HellermannTyton

From: **Quality Assurance HellermannTyton GmbH**

Subject: PPAP Approval signature deadline

Dear customer:

As you are aware the PPAP process is an integral part of our business. With that in mind, we are informing our customers who are requesting a PPAP that there is a 30 day (calendar) deadline to which we are expecting your reply back with a signed copy of the PSW with a disposition regarding it´s validity. It is important that we maintain compliance to the current AIAG PPAP manual.

As a part of compliance a signed and approved PSW is essential for our records.

We reserve the right to consider that PPAP valid and complete, if we do not receive a signed copy of the PSW within 30 days (calendar).

Once you have received our PPAP information please e-mail us a copy of your disposition with the appropriate signatures as soon as possible to the following person:

nescha.lohse@HellermannTyton.de Quality Assistant phone: +49 (0) 4122 701 5726

Your cooperation is greatly appreciated!

Respecting the procedure as described above, the documentation with HellermannTyton PB-No.: **106550** with submission date 14.03.2024 will be considered as complete and valid automatically on **13.04.2024** unless otherwise disposed!

HellermannTyton

HellermannTyton GmbH internal remarks: PB-No.: **106550**

Part Describtion: PLUGFTOVALXL GPN 150345

Part Submission Warrant

Part Name **PLUGFTOVALXL** Cust. Part Number **FU5T-14G317-LA**

Shown on Drawing No. **15-0345-001-CSU** Org. Part Number **13302029**

Engineering Change Level **00.0** Dated **30.04.2015**

Additional Engineering Changes **n/a** Dated **n/a**

Safety and/or Government Regulation ☐ Yes ☑ No Purchase Order No. **13302029** Weight (kg) **0,0009**

Checking Aid No. **n/a** Checking Aid Engineering Change Level **n/a** Dated **n/a**

ORGANIZATION MANUFACTURING INFORMATION

HellermannTyton GmbH **DUNS: 315430892**
Organization Name & Supplier/Vendor Code

Großer Moorweg 45
Street Address

Tornesch Region **25436** **Germany**
City Postal Code Country

CUSTOMER SUBMITTAL INFORMATION

Nursan Kablo Donanimlari (**30471**)
Customer Name/Division

Nadiye BARUTÇU
Buyer/Buyer Code

various
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☑ Yes ☐ No ☐ n/a

Submitted by IMDS or other customer format: **1166269196**

Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☐ No ☑ n/a

REASON FOR SUBMISSION (Check at least one)

- ☑ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Discrepancy
- ☐ Tooling inactive > than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Additional Location
- ☐ Other - please specify below

REQUESTED SUBMISSION LEVEL (Check one)

- ☐ Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
- ☐ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
- ☑ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
- ☐ Level 4 - Warrant and other requirements as defined by customer.
- ☐ Level 5 - Warrant with product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS

The results for ☑ dimensional measurements ☑ material and functional tests ☐ appearance criteria ☑ statistical process package

These results meet all design record requirements: ☑ Yes ☐ No (If "No" - Explanation Required)

Mold / Cavity / Production Process **injection moulding / serial mold**

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of confidential - pcs / 24 hours.

I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from this declaration below.

EXPLANATION/COMMENTS:

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a

Organization Authorized Signature **i.A.** W. Lohse Date 14-Mar-24

Print Name **i.A. N. Lohse** Phone No. +49 (0) 4122 701 5726 Fax No. +49 4122 701 241

Title **Quality Assistant** E-mail nescha.lohse@HellermannTyton.de

FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☑ Approved ☐ Rejected ☐ Other

Customer Signature Date 15.03.2024

Print Name Nadiye BARUTÇU Customer Tracking Number (optional)

Production Part Approval, Dimensional Results

HellermannTyton

Internal PB-No.: **106550**

Production Part Approval
Dimensional Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14G317-LA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**PLUGFTOVALXL**
INSPECTION FACILITY:	**QS-Laboratory**	DESIGN RECORD CHANGE LEVEL:	00.0 30.04.2015
		ENGINEERING CHANGE DOCUMENTS:	
		NAME of LABORATORY:	

ITEM	DIMENSION / SPECIFCATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)			OK	NOT OK
					mean	**min**	**max**		
1	**19,7**	**± 0,5**			**19,6**	**19,6**	**19,6**	☑	☐
								☐	☐
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Blanket statements of conformance are unacceptable for any test results.

