

Quality Function Deployment (QFD): Example

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QFD (Quality Function Deployment)

- ❖ A series of matrices are employed, but each phase translates the customer requirements to design requirements for each system, sub-system, component, and process; the four phases.

Four phases of QFD are:

1. Product Planning and Definition
2. Design Deployment (Development)
3. Process Development (Planning)
4. Production Process Quality Control

1. Product Planning and Definition

- a. Collecting requirement details(VoC)
- b. Translating VoC into engineering requirements
- c. Including evaluation of competitors' products (competitive analysis)
- d. The initial design concept is based on
 - i. Product performance
 - ii. Product specifications

2. Design Deployment (Development):

- a. Identifying critical parts and assemblies
- b. Streaming down critical product characteristics and translating into part and assembly specifications (part and assembly specifications)
- c. Defining functional requirements or specifications for each functional level (defining specifications)

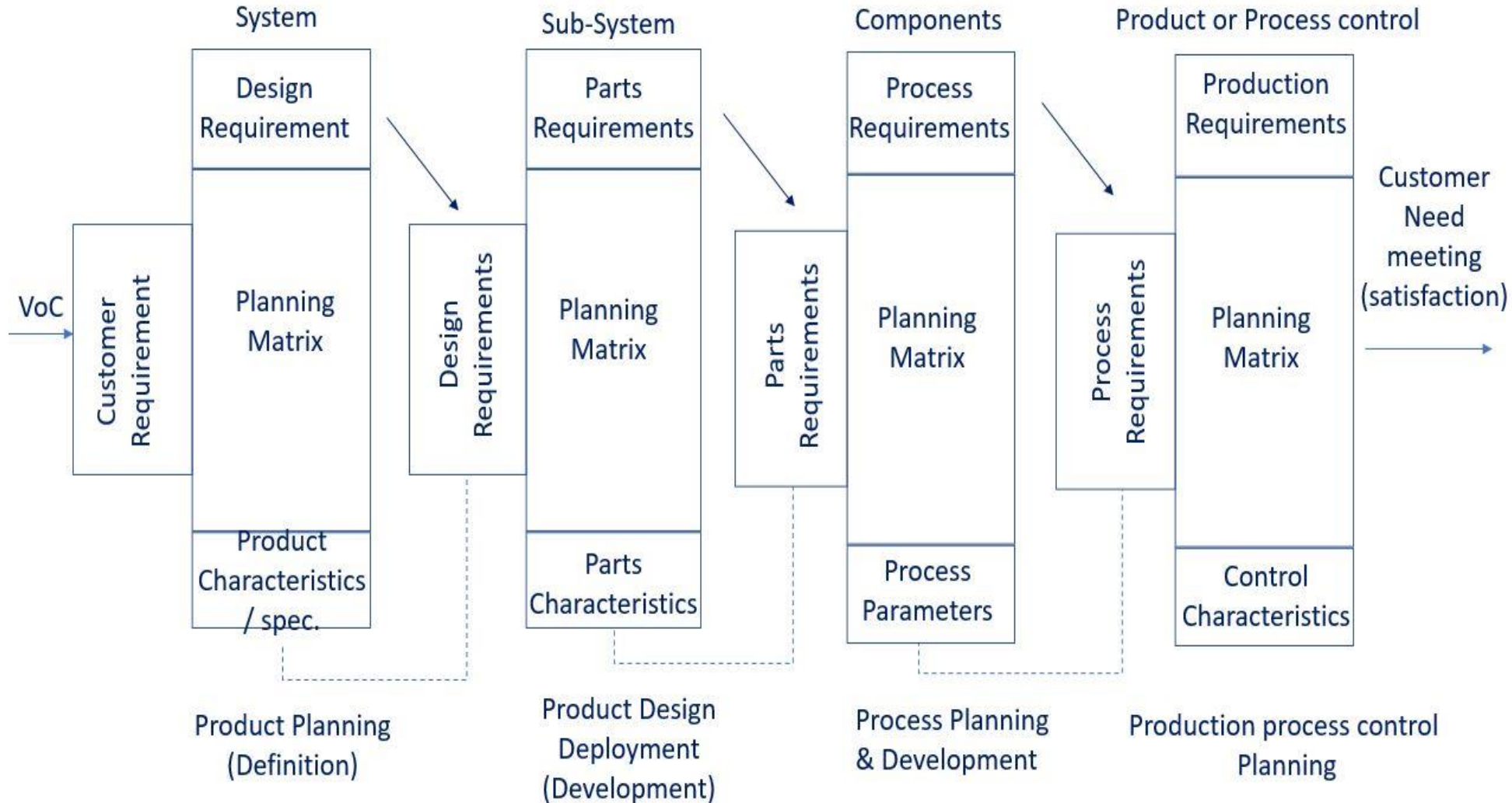
3. Process Development (Planning):

- a. Designing processes based on product and component specifications.
(Designing manufacturing and assembly process)
- b. Developing process steps and identification of process characteristics.

