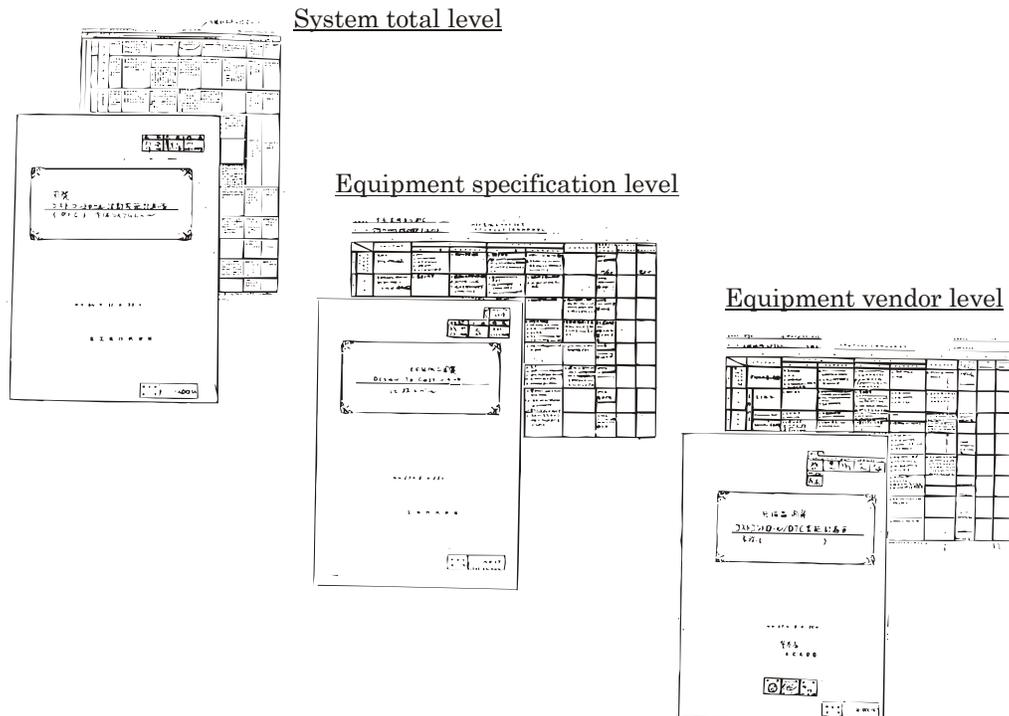


Table 3.2-1 Table of Contents of Implementation Plan for Development and DTC/Cost Control

Table of content of Implementation plan for Development and DTC/cost control	
Chapter	Contents
1. The purpose of this document	<ul style="list-style-type: none"> • State “the purpose of this document is to provide the procedure and the organization”
2. Purpose of this implementation plan	<ul style="list-style-type: none"> • State “the concrete purpose of this project”
3. Related document/Referenced document	<ul style="list-style-type: none"> • State “according what ,this implementation plan is implemented”
4. Basic policy	<ul style="list-style-type: none"> • State the basic policy in the style of “verb+noun”
5. Organization of activity	<ul style="list-style-type: none"> • Show the promoting secretary office,task team position in the organization
6. Goal/Target and condition	<ul style="list-style-type: none"> • Establish the target cost as the one of the goals and production number with fixed yearly price
7. The objective and scope	<ul style="list-style-type: none"> • Define what and scope
8. Development work phase and contents	<ul style="list-style-type: none"> • Show the clearly divided phase by steplist and state the contents of each phase in brief sentences
9. Development schedule by bar chart (Gantt chart)	<ul style="list-style-type: none"> • Show the contents of steplist by bar chart (Gantt Chart)
10. Requirements of “What and How” in each intermediate report and their formats	<ul style="list-style-type: none"> • Show the related format to avoid insufficient reporting at each intermediate report point.

