

The background features a large, semi-transparent seal of the Georgia Institute of Technology. The seal is circular and contains a central figure holding a torch and a scale, surrounded by the text "THE GEORGIA INSTITUTE OF TECHNOLOGY" and "1885".

Specifications
ME – 2110
Creative Decisions and Design

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Specification List



D = Demand W = Wish

		Specification	Issued:	
Changes	D/W	for: Requirements	Resp.	Source
		Replaces issue of		Page 1

Questions to Ask When Performing a Design

- ❖ Where can I sell my product?
 - What products do my customers need?
- ❖ How can I improve my product?
 - What customer needs are not being met?
- ❖ When will my product become obsolete or inappropriate?
 - How are changes in technology affecting the marketplace?

Checklist for Developing a Specification List (1)

- ❖ Geometry
 - Size, height, breadth, length, diameter, space requirement, number, arrangement, connection extension
- ❖ Kinematics
 - Type of motion, direction of motion, velocity, acceleration
- ❖ Forces
 - Direction of force, magnitude of force, frequency, weight, load, deformation, stiffness, elasticity, stability, resonance
- ❖ Energy
 - Output, efficiency, loss, friction, ventilation, state, pressure, temperature, heating, cooling, supply, storage, capacity, conversion

Spec List Checklist (2)

- ❖ Material
 - Physical and chemical properties of the initial and final product, auxiliary material, prescribed materials (food regulations, etc.)
- ❖ Signals
 - Inputs and outputs, form, display, control equipment
- ❖ Safety
 - Direct safety principles, protective systems, operational, operator and environmental safety
- ❖ Ergonomics
 - Person-machine relationship, type of operation, cleanliness of layout, lighting, aesthetics
- ❖ Production
 - Factory limitations, maximum possible dimensions, preferred production methods, means of production, achievable quality and tolerance

Spec List Checklist (3)

- ❖ Quality control
 - Possibilities of testing and measuring, application of special regulations and standards
- ❖ Assembly
 - Special regulations, installation, siting, foundations
- ❖ Transport
 - Limitations due to lifting gear, clearance, means of transport (height and weight), nature and conditions of dispatch
- ❖ Operation
 - Quietness, wear, special uses, marketing area, destination (for example, sulphurous atmosphere, tropical conditions)

Spec List Checklist (4)

- ❖ Maintenance
 - Servicing intervals (if any), inspection, exchange and repair, painting, cleaning
- ❖ Recycling
 - Reuse, reprocessing, waste disposal, storage
- ❖ Costs
 - Maximum permissible manufacturing costs, cost of tooling, investment and depreciation
- ❖ Schedules
 - End date of development, project planning and control, delivery date

Example: A Pencil

- ❖ Task: Design A Pencil
 - Functions:
 - Make An Erasable Mark
 - Erase An Erasable Mark
- ❖ Constraints
 - Can Be Made Into A Point
 - Holds Point
 - Comfortable To Use
 - Cheap (\$0.10)

Specifications (1)

		Specification	Issued:	
		For: A Pencil	Page 1	
Changes	D/W	Requirements	Resp.	Source
		Make And Erase Marks On Paper.	Design Class	
	D	Geometry		Instructor
	W	Fits In Human Hand		"
		Fits In Pocket		
	D	Kinematics		"
		Quick		
	D	Forces:		"
		Operates With Force From A Human		
	D	Material:		Standard
		Forms Erasable Mark		Product
	D	Removes Erasable Mark		"
	D	Sharpenable		"
	D	Holds A Point		"
	D	Not Poisonous		FDA
		Replaces Issue Of		

Specifications (2)

			Issued: 1 (Cont'd)	Page 2
Changes	D/W	Requirements	Resp.	Source
	D	Signals: Operation Force Changes When Sharpening Needed	Design Class	Instructor
	D	Operation Force Changes When Eraser Needs Fixing		"
	D	Safety: Not Poisonous		OSHA
	D	Quiet		"
	D	Will Not Break into Hazardous Pieces		"
	D	No Sharp Edges		"
	D	Ergonomics: Lightweight		Instructor
	W	Comfortable		"
	D	Fits In Adult Human Hand		"
	D	Activation Force Is Within Human Limits.		"
	D	Production: Few Parts	Boothroyd & Dewhurst Guide To Mfg.	
	D	Easy		

Specifications (3)

			Issued: 1 (Cont'd) Page 3	
Changes	D/W	Requirements	Resp.	Source
	D	Quality Control: Visual Inspection Only		Mfg Engineer
	D	Assembly: None By Customer		Std. Product
	D	Transport: No Special Requirements, Packaging, Permits, Etc.		Mfg Engineer
	D	Operation: Quiet		Instructor
	D	Easy		"
	D	Good Wear Characteristics		"
	D	Operates In Any Environment In Which Paper Can Be Used		"
	D	Operates On Any Paper		"
	D	Maintenance: Easily Sharpened (Re-Pointed)		"
	D	Costs: Cheap (\$0.10 Selling Price)		K-Mart Price
	D	Schedule: By The End Of Class		Instructor

