

Chapter 6

Basic Conditions to Proceed with “Design to Cost”

Abstract

Design to Cost (DTC) is a target management method that proceeds with a design by setting up the target cost or price. This chapter explains matters common to its whole.

Designing a complicated system requires a complex process. In the past, linking the design with the final overall target price and proceeding the process were defined only in concept and policy.* No set procedure existed here in Japan, in the U.S., or elsewhere before 1976.

The idea of Design to Cost, which had been a concept, was methodized as procedure using the Steplist Management Method described in previous chapters.

You will see the method as procedure which Mr. Tadashi Yamaguchi and I had been working in 1976-85. Our joint-work had been followed by a number of implemented results, and the revised version is shown in Chapters 6 and 7 of this book. This is how the procedure preserves and proves the quality of thinking and work in the design phase.

* The concept and policy, which were our starting point, are noted in the DOD Directive 5000.28 (1975), released by the U.S. Department of Defense.

Chapter 6

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6.1 General Matters

6.1.1 Introduction

6.1.2 Effect of Combining the DTC-Method Using Development Control with the DTCN-Method

6.1.3 Discussion of Conventional DTC

6.1.1 Introduction

Design to Cost (DTC) is a target management method which proceeds with a design by setting up the target cost or price.

Designing a complicated system requires a complex process. In the process of implementing the target design (including the target cost design), how to connect the design process with the final overall target price and how to proceed the process were not defined. There was a concept and a policy,* but a set procedure was not introduced in Japan, the U.S., or elsewhere until the 1970's.

*The concept and policy were introduced in the U.S. in:

1. DOD5000, Acquiring the Main National Defense System(1971)
2. DOD5000.28, Design to Cost (1975)
3. DARCOM P700-6, Design to Cost Common Guide (1977)

The idea of Design to Cost, which used to be nothing more than a concept, was methodized and made practicable in 1976, using the Steplist Management Method. This became the starting point of the method and procedure shown here. The DTC procedure in this book was drawn from practical application with corporations, the Defense Agency of Japan, and the National Space Development Agency (NASDA) of Japan. Moreover, conclusions from the development of the generalized DTCN Method have also been included.

As an outcome of the practical application of the DTC Method, the quality control of thinking and action in the process of design or in the upper stream of planning (cost management as a reason in addition to the sought-after achievement) became ensured.

The way of thinking and procedure for the DTC Method stated in Chapters 6, 7, and 8 describe the methodized policy and procedure of DTC using the DTCN Method. The development will advance effectively and exactly within the procedure by linking the newly developed method with conventional methods, and utilizing them in a phased manner.

6.1.1.a What is the DTC Method? (A way of thinking and procedure)

The DTC Method described here indicates the way of thinking and procedure that brings the actualization of the DTCN methodology by imposing the policy of Design to Cost at the start of development.

When the basic policy of the method, "handle cost as an essential element in the same way as the performance of the product and the schedule in a process of design," is concretely methodized, cost management becomes possible. Besides cost, target achievement design activities of the function, performance (Note 1), schedule, and reliability will be well-balanced (Note 2) under this management. As a result, the DTC Method using the DTCN Method becomes essential to newly developing an effective and efficient integrated management method.

(Note 1) The difference between function and performance: Function means "how you can get yourself from Japan to the U.S.;" efficiency means "how long it will take to get from Japan to the U.S."

(Note 2) Balance: based on the assumption that a method which uses weighting is applied.

6.1.1.b The Object of the DTC Method

The following three cost objectives are where DTC may be applied. Incorporating the following three and related costs within the overall management is sometimes called "Cost Control."

(1) DTC for unit production cost: in the process of development, design to set unit production cost as a target cost.

(2) DTC for lifecycle cost: in the process of development, design to lower the total lifecycle cost.

(3) DTC for development cost: in the process of development, design with a target development cost.

This chapter will explain the common matters in DTC implementation. In Chapter 7, the DTC Method for Mass Production Unit Cost, and in Chapter 8, the DTC Method for Development Cost will be summarized.