Table 3.2-2-1 Actual Steplist for Aircraft System, Total

Aircraft system, total		Development of XXX and cost control		Step list														
Title :		Develop a cost effective XXX aircraft																
Key work :																		
Div.	Phase	Contents of step	A		B		C		D		E		F		G		H	
			Step	Item	Input	Pre assurance activity	Item	Output	Post assurance activity	Other conditions	Who approves the output and schedule	Scheduled attendees at output examination meetings						
Concept design and deployment	I-1	Establishment of concept	Approval of implementation plan document	1.Design baseline and estimation method of production unit cost 2.Assembly sequence chart (Pre-draft)		1.Establish the development and cost control implementation plan document	1.The development and cost control implementation plan document	1.Approve the development and cost control implementation plan document	1.The implementation plan document is to be approved with design concept examination	1981/12/mid	Person concerned with planned document examination							
	I-2		Establishment of basic concept (Design work by DTC work sheet)	1.Design baseline 2.Assembly sequence chart (Pre-draft) 3.WBS(level 5) 4.1st RFQ to equipment vendor	1.Establish the work priority of DTC worksheet 2.Review of design baseline by designer,prod.planner, purchasig person to proceed DTC 3.Work by DTC worksheet 4.Obtain 1st estimation from vendor 5.Estimate and allocate target cost of production (level 5, 1st time)	1.Basic concept 2.WBS 3.Target cost(level 5) 4.List of wants 5.Assembly sequence chart(draft) 6.Preliminary estimation of equipment	1.Examination of the conceptual drawings by company and Government officer	1.Target cost(level 5,preliminary must be approved at this phase 2.Wants means the necessary conditions to allocate the target cost from the point of design and manufacturing engineering	1982/2 end	Person concerned with basic design drawing examination								
	I-3	Development of concept	Establishment of basic concept drawing and allocation of target cost(2nd time)	1.Basic concept 2.Assembly sequence chart (Draft) 3.List of wants 4.Preliminary estimation of equipment by vendor 5.1st estimation of equipment by vendor	1.Clearly define the engineering concept and estimate the cost by using the cost estimating worksheet 2.Complete basic concept dwg. 3.Review the target cost(level 5) by basic concept drawing	1.Basic concept drawing 2.Allocated target cost(level 5, 1st time) 3.Created measure,idea(plan), to realize the target cost - Items how to proceed - Conditions how to purchase	1.Adjust and agree how to proceed the task of left side column among the concerned section(planning, purchasing quality, controller) 2.Examine and approve the designed drawing(part 1)	1982/5 end	Person concerned with basic design drawing examination (Part 1)									
	I-4		Development of design	Completion of basic plan drawing(Design work by using DTC trade work sheet)	1.Basic concept drawing 2.Target cost(Level 5) 3.Measure idea(plan) to realize the target cost	1.Trade the concept by using DTC trade worksheet 2.Make the drawing according to the result of trade study 3.Estimate cost by above 2 and review target cost	1.Basic plan drawing 2.Assembly sequence chart 3.Jig drawing of long lead time 4.Target cost (level 5, 3rd time)	1.Approve basic plan drawing 2.Approve the allocated cost of each sub-contractor portion	1.All pre-review examination work is to be proceeded by reviewing the DTC trade studied result and the cost status report graph									
	Selection of engine	1.The wants for engine and adjustment items by design group 2.RFQ to engine manufacturer by Government		1.Explanation of details of engine to prime contractor and Government by potential engine manufacturer 2.DTC trade study at potential engine manufacturer 3.Work together as necessary 4.Draw aircraft plan drawing for each potential engine	1.Final proposal from potential engine manufacturer 2.Aircraft plan drawing for each potential engine	1.Survey of engine manufacturer by design team (engineer,purchasing,etc) 2.Contractors work together with Government in final engine selection	1982/10 end	Person concerned with basic design drawing examination (Part 2)										