Coffee Example

Entries in Houses of Quality From QFD Deployment are Sources Of Specifications

House Of Quality #1	House Of Quality #1	House Of Quality #2	House Of Quality #3	House Of Quality #4
What	How / What (#2)	How / What (#3)	How / What (#4)	How
<u>Cust. Req.</u> Hot Smells Good Tastes Good Cheap Good Color Non-Poisonous No Grounds	<u>Characteristic</u> Serving Temp. Smell Jury Taste Jury Price Color Std. Analysis Filter/Weigh	<u>Feature</u> Water Temp. Bean's Origin Water Quality Weight/Serving Fineness Of Ground. Age Of Coffee (Raw, Brewed)	<u>Process</u> Water Speed Heater Output Brew Time Brew Temp. Grind Setting Water Source Filter Quality Time To Serving Reinitialize (Renew Filter, Grounds)	<u>Production</u> Thermometer Flow Control Timer Cleaning Plan Disposal Plan (Raw, Brewed)

Coffee Specifications #1

		Specification	Issued:	
		For: CUP OF COFFEE	Page 1	
Changes	D/W	Requirements	Resp.	Source
		Cup Of Coffee <u>Energy</u> Hot <u>Material</u> Good Color Non-Poisonous No Grounds <u>Safety</u> Non-Poisonous <u>Signals</u> Good Color Smells Good Tastes Good <u>Costs</u> Cheap <u>Quality Control</u> Good Color Smells Good Tastes Good		1st HoQ WHATs from class “ “ “ “ “ “ “ “ “ “
		Replaces Issue Of		

Next Level Of Detail In Specs...

House Of Quality #1	House Of Quality #1	House Of Quality #2	House Of Quality #3	House Of Quality #4
What	How / What (#2)	How / What (#3)	How / What (#4)	How
<u>Cust. Req.</u>	<u>Characteristic</u>	<u>Feature</u>	<u>Process</u>	<u>Production</u>
Hot Smells Good Tastes Good Cheap Good Color Non-Poisonous No Grounds	Serving Temp. Smell Jury Taste Jury Price Color Std. Analysis Filter/Weigh	Water Temp. Bean's Origin Water Quality Weight/Serving Fineness Of Ground. Age Of Coffee (Raw, Brewed)	Water Speed Heater Output Brew Time Brew Temp. Grind Setting Water Source Filter Quality Time To Serving Reinitialize (Renew Filter, Grounds)	Thermometer Flow Control Timer Cleaning Plan Disposal Plan (Raw, Brewed)

Coffee Specifications #2: "Hows?"

		Specification	Issued:	
		for: Cup Of Coffee		Page 1
Changes	D/W	Requirements	Resp.	Source
		Cup Of Coffee		
		<i>Energy:</i> Serving Temperature		1st HoQ from class
10/3/95		<i>Material:</i> Color Std		NIST STD
10/3/95		Non-Poisonous		FDA
		Brewed Coffee Should Yield Minimum Coffee Grounds When Filtered		1st HoQ from class
10/3/95		<i>Safety:</i> Non-Poisonous		FDA
10/3/95		<i>Signals:</i> Color Std		NIST STD
		Smells Jury		1st HoQ from class
		Taste Jury		"
		<i>Costs:</i> Minimize Price		1st HoQ from class
10/3/95		<i>Quality Control:</i> Color Std		NIST STD
		Smells Jury		1st HoQ from class
		Taste Jury		"
		Replaces issue of		

Coffee Specifications #3: “How Muches?”

		Specification	Issued:	
		For: CUP OF COFFEE	Page 1	
Changes	D/W	Requirements	Resp.	Source
		Cup Of Coffee		
		<i>Energy:</i> Serving Temperature, 140°F		1st Hoq From Class
10/4/95		<i>Material:</i> Color Std, NIST # ?		NIST STD
10/4/95		Non-Poisonous, < X ₁ , X ₂ , ...mg/l		FDA
		Brewed Coffee Should Yield < Y mg/l Coffee Grounds When Filtered		1st HOQ From Class
10/4/95		<i>Safety:</i> Non-Poisonous, < X ₁ , X ₂ , ...mg/l		FDA
10/4/95		<i>Signals:</i> Color Std, NIST # ?		NIST STD
		Smells Jury, 95% Consensus		1st HOQ From Class
		Taste Jury, 95% Consensus		“
		<i>Costs:</i> Minimize Price		1st HOQ From Class
10/4/95		<i>Quality Control:</i> Color Std, NIST # ?		NIST STD
		Smells Jury, 95% Consensus		1st HOQ From Class
		Taste Jury, 95% Consensus		“
		Replaces Issue Of		

Continue with Next Level of Detail in Specs

House Of Quality #1	House Of Quality #1	House Of Quality #2	House Of Quality #3	House Of Quality #4
What	How / What (#2)	How / What (#3)	How / What (#4)	How
<u>Cust. Req.</u>	<u>Characteristic</u>	<u>Feature</u>	<u>Process</u>	<u>Production</u>
Hot Smells Good Tastes Good Cheap Good Color	Serving Temp. Smell Jury Taste Jury Price Color Std.	Water Temp. Bean's Origin Water Quality Weight/Serving Fineness Of Ground. Age Of Coffee (Raw, Brewed)	Water Speed Heater Output Brew Time Brew Temp. Grind Setting Water Source Filter Quality TIME TO SERVING REINITIALIZE (RENEW FILTER, GROUNDS)	Thermometer Flow Control Timer Cleaning Plan Disposal Plan (Raw, Brewed)
Non-Poisonous No Grounds	Analysis Filter/Weigh			