This letter is done automatically and is valid without signature.

CREATOR	**TITLE**	**DATE**
i.A. N. Lohse	Quality Assistant	14-Mar-24

Production Part Approval, Performance Test Results

HellermannTyton

Internal PB-No.: **106550**

Production Part Approval
Performance Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14G317-LA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**PLUGFTOVALXL**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	00.0 30.04.2015
*CUSTOMER SPECIFIED SUPPLIER/VENDOR		ENGINEERING CHANGE DOCUMENTS:	
*If source approval is req`d, include the Supplier (Source) Customer assigned code.			

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA) / TEST CONDITIONS			OK	NOT OK
								☐	☐
2	**Performance requirements at**							☐	☐
	dry as molded:							☐	☐
	1. Fir tree push in force: ref.							☐	☐
	10 lbs max in each applicable							☐	☐
	oval hole size and a plate							☐	☐
	thickness of 1,8 mm							☐	☐
	2. Fir tree pull out force: ref.							☐	☐
	25 lbs min in each applicable							☐	☐
	oval hole size and a plate							☐	☐
	thickness of 1,8 mm							☐	☐
	3. Sheet metal thickness range:	**0,60 - 8,0 mm**						☐	☐
	4. Applicable oval hole sizes:							☐	☐
					mean	**min**	**max**	☐	☐
	A. 6,2 x 12,2 mm	**Push in**			**5,63 lbf**	**4,74 lbf**	**6,53 lbf**	☑	☐
		Pull out			**62,64 lbf**	**50,92 lbf**	**74,36 lbf**	☑	☐
	B. 6,5 x 12,5 mm	**Push in**			**3,76 lbf**	**2,87 lbf**	**4,65 lbf**	☑	☐
		Pull out			**63,54 lbf**	**49,51 lbf**	**77,57 lbf**	☑	☐
	C. 6,5 x 13,0 mm	**Push in**			**3,18 lbf**	**2,22 lbf**	**4,15 lbf**	☑	☐
		Pull out			**58 lbf**	**46,23 lbf**	**69,77 lbf**	☑	☐
	D. 7,0 x 12,0 mm	**Push in**			**4,2 lbf**	**3,58 lbf**	**4,82 lbf**	☑	☐
		Pull out			**62,91 lbf**	**50,65 lbf**	**75,17 lbf**	☑	☐
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Blanket statements of conformance are unacceptable for any test results.

This letter is done automatically and is valid without signature.

CREATOR	TITLE	DATE
i.A. N. Lohse	Quality Assistant	14-Mar-24

Production Part Approval, Material Test Results

HellermannTyton

Internal PB-No.: **106550**

Production Part Approval
Material Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14G317-LA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**PLUGFTOVALXL**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	00.0 30.04.2015
*CUSTOMER SPECIFIED SUPPLIER/VENDOR		ENGINEERING CHANGE DOCUMENTS:	
*If source approval is req`d, include the Supplier (Source) Customer assigned code.		NAME of LABORATORY:	

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
						☐	☐
3	**PA66HIRHS**				**Material is PA66HIRHS**	☑	☐
	Color: black				**Color of material is black**	☑	☐
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Blanket statements of conformance are unacceptable for any test results.

This letter is done automatically and is valid without signature.