	Selection work of equipment and vendor	1.2nd RFQ (draft) a.Engineering requirements b.Conditions to estimate c.Buyer's terms and conditions for basic material purchase agreement d.Requirements for DTC		1.Decide final specification and target cost and send RFQ to potential vendor 2.DTC trade work at vendor 3.Vendor makes final proposal for selection	1.Final proposal of equipment vendor 2.Puechasing agreement with vendor (draft)	1.Compare and select the equipment and vendors 2.Draw plans of selected result 3.Contract with selectd vendor 4.Start DTC trade work at equipment vendor (1)High cost equipments (2)High cost materials	The RFQ to vendor must be twice. 1st RFQ is to find what can be purchased or developed 2nd RFQ is to define final specifications which we want to buy The 1st RFQ result and detailed examination on aircraft design side											
Detailed design	II-1	Detailed plan dwg.	Design work by DTC trade worksheet to complete the detailed drawing	1.Basic plan drawing 2.Target cost(WBS level 5) 3.Measure idea(draft) to realize the target cost	1.Make detailed design cost control implementation plan 2.Design work by DTC trade work sheet 3.Re-allocate target cost by reviewing the detailed plan drawing	1.Detailed design cost control implementation plan drawing 2.Detailed plan drawing 3.Target cost(level 5,final) 4.Assembly sequence chart 5.Jig drawing of long lead item	1.Approve the detail design cost control implementation plan 2.Approve detailed drawings	Approval of detailed design cost control implementation plan must be done with detail planned drawing examination	1983/3 end	Person concerned with detailed design drawing examination (Part 1)								
	II-2		Parallel work	Detailed design(Manufacturing drawing) by cost driving factors	1.Detailed plan drawing 2.Cost driving factors	1.Proceed the design work considering cost driving factor 2.Draw detailed drawing in accordance with results of DTC trade study at detailed drawing phase 3.Meet to examine the plan drawing in detail (P-dwg examination meeting) with production and purchasing people before starting to draw each manufacturing drawing at prime contractor and sub-contractor company	1.Manufacturing drawing(draft) 2.Manufacturing drawing(decided)	Manufacturing drawing(decided) are released after pre-planning work by manufacturing planning group	1.Pre-planing means mfg. Plan by draft of mfg. Drwing 2.Final-planing means mfg.plan by decided mfg.drawing 3.The monitoring of effort in P drawing examination meeting is evaluated by counting the number of created theme/ideas vs the scheduled curve for monitoring	1983/3 end								
	II-3	Detailed drawing (Mfg. dwg.)		Manufacturing planning	1.Manufacturing drawing(draft) 2.Manufacturing drawing(decided) 3.Target cost(level 5) 4.Main planning work	1.Pre-plan work(adjust and solve the problem of mfg. and purchasing 2.Main planning work	1.Operation procedure sheet 2.Jig drawing 3.Purchasing conditions 4.Estimation of unit production cost (II-3)		about 1984/6									
Test	III-1	Product for test and evaluation	Parallel work	Production of aircraft for test and examination completion	1.Manufacturing drawing 2.Operation procedure sheet 3.Jig drawing 4.Purchasing conditions 5.Rule of summerizing the resultant cost	1.Produce test specimen 2.Produce test aircraft	1.Tested specimen 2.Improved aircraft 3.Sum of practical costs	1.Examine and evaluate the final results in development examination meeting	1986/3 end	Person concerned with completion examination								
	III-2			Final examination and verification of unit production cost	1.Improved aircraft 2.Sum of practical cost in development	1.Evaluate results of test aircraft and choose the planned improvement in production aircraft 2.Estimate to do the above	1.Improvements item for production 2.Estimation of production cost 3.Estimation of production jig	1.Prepare the production phase contract 2.Summarize the results and activities of DTC work	Estimation completion for production budget 1985/3 end									

