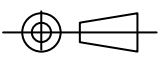


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1. SCOPE

1.1 Purpose

The practices established in this document provide uniformity in identification and calculation of the major identifiable cost avoidance and cost reduction savings factors resulting from standardization projects.

1.2 Technical Requirement Identification

The practices detailed in this document provide for calculating savings and cost avoidance as a result of the following factors which are identified by their respective requirement identifiers:

NAS1524-1	Standardization Savings from Increased Quantity Purchases
NAS1524-2	Standardization Savings in Paperwork and Handling
NAS1524-3	Standardization Savings from Reduced Storage Requirements
NAS1524-4	Standardization Savings from Reduced Engineering Search Time
NAS1524-5	Standardization Savings from Using a Stocked Standard Part in lieu of Establishing a New Standard
NAS1524-6	Standardization Savings from Using a Stocked Standard Part in lieu of a New Design
NAS1524-7	Standardization Savings from Control and Reduction of the Number of Items in Inventory through Simplification or Use of a Supersedure Procedure
NAS1524-8	Standardization Savings from Using a Stocked Standard Part in lieu of a Nonstocked Part
NAS1524-9	Standardization Savings from Using a Design Standard in lieu of detailing the Data Completely on the Drawing

2. REFERENCED DOCUMENTS

Appendix 10 lists general useful references.

Appendix 20 lists tangible and intangible factors to be considered in identifying and calculating standardization savings.

3. DEFINITIONS

3.1 Cost Avoidance

A decrease in the targeted overall cost for accomplishing a function. Such a decrease is made before actual cost figures are available for the product or service involved.

3.2 Cost Reduction

A decrease in the committed or established overall cost for accomplishing a function.

3.3 Economic Order Quantity

The order size at which the unit cost of purchasing and stocking an inventory item is at its lowest. To find the Economic Order Quantity (sometimes called the lot quantity or order quantity) it is necessary to calculate all costs connected with an order, including restocking costs and carrying costs.

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3.4 Inventory Carrying Cost

The sum of those increments contributing to the expense of storing and maintaining a stock of items. Carrying cost increments usually considered are:

- a. Interest on invested capital.
- b. Insurance charges.
- c. Cost of warehouse space.
- d. Labor cost to maintain stock.
- e. Cost of obsolescence, surplus, breakage, etc.

3.5 Cost of Establishing a New Item

The sum of those increments contributing to the expense of making a new item available for use in a system. These increments include:

- a. Engineering time.
- b. Drafting time.
- c. Checking and release time.
- d. Evaluation or qualification tests.
- e. Preparation of initial procurement and stocking documents.
- f. Preparation of initial inspection plans.

4. GENERAL REQUIREMENTS

Major identifiable savings factors are presented for appraisal of standardization accomplishments. Only the primary savings factors have been identified and secondary factors have been omitted because of difficulty in calculation or lack of significance in savings potential. Appendix 20 lists the savings factors usually resulting from standardization action. Wherever possible, typical costs of doing business are included. The majority are the result of national surveys and the remainder represent the best information available at the time. Users are encouraged to test and modify these factors to suit specific requirements and, should better data become available, provide these to the National Aerospace Standards Committee for subsequent revision of this standard practice.

For a more complete and detailed exposition of the principles covered in these standard practices see References No. 3, No. 5, and No. 6 listed in Appendix 10.

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5. DETAILED PROCEDURES

5.1 NAS1524-1: Standardization Savings from Increased Quantity Purchases

5.1.1 The savings attainable through standardization from increased quantity purchases may be estimated from the use of the equation:

$$\begin{array}{rclclclclclcl} \text{Cost} & = & \text{Purchase} & + & \text{Purchase} & + \dots & \text{Purchase Cost} & - & \text{Total Quantity} & \times & \text{Cost of} \\ \text{Savings} & & \text{Cost Part 1} & & \text{Cost Part 2} & & \text{Other Parts} & & \text{Replaced Parts} & & \text{Standard Part} \\ S_{qb} & = & Q_1 C_1 & + & Q_2 C_2 & + \dots & Q_n C_n & - & (Q_1 + Q_2 + \dots + Q_n) & \times & C_s \end{array}$$

where:

- S_{qb} = The cost reduction resulting from a quantity purchase and discount.
- Q_1 = The quantity of part 1 which would have to be purchased yearly if it were not replaced by standard part P_s .
- C_1 = The unit cost, in dollars, of part 1 based on the actual purchase costs in dollars.
- Q_2 = The quantity of part 2 which would have to be purchased yearly if it were not replaced by the same standard part P_s .
- C_2 = The unit cost, in dollars, of part 2 based on the actual purchase costs.
- C_s = The unit cost, in dollars, of the standard part based on the increased quantities needed yearly.

5.1.2 Example

Yearly requirements for an aerospace program require 10,000 hose clamps costing 60 cents each and 20,000 similar clamps costing 70 cents each. Replacing these clamps with an industry standard costing 50 cents each for the 30,000 required each year results in the following savings:

$$\begin{aligned} S_{qb} &= 10,000 \times \$0.60 + 20,000 \times \$0.70 - (10,000 + 20,000) \$0.50 \\ &= \$6,000 + \$14,000 - \$15,000 \\ &= \$5,000 \text{ per year} \end{aligned}$$

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5.2 NAS1524-2: Standardization Savings in Paperwork and Handling

5.2.1 The savings attainable through standardization in paperwork and handling may be estimated through the use of the equation:

$$\begin{aligned} \text{Cost Savings} &= \text{Reduction in Purchase Orders} \times \text{Cost to Process PO} + \text{Reduction in Shipments} \times \text{Cost of Paperwork and Inspection} \\ S_{pw} &= (N_1 - N_2) \times (K) + (D_1 - D_2) \times (J + M) \end{aligned}$$

where:

S_{pw} = Cost avoidance resulting from reduction in paperwork and handling.

N_1 = Number of orders placed per year before standardization.

N_2 = Number of orders placed per year after standardization.

The most economical number of orders that could be placed can be derived from the economic order quantity formula. (See References No. 2 and No. 4 in Appendix 10 for this derivation and other useful applications.) The most economical number of orders is expressed as:

$$N = \sqrt{\frac{IA}{2K}}$$

where:

I = Inventory carrying cost in decimals. (Aerospace industry average in 1966 was .18.)

A = Annual volume in dollars.

K = Purchase order average process costs. (Includes purchase orders and invoices. A typical average cost is \$35.)

D_1 = Number of yearly shipments before standardization.

D_2 = Number of yearly shipments after standardization.

J = Storage bin average cost. (Paperwork only. A typical average cost is \$16.)

M = Receiving inspection average cost. (Varies widely depending on commodity, but a typical average cost is \$32.)

5.2.2 Example

By applying the principles of standardization on an aerospace program, the variety of electrical connectors is significantly reduced resulting in increased quantity purchases of the preferred varieties with a resultant decrease in annual cost from \$100,000 to \$70,000. Savings in paperwork and handling can be estimated conservatively by assuming that the most economical number of orders will be placed and each order will be delivered as a single shipment.

$$N_1 = \sqrt{\frac{.18 \times \$100,000}{2 \times \$35}} = \sqrt{256} = 16$$

$$N_2 = \sqrt{\frac{.18 \times \$70,000}{2 \times \$35}} = \sqrt{180} = 13$$

$$\begin{aligned} S_{pw} &= (16 - 13) \$35 + (16 - 13) (\$16 + \$32) \\ &= \$105 + \$144 \\ &= \$249 \text{ per year} \end{aligned}$$

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