Supplementary explanations on DTC for lifecycle cost will be given in Chapters 7 and 8.

6.1.2 Effect of Combining DTC Method Using Development Control with the DTCN Method

(1) Policies of DTCN and DTC:

DTCN: Design to Customers' Needs

Design according to the target of the customers' needs.

DTC: Design to Cost

Design according to the target of cost.

The DTC Method stated here is a method of development where a policy, "to proceed with the design by setting target cost and various targets on top of the DTCN Method," is added.

Hence, the realization of the DTC Method will shape the DTCN Method, which takes cost into consideration.

The application of the DTCN methodology makes cost indispensable in responding to the demands of the customer. In other words, cost-effectiveness will be included. Therefore, the implementation of DTCN will create a scene or circumstances that will inevitably lead to the application of DTC.

For these reasons, the DTC Method and the DTCN Method are complementary systems. Being complementary signifies using them in combination. The effect of the combination will be explained next.

(2) Effect of Combining the DTCN and DTC Methods:

1. By frequently using the PMD (Purpose-Measure Diagram) Method, the vectors of the persons concerned, which include the customers, will match, and needs will be created.
2. Using cost management, a proper target can be achieved with well-balanced performance, reliability, human-interfacing, operation, and maintenance, and its logistic support.
3. Draw up, approve, and actualize the implementation plan document using the Steplist Management Method and Phase Management Method (3-5). By doing so, planning and the management of steady development, including future growth based on stratified decision-making, becomes possible.
4. By incorporating the policy of DTCN and DTC into the implementation plan document on development and design, a mechanism for ensuring the necessary and appropriate profit to create the next customers will be established.
5. Using the PMD Method, an atmosphere whereby the vector can be created for top-down or bottom-up management, and satisfactory arrangement will be produced.

(3) PMD Utilizing a Combination of DTCN and DTC:

The relationship of the combined usage of the DTCN and DTC methods will result in the PMD shown in Figure 6.1-1.

When applying the DTC Method to customer goods other than the examples, to the development of information systems and methods for small and medium-sized corporations, or to large-scale governmental projects, first refer to the cases outlined elsewhere in this chapter and in Chapters 7 and 8. At the beginning, draw up a PMD and create the view of direction among the people concerned. Then, working a DTC through the DTCN Method becomes adaptable in every area

You will be able to acquire the knack by preparing procedure documents, implementation plan documents, and Shop Operative Practices (SOP) applicable to any type of industry while implementing

Design-to-Cost using DTCN Methodology.

6.1.3 Discussion of Conventional DTC

The following questions have been raised in Japan and in the U.S. regarding the handling of conventional DTC:

1. Where and how to start with DTC.
2. How to decide the target cost and to allocate the target cost reasonably.
3. How to improve conventional value engineering (VE) to make it easier to use with DTC.
4. How to combine DTC activity with the project schedule.
5. How to quickly and effectively create, and select ideas to meet objectives after identifying them.
6. How to accumulate up-to-date cost and price data for multiple uses.
(Conventional cost and price tables prepared by the conventional method soon become obsolete.)
7. How to analyze the quantity and escalation effects in pricing data when considering published indices.
8. How to control the deviations in cost estimates, which vary as the design progresses.
9. How to adjust the emerging design technique, which tends to become slightly different between the early stage and the later stage of the design process.
10. Can we simplify the Lifecycle Cost technique?
11. How to create an effective and efficient WBS (Work Breakdown Structure)
12. Is it necessary to provide an incentive (at any time)?
13. What is the difference between DTC for unit production cost and DTC for development cost?
14. How DTC can proceed along MIL-STD-499A (Engineering Management)

Using the DTC Method with the DTCN Methodology will answer these questions.

The rest of Chapter 6 will confirm the minimum essential understanding and knowledge required to proceed with DTC. The DTC procedures for mass production unit cost and development cost, and how to prepare a management system will be stated, and its significance discussed in Chapter 7.

Fig. 6.1-1 Purpose-measure diagram of DTC Method using DTCN Methodology

