IV. SUPPLIER SELECTION

EVERYTHING CAN BE IMPROVED.

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Supplier Selection

Supplier Selection is presented in the following topic areas:

- **Product/Service Requirements**
  - **Internal Design Reviews**
  - **Identifying Requirements**
- **Supplier Selection Planning**
  - **Supplier Comparison**
  - **Potential Suppliers Evaluation**
  - **Supplier Selection**

Internal Design Reviews

It is important to recognize that a design is intended to satisfy customer needs.

Examples of internal customers and their requirements are detailed below:

Internal Customer	Requirements
Sales	Cost and quantity
Quality	Reliability and quality levels
Top management	Profit and gross margin
Manufacturing	Manufacturability requirements
Service	Serviceability requirements

Internal Design Reviews (Continued)

Examples of external customers and their requirements are illustrated below:

External Customer	Requirements
End user	Quality characteristics
Dealers, distributors	Service, storage, and delivery
Regulatory agencies	Safety, emissions

Both ISO 9001 and ISO/TS 16949 require a company to control design inputs related to the product, including applicable statutory and regulatory requirements.

It would be impractical (as well as almost impossible) for the design procedure to provide all details in developing the design specification. Usually, the design procedure includes a design input checklist that is reviewed for each item.

Internal Design Reviews (Continued)

Design Input Considerations

Customer drawings	Quality system requirements
Customer contract	Tooling, gages, fixtures, facilities
Market research results	Training requirements
Sales projections	Subcontractor requirements
Regulatory issues	Serviceability requirements
Statutory issues	Manufacturability requirements
Safety requirements	Competitive analysis
Quality requirements	Product performance requirements
Reliability requirements	Price, cost, gross margin
Design goals	Warranty, repair, return history
Design FMEA results	Special product characteristics
Bill of materials	Special process characteristics
Assumptions	Product assurance requirements

Each area of the checklist is reviewed to develop the design specification.

Internal Design Reviews (Continued)

Design specifications may be developed with an iterative approach, in phases, or in stages. An example of the sequence of design specifications development is:

- **System**
- **Subsystem**
- **Module**
- **Component or material**

Once the design specification phase starts to take shape, a design review should take place. A design review is usually considered mandatory when the design specification (concept phase) is complete, or complete enough to assign engineers to the task of making the design specifications real hardware prototypes.

Often a product design requires trade-offs between conflicting aspects of reliability, maintainability, cost, weight, ease of manufacture and performance. The final decision on a product design, therefore, depends heavily upon the experience of members of the design team.

Internal Design Reviews (Continued)

The membership and responsibilities of a typical design review committee are shown in the Table below.

Member	Review Phase					Responsibility
	I	II	III	IV	V	
Chairperson (of design function)	X	X	X	X	X	Calls and conducts reviews; issues all reports
Design engineer (of this product)		X	X	X	X	Prepares and presents the design approach
Independent design engineer		X	X	X	X	Reviews and verifies adequacy of design
Customer or marketing representative	X	X	X	X	X	Ensures that the customer's viewpoint is represented
Reliability manager or engineer	X	X	X	X	X	Evaluates the design for reliability
Materials/stress engineer		X				Verifies stress calculations and material usage
Human factors/safety engineer		X	X			Ensures product safety in use and manufacture
Manufacturing engineer			X	X	X	Ensures cost effective manufacture
Quality engineer or quality representative		X	X	X	X	Reviews inspection and test capabilities
Test engineer			X		X	Presents test procedures and results
Others						As required

Internal Design Reviews (Continued)

The design review considers all important factors in the creation of a mature product design.

- **Are customer performance requirements met?**
- **Is the design as simple as possible?**
- **Are proven components and configurations used?**
- **Are manufacturing tolerances adequate?**
- **Is the manufacturing process capable?**
- **Are approved parts used in all practical cases?**
- **Are environmental requirements met?**
- **Are operational conditions considered?**
- **Are maintainability features present?**
- **Are there provisions for testing and inspection?**
- **Have potential failure modes been analyzed?**
- **Has a worst-case analysis been conducted?**

Internal Design Reviews (Continued)

The design process goes through several phases. Examples of typical design phases and purposes are:

Design Phase	Purpose
Concept	Acquire and document design inputs
Design	Convert design inputs into documented specifications
Prototype	Convert design specifications into hardware
Pre-production	Pilot runs, capability analysis studies and confirmation
Deployment	Full production
Final	Determine the success of meeting the design inputs

Design reviews should be conducted at the end of each phase.

Identifying Requirements

The customer must take steps to insure that the supplier's quality program is adequate. Additionally, a customer must take steps to ensure that their own quality program is adequate.

Bossert refers to the three Ps of evaluation:

Program: This judges the effectiveness of a supplier's efforts to provide an adequate product.

Product: Evidence is gathered on the degree of product conformity to specification and design.

Process: This involves the interaction of manufacturer management, workers, and machinery to provide a satisfactory end product.