(Note)1. To reach the target cost, an evaluation must be done by comparing the scheduled cost status curve and the present cost status curve in each stage.
 (Note)2. To proceed lifecycle cost design, only look at the cost difference between comparable plans.

Table 3.2-2-2 Correspondence between Eight Basic Steps in Standard Steplist and Development Phase for Aircraft System, Total of table 3.2.2-1

	Basic eights step standard steplist	Development phase for aircraft system ,total
1	1 st step information collection phase	Approval of implementation plan document phase
2	Basic idea phase	Establishment of basic concept phase
3	Breakdown structure phase	Deployment of basic concept phase
4	2 nd information collection phase	Deployment of design phase
5	Basic(matter, design)phase	Detailed plan drawing phase
6	Detail(matter,design)phase	Detailed drawing (Manufacturing drawing)phase
7	Implementation phase	Production of aircraft for test and examination completion phase
8	Review and corrective action phase	Final examination and verification of unit production cost phase

Table 3.2-3-2 Correspondence between Eight Basic Steps in Standard Steplist and Equipment Specification Level Phase of Table 3.2.3-1

	Basic eight-step standard steplist	Equipment specification level phases
1	1 st step information collection phase	1 st Equipment information collection phase
2	Basic idea phase	Comparison of system structure concept of Equipment and pre-allocation of target cost
3	Breakdown structure phase	Specification(draft) and creation of RFP (Request for Proposal) phase
4	2 nd step information collection phase	Equipment vender estimation / comparison / selection and settlement of target cost
5	Basic(matter,design) phase	Design work at vendor and spcification of controlling drawing or source controlling drawing
6	Detail(matter,design) phase	Equipment production and engineering test at component level
7	Implementation phase	Corrective action for flight test result
8	Review and corrective action phase	Review of production design and its unit production cost

Table 3.2-4-2 Correspondence between Eight Basic Steps in Standard Steplist and Equipment Vendor Level Phase of 3.2.4-1

Basic eight-step standard steplist		Equipment vendor level phases
01	0-phase information collection phase	Entry to join project phase
02	(Assumed) basic idea phase	Co-operation work with upper system manufacturer (aircraft manufacturer)
1	1 st information collection phase	Proposal of implementation plan(draft) concept award
2	Basic idea phase	Equipment concept drawing phase
3	Breakdown structure phase	<ul style="list-style-type: none"> • Allocation of target cost breakdown • Selection of sub-vendor material and part
4	2 nd information collection phase	Plan drawing/approval drawing(draft)
5	Basic(matter,design)phase	Manufacturing drawing and manufacturing plan
6	Detail(matter,design)phase	<ul style="list-style-type: none"> • Manufacturing of product • Engineering test
7	Implementation phase	Corrective action for the result of aircraft level test
8	Review and corrective action phase	Review for production and verification of unit production cost target

Table 3.2-5 Relationship between Aircraft System, Total (Table 3.2-2), Equipment Specification Level (Table 3.2-3), and Equipment Vendor Level (Table 3.2-4)

Chart 3.2-2 phases (Aircraft system total level)	Chart 3.2-3 phases (Equipment specification level)	Chart 3.2-4 phases (Equipment vendor level)
I-2 Establishment of basic concept	1 st Equipment information collection phase	01 Entry to join project
I-3 Deployment of basic concept (including allocation of target cost)	2 Comparison of system structure concept of equipment and pre-allocation of target cost 3 Specification(draft) and creation	02 Co-operation work with upper system manufacturer (aircraft manufacturer)
I-4 Selection of equipment and vendor	4 Equipment vendor estimation/comparison/selection and settlement of target cost	1 Proposal of implementation plan (draft), memo of understanding and contract award
II-1 Work for detailed plan drawing	5 Design work at vendor and approval of spec./source control drawing 6 Equipment production and engineering test at component level	2. Equipment concept drawing 3A Allocation of target cost breakdown 3B Selection of sub-vendor materials and parts 4 Plan drawing /approval drawing 5 Mfg.drawing and mfg.plan 6A Manufacturing of product 6B Engineering test
III-1 Production of aircraft for test and examination completion	7. Corrective action for flight test result	7. Corrective action for the result of flight level test
III-2 Final examination and verification of unit production cost	8. Review of production design and unit production cost	8. Review of production and Verification of unit production cost target