4. Production Process Quality Control:

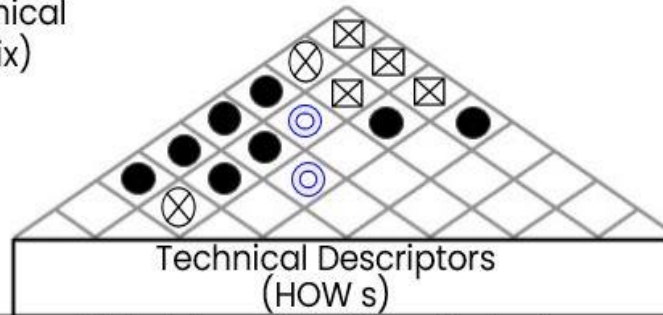
- a. Determining process parameters.
- b. Developing and implementing appropriate process quality control.
- c. Designing production piloting according to process capability

Four Phases of QFD



Interrelationship between Technical Descriptors (correlation matrix)
HOW s vs HOW s

+9	●	Strong Positive
+3	⊙	Positive
-3	⊗	Negative
-9	⊠	Strong Negative



Handlebar for Bike

Importance to the customer: Scale 1-10
Sales point: Scale 1-2

Relationship between Customer Requirement and Technical Descriptors
WHATs vs HOWs

+9	●	Strong
+3	⊙	Medium
+1	△	Weak

		Primary		Material Selection				Manufacturing Process				Technical Descriptors											
		Primary	Secondary	Steel	Aluminium	Titanium	CFRP	Welding	Die Casting	Sand Casting	Forging	Powder Metallurgy	Mid- Cure	WHATs vs HOWs									
														+9	●	Strong	+3	⊙	Medium	+1	△	Weak	
Customer Requirements (WHATs)	Aesthetics	Aerodynamic Look	△	⊙	⊙	●	△	●	△	△	●	●	4	5	3	6	4	1	1.5	9	Prioritized Customer Requirements		
		Nice Finish	△	⊙	⊙	●	△	●	△	⊙	●	●	4	5	4	5	4	1	1	5			
		Corrosion Resistant	△	⊙	●	●	△	⊙	△	△	⊙	●	4	4	3	3	4	1	1	3			
	Performance	Lightweight	△	⊙	⊙	●	△	⊙	△	△	△	●	3	4	2	7	4	1.3	2	18			
		Strength	●	⊙	●	●	⊙	⊙	●	●	⊙	●	3	3	4	5	3	1	1	5			
		Durable	●	⊙	●	●	△	●	⊙	●	⊙	⊙	3	3	4	3	3	1	1	3			
	Cost	Reasonable Cost	●	●	△	⊙	●	⊙	●	⊙	△	●	3	4	3	7	4	1.3	1.5	14			
Technical Difficulty			1	6	9	4	4	7	3	6	9	4											
Weightage			233	255	209	429	179	273	215	159	191	495											
Carbon Fiber Reinforced Polymer (Carbon Fiber) Moulding and Curing			Prioritized Technical Descriptors										Company's Product	A's Product	B's Product	Importance to customer	Target Value	Scale up Factor	Sales Point	Absolute Weightage			

*CFRP- Carbon Fiber Reinforced Polymer
(Carbon Fiber)

*Mld.-Cure. – Moulding and Curing

Formulae and Illustration

$$\diamond \text{ Scale up Factor} = \frac{\text{Target Value}}{\text{Company's Product Value}}$$

$$\diamond \text{ Absolute Weightage} = \text{Scale up Factor} \times \text{Sales Point} \times \text{Importance to Customer}$$

$$a_j = \sum_{i=1}^n R_{ij} \cdot c_i$$

R is Relationship Matrix
c is Customer Importance

□ Illustration of First Column (weightage):

$$1 \times 9 + 1 \times 5 + 1 \times 3 + 1 \times 18 + 9 \times 5 + 9 \times 3 + 9 \times 14 = 233$$