

ME537 - PRODUCT REALIZATION			
PROJECT NAME	3D Tic Tac Toe		
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DATE	March 25, 2020	AUTHORS	
DOCUMENT TRACKING			
VERSION	EDITS COMPLETED BY	DATE	DESCRIPTION OF EDIT
1.0	Sung Won	03/19/2020	Created quality test plans (for multiple samples and DVT)
1.1	Sung Won	04/05/2020	Added more tests and recategorized some tests
1.2	Sung Won	5/1/2020	Corrections to the reliability tests

#	Test	Test Description	Samples (theoretical/actual)	Sample Size	Time to Test (min)	Acceptability Criteria (Spec No.)
1.0 Durability						
1.01	Drop test (box)	Drop the fully assembled box with the acrylic board from a height of 30 in onto a flat, hard surface.	actual	10	2	No cracks or chipping and stays intact (22.05)
1.02	Drop test (pieces)	Drop the game pieces from a height of 30 in onto a flat, hard surface.	actual	10	2	No cracks or chipping and stays intact (22.05)
1.03	Moisture susceptibility	Handle the fully assembled box with wet hands.	actual	10	30	No expansion or discoloration of wood (21.04)
1.04	Load bearing capacity (box & rope)	Place all the game pieces inside the fully assembled box and walk around while holding by the rope for 1 hour.	actual	10	60	Box and rope stay intact (21.06)
1.05	Load bearing capacity (acrylic board)	Apply a known force on the acrylic board for 1 hour, while the board is assembled with the box.	actual	10	60	No cracks and stays intact (22.07)
1.06	Stacking test	Stack the pieces on top of each other until it tips over.	actual	50	10	Can stack a minimum of 3 pieces without tipping (14.03)
1.07	Compression test (pieces)	Apply a force of about 2 N to the game pieces.	actual	10	5	Withstands a minimum of 2 N (22.09)
1.08	Compression test (acrylic board)	Apply a force of about 5 N to the acrylic board.	actual	10	5	Withstands a minimum of 5 N (22.10)
1.09	Rope does not disconnect from box	Pull on the rope laterally away from the fully assembled box with about 2 N force.	actual	10	5	Rope stays connected to the box (5.08)
1.10	UV test (pieces)	Expose game pieces to UV light for 3 hours.	actual	50	180	Pieces do not become brittle or turn yellow (18.05)
1.11	UV test (box)	Expose wooden box to UV light for 3 hours.	actual	10	180	Box does not become brittle or turn yellow (18.05)
1.12	Humidity test	Place the fully assembled box in an increasingly humid environment.	theoretical	10		No expansion or discoloration of wood around room temperature (22.05)
1.13	Vibration test	Hold the fully assembled box and shake side-to-side for 5 min.	actual	10	5	No chipping or cracks on the box or the game pieces (18.06)
2.0 Aesthetic						
2.01	Color uniformity of pieces	Visually inspect the colors of the game pieces.	actual	50	60	Colors across all games pieces are uniform (25.12)
2.02	Surface finish	Inspect that the box and the game pieces are smooth.	actual	10	60	Surfaces of the box and the pieces are smooth without scuff or sink marks (25.03-25.07, 25.13)
2.03	Sharp edges	Inspect that there are no sharp edges to the pieces.	actual	50	30	Edges of the pieces are round (25.02)
2.04	Perpendicularity	Visually inspect whether the edges of the box are warped.	actual	10	5	Edges of the box are perpendicular to the bottom of the box (25.09)
2.05	Lid alignment	Place lid on box and visually analyze outer dimensions.	actual	10	1	Lid is flush against the box front wall
2.06	Casting Quality/ Finish	Visually inspect all the pieces.	actual	50	60	No visual bubbles present No surface bumps can be felt No gaps in edges No Flashes Parting line not obvious
2.07	Knots in wood	Visually inspect and measure knots in wood as per ANSI criteria.	actual	10	5	
3.0 Functionality						
3.01	Slide test	Slide the acrylic board through the slots of the fully assembled box.	actual	10	2	Acrylic board slides through easily without bumps (25.08)
3.02	Fit test (acrylic board)	Gently shake the box in different lateral directions to check whether the acrylic board falls off.	actual	10	15	Acrylic board does not completely slide off the box
3.03	Fit test (pieces)	Inspect that the pieces fit one another and onto the acrylic board.	actual	50	15	Pieces fit together tight enough to stay connected (14.02)
3.04	Box holds all pieces	Place all the game pieces into the box by placing them in a random arrangement. Repeat 10 times.	actual	10	15	All the 29 game pieces fit inside the box (14.06)
3.05	Count test	Count the number of pieces (of each type) for each fully assembled, operational product.	actual	10	7	Minimum of 14 pieces for each type (12.03)

3.06	Joint quality	AITC Test T105 - Diagnostic Tests for Joint Quality	actual	10	20	Each wall should be properly joined with adjacent ones
4.0 Life/Reliability						
4.01	Slide test	Slide the acrylic board through the slots of the fully assembled box. Repeat for 500 cycles.	theoretical	10		Acrylic board slides through easily without bumps (24.01)
4.02	Throw test (pieces)	Take out the pieces and throw them into the box to simulate the start and end of the game. Repeat for 1000 cycles.	theoretical	10		No cracks or chipping and stays intact (24.02)
4.03	Fit durability of pieces	Connect the game pieces to each other and disconnect. Repeat for 1000 cycles.	theoretical	50		Pieces still fit one another to be stacked without tipping (24.04)
4.04	UV test (box)	Expose wooden box to UV light for 3 hours.	theoretical	10		Box does not become brittle or turn yellow (18.05)
4.05	Vibration test	Vibrate the fully assembled box at random RMS.	theoretical	10		No chipping or cracks on the box or the game pieces (18.06)
4.06	Rope wear test	Pick up the box by the rope and swing it to check for wear of the rope. Repeat for 500 cycles.	theoretical	10		Rope stays connected to the box (5.08)