Table 3.2-3-1 Actual Steplist of Equipment Specification Level of Development

Equipment specification level

Subject :Design cost of major equipment

Key word:Proceed DTC of equipment by logical procedure

Inside prime Co. for equipment
Step list

Contents of step	Steps	Input		Output		Other conditions	Who approves the output and when	Scheduled attendees at output examination meetings
		Item	Pre-assurance activity	Item	Post-assurance activity			
1 1st information collecting phase	1st information collecting phase for equipment	1.1st RFP to the potential vendor a. Engineering requirements b. Quality requirements c. Conditions of estimation d. Other requirements	1.Make the estimation at vendor 2.Vendor proposes estimated result	1.Vendor estimation (1st time) (what,what kind of,what level, how much by what route must be shown)	1.Let them explain as necessary 2.Make bar chart, especially of long lead time items		Each design group leader Cost control group 1981/2 end	
2 Basic idea	Comparison of system structure concept of equipment and pre-allocation of target cost	1.Vendor estimation(1st time)	1.Examine the combination of equipments 2.Comparison of combination 3.Estimate roughly min. and max. cost(inside)	1.Combination concept of equipment 2.Rough prospect cost(min. max.) 3.Condition for min. cost	1.Approve the concept of equipment 2.Draft target cost		Each design group leader Cost control group Purchasing section	
3 Breakdown structure	Specification(draft)drawing creation of Request For Proposal	1.Combination concept of equipmet 2.Plan of vendor survey and establishment of equipment concept with vendor 3.List of equipment 4.Request letter to vendor to proceed aboe co operation	1.Cooperate with vendor to establish the concept of equipment as necessary 2.Adjust the level of requirements 3.Make draft of spec/source control drawings	1.Draft of spec/source control drawing and specification 2.Request for proposal(draft)	1.Approve the contents of RFP (2nd)	1.Explain the procedure of DTC and ask for cooperation to proceed	Each design group leader Chief engineer Purchasing section	
4 2nd information collecting phase (evaluation of break down structure)	Equipment vendor estimation/ comparison/selection and settlement of target cost	1.2nd time RFP a.specification,spec.drawing (draft) b.Quality requirements c.Condition to estimate d.Proposal format	Vendor 1.Make proposal 2.Make list of measures/ideas to realize the target cost 3.Make draft of development/DTC implementation plan document	1.2nd proposal and estimation including: a.List of measures/ideas to realize target cost b.Draft of development/DTC implementation plan document	1.Decide target cost 2.Re-organize the proposal as necessary 3.Confirm conditions by negotiation 4.Select vendor 5.Adjust and approve the implementation plan of vendor	1.It is necessary to have the Government agree before selecting the vendor	• Team to select the vendor • Committee for vendor selection	
5 Basic matter or design	Design work at vendor and approval of specification control drawing or source control drawing	1.Target cost 2.Negotiated and approved proposal,estimation and development plan 3.Approved DTC implementation plan document 4.Letter of intent	• Vendor 1.Proceed basic design 2.Implement DTC work by approved implementation plan • Prime Co. investigate site and instruct vendor	1.Approved vendor drawing 2.Production schedule 3.Periodic meeting schedule (The place must be located at main and vendor reciprocally)	1.Check DTC results and details approval	1.Co-operate in design work as necessary	Each design group leader Cost control group Chief engineer Purchasing section	
6 Detail matter or design	Equipment production and engineering test at component level	1.Approved vendor drawing 2.Wants from production group	Vendor 1.Draw manufacturing drawings 2.DTC work by implementation plan	1.Manufacturing drawings 2.Engineering test plan document 3.Manufactured equipment	1.Production 2.Adjust engineering meeting by vendor site survey 3.Approve the engineering test plan 4.Implement engineering test 5.Approve the results of engineering test	1.Check that similar reports can be replaced with all or part of actual test	Each design group leader Chief engineer Cost control group	
7 Implementation or prototype test	Corrective action for test flight results	1.Manufactured equipment for prototype aircraft	1.Test flight 2.Corrective action for prototype and production aircraft using results of test flight	1.Actual result of manufactured equipment 2.Flight tested equipment	1.Extract theme/idea to be reflected in production 2.Give notice of certification to vendor 3.Re-confirm production target cost		Each design group leader Purchasing section Cost control group	
8 Review and corrective action	Review of production design and unit production cost	1.Reflect items for mass production(draft) 2.Production target cost (years price) 3.Actual result of manufactured products	1.Value analysis review of design 2.Verify the production unit cost	1.Target production cost/price	1.Establish the agreement for mass production and report its contents to Government officer		Each design group leader Cost control group Chief engineer Purchasing section	

Table 3.2-4, 1 Actual Steplists of Development at Vendor

Equipment vendor level

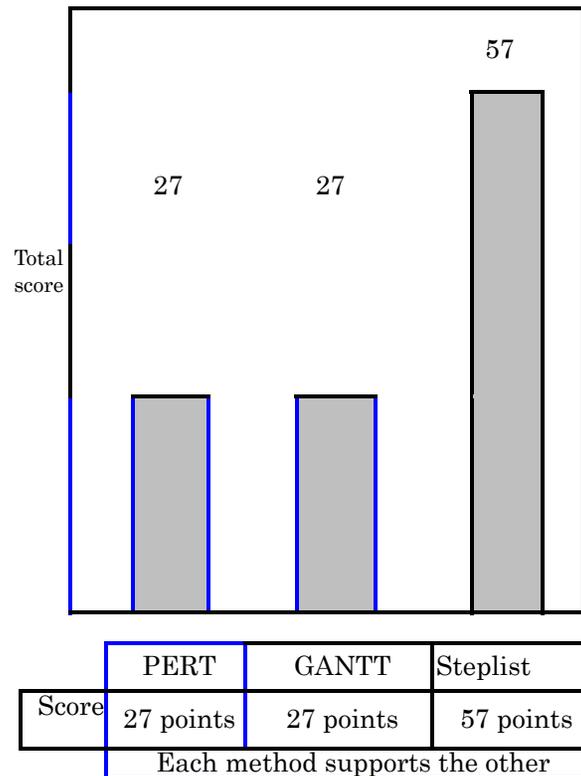
Subject : Design to cost of equipment for XXX
 Key word : Design and production of the target cost product

Steplists(Phased plan document)

Approved by: _____ date: _____
 Promote officer: _____

	A	B	C		D		E		F	G	H
			Steps	Input Item	Pre-assurance activity	Output Item	Post-assurance activity	Other conditions	Who approves output and schedule	Scheduled attendees at output examination meetings	
01	Preparation to join the project	Project entry phase	1.Entry policy to the project (inside company)	1.Approach to prime contractor 2.Obtain 1st Request for Proposal a.Engineering requirements b.Quality requirements c.Estimating conditions d.Other requirements	1.Design draft as equipment manufacturer 2.Obtained 1st Request For Proposal	1.Explain equipment product to prime manufacturer	From this time,repeat the revision of proposal and estimation according the discussion result with prime contractor until contract award				
		Co-operative work with upper system manufacturer(aircraft manufacturer)/phase	1.Design draft as the equipment manufacturer 2.1st proposal and estimation	1(Prime) Evaluate,investigate,combine, and examine the proposed equipment	1.Equipment spec. and specification drawing(pre-pre draft) 2.2nd Request For Proposal 3.Target cost	(Prime) 1.Adjust the contents before send 2nd RFQ 2.Issue 2nd RFQ to equipment manufacturer					
1	1st information collecting phase	Proposal implementation plan (draft),Memo, Of Understanding and contract award phase	From prime contractor 1.Equipment specs. and specification dwg.(pre-draft) 2.2nd RFP 3.Target cost(draft) 4.Request to make implementation plan and associated documents	1.Make 2nd proposal 2.Make development/DTC implementation plan 3.Make associated documents	1.Development/DTC implementation plan(draft) 2.Associated document(include the measure/idea to realize the target cost	(Prime) 1.Agree on target cost 2.Adjust and approve development/DTC implementation plan 3.Confirm conditions through negotiation 4.Issue letter of intent to equipment manufacturer (Equipment manufacturer) 1.Agree on the Memory Of Understanding(include target cost)	1.Proceed the concept design completely 2.Provisional award of contract becomes official award of contract after Government officer agrees				
2	Basic idea	Parallel work	Equip. concept drawing phase	1.Design draft 2.Target cost 3.Development/DTC implementation plan document	1.Extract potential DTC theme/ ideas and wants from customers' side 2.Trade study by DTC trade study worksheet	1.Concept drawing 2.List of potential DTC theme/ idea and wants for plan drawing phase 3.Prospect to reach the target cost 4.Prospect to reach the target weight	1.Approve the concept drawing (inside company) 2.Approval of concept drawing by prime contractor 3.Approval of concept drawing by Government officer				
			Allocation of target cost breakdown phase	1.Concept drawing 2.Target cost	1.Estimate present cost 2.Allocate target cost	1.WBS with allocated target cost 2.Present cost(1st time) 3.Potential measure/ideas to realize target cost	Same as above	Potential measures/ideas to realize target cost must include up to production phase			
3	Breakdown structure phase		Selection of sub-vendor materials and parts	(Equipment manufacturer) 1.RFQ to sub-vendor (1)Engineering requirement (2)Estimated condition spec. (3)Basic agreement to purchase the material	1.Send RFQ to sub-vendor 2.Vendor issue RFQ and cost	1.Proposal and estimation of sub-vendor 2.Draft of contract with sub-vendor	1.Examine and select sub-vendor	Agree to the upper limit of escalation price formula by having the escalation price formula in sub-vendor proposal from 1st time proposal			
			Plan drawing/approval drawing (draft) phase	1.Target cost 2.Present specification price 3.Concept drawing 4.List of DTC themes/ideas	1.Make plan drawing 2.Trade design ideas by DTC trade worksheet 3.Extract themes/ideas to be examined during and after manufacturing drawing phase	1.Plan drawing(to be approved) 2.Prospect to realize the target cost 3.List of theme/ideas to be examined during and after manufacturing drawing phase	1.Approve the plan drawing (inside company) 2.Prime approves plan drawing 3.Get approval in necessary case 4.Obtain the order evidence from the prime Co.				
4	2nd information collecting phase		Manufacturing drawing and Manufacturing plan phase	1.Specification drawing of prime Co 2.Plan drawing 3.List of potential themes/ideas to be examined 4.List of cost driving factor 5.Plan to improve manufacturing phase	1.Proceed design work considering cost driving factors	1.Drawing to ask approval 2.Draft of manufacturing drawing	1.Approve vendor drawing 2.Proceed pre-plan work for manufacturing 3.Complete manufacturing drawing approval 4.Proceed the manufacturing plan	Planned items to improve in manufacturing phase to realize the target cost mean concrete measures at manufacturing phase			
5	Basic matter or design		Manufacturing of product	1.Manufacturing drawing 2.Operation sheet to produce 3.Tool order to make	1.Make tooljig 2.Manufacture the equipment 3.Trial of improvement measures on production line	1.Equipment to be deliver to prime	1.Pocceed engineering test 2.Take corrective action as necessary 3.Prime Co. inspects the manufactured equipment				
			Engineering test	1.Test standard and specification	1.Make and approve the test plan and procedure 2.Proceed engineering test	1.The result of engineering test	1.Approve the engineering test result				
6	Detailed matter or design	Parallel work	Collective action for the result of aircraft level test	1.Delivering product	1.Proceed aircraft installation test(including flight test) 2.Corrective action by test result (Corrective action must be divided between prototype action and mass production action)	1.Delivered product corrective action taken 2.Result of test	1.Extract necessary improvement in mass production phase				
7	Implementation or prototype test		Review for production and verification of unit production cost target	1.Reflect items 2.Target cost/price 3.Actual results in development	1.Examine eng.improvement+ F1 2.Examine mfg.improvement 3.Verification of scheduled production price	1.Scheduled production price 2.Final and sum up of cost control activity result	1.Prime Co. approves the result 2.Government officer approves the result				
8	Review and corrective action		Note: Report the status of DTC activity using the DTC status report to prime-manufacturer every 2 months(Prime-manufacturer reports results of each sub-vendor to Government)								

Figure 3.2-6 Comparison of PERT, the GANTT Table, and the Steplist and how their functions support each other



Question		PERT	GANTT CHART	STEP LIST	Note
1	Is it useful to create a schedule ?	3	3	3	Note1
2	Is it useful to divide the induction approach and deductive approach?	0	0	4	
3	Is it useful for phased decision ?	0	0	4	Note2
4	Is it useful to pick up important activities and events ?	0	0	4	Note1
5	Is it useful to create a faultless process to reach the objective results ?	1	1	4	Note1
6	Is it useful to pick up pre-assurance conditions for output items	0	0	4	Note1
7	Is it useful to pick up post-assurance conditions for output items ?	1	1	4	Note1
8	Is it useful to pick up the connecting point of hierarchical items ?	1	1	4	
9	Is it useful to pick up the input and output items ?	0	0	4	Note1
10	Is it useful to extract the evaluation standard for each stepped phase ?	0	0	4	Note1
11	Is it easy to read the schedule ?	2	4	2	Note1
12	Is it useful to find the critical path ?	4	3	2	
13	Is it a useful tool to adjust the schedule ?	4	3	2	Note1
14	Is it useful to adjust the aggregation ?	3	3	0	
15	Is it useful to accumulate the know-how of the people concerned ?	2	2	4	
16	Is it useful for the intelligence of the organization ?		2	4	Note2
17	Is it possible to create computer software ?	4	4	4	
Total score		27	27	57	

Evaluation point : Most excellent 4
 Excellent 3
 Satisfy 2
 Acceptable 1
 Not Applicable 0

Note 1. Each method must support the other the steplist has the function to pick up the faultless elements, assurance

Conditions and clear phase items, which the other methods can not do.

Note 2. The steplist method requires that before making the steplist, consensus must be created