CREATOR	**TITLE**	**DATE**
i.A. N. Lohse	Quality Assistant	14-Mar-24

DuPont Washington Works
Certification Office
P.O. Box 1217
Washington, WV 26181-1217

July 06, 2023

HELLERMANN TYTON CORP
QUALITY ASSURANCE
6701 W GOOD HOPE RD
MILWAUKEE - WI 53223-4620

DU PONT ORDER NO: 2501018843
CUSTOMER PO NO: 146598-22
DELIVERY DATE: 07/06/21
DELIVERY NO: 7802126353
FAX NUMBER:

THIS IS TO ADVISE THAT THE PRODUCT LISTED BELOW HAS BEEN CLASSIFIED STANDARD PRODUCT. TEST DATA ARE ATTACHED WHICH SHOW COMPLIANCE TO THE INDICATED SPECIFICATION.

QUALITY ASSURANCE MANAGER

PRODUCT(S)	LOT(S)	QTY Kgs	QTY Lbs	SPECIFICATION(S)
ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN CPN:UR0IMHSUV0 HOPPER	NBEVGZ0301	21237.41	46820.00	FORD WSS-M4D706-B1 ASTM D6779 PA0161 DUPONT STANDARD SPEC FCA USA LLC MS.50017 / MS-DB-41 GENERAL MOTORS GMW16447P-PA66-T2 GENERAL MOTORS GMW16558P-PA66-T1

DU PONT COMPANY
CUSTOMER SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN
Specification: FORD WSS-M4D706-B1 (01)

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS
LOT TEST			LOT NO: NBEVGZ0301	
Water Content at Packout, %	ISO 15512		0.18	0.08
PERIODIC TEST			LAST TEST DATE: December 2020	
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2	55		68
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA	11.0		18.0
Tensile Modulus, Mpa	ISO 527-1&2	2100		2500
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2	55		63
HISTORICAL TEST				
Density, g/cm3	ISO 1183/Method A	1.09	1.13	1.11
Flammability, mm/min	ISO 3795		100	B/23.7
Notched Izod Impact,1000Hrs@110C,%Chg	ISO 180 & 188		25.0	-5.0
Temp of Melting, 2nd Melt, 10°C/min, °C	ISO 11357	257	265	261
TenStress@50mm/min,Age1000Hrs@110°C,%Chg	ISO 188/527 1&2		25.0	-8.0

(01) THE PROPERTY REQUIREMENTS LISTED ABOVE ARE CERTIFIED PER AGREED-UPON VALUES ON THE FORD TEST SAMPLING PLAN, APPROVED BY FORD 08/24/12.

DU PONT COMPANY
CUSTOMER SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN
Specification: ASTM D6779 PA0161 (01)

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS	
LOT TEST			LOT NO: NBEVGZ0301		
Melt Viscosity, Pa.s	ISO 11443	30	130	76	(02)
Water Content at Packout, %	ISO 15512		0.20	0.08	
PERIODIC TEST			LAST TEST DATE: December 2020		
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2	50		68	
Density, g/cm3	ISO 1183/Method A	1.08	1.12	1.11	
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA	9.0		18.0	
Tensile Modulus, Mpa	ISO 527-1&2	1700		2500	
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2	52.0		63.0	

(01) ASTM D6779 PA0161
(02) PERFORMED AT 280°C WITH A SHEAR RATE OF 1000/SEC AND A DWELL TIME OF 300 SECS USING AN ORIFICE WITH AN L/D RATIO OF 20:1 RESULTS ARE CORRECTED TO 0.13% MOISTURE.

DU PONT STANDARD SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS	
LOT TEST			LOT NO: NBEVGZ0301		
Melt Viscosity, Pa.s	ISO 11443	40	120	76	(01)
Water Content at Packout, %	ISO 15512		0.18	0.08	
PERIODIC TEST			LAST TEST DATE: December 2020		
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2			68	
Density, g/cm3	ISO 1183/Method A			1.11	
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA			18.0	
Temp of melting,2nd melt,10°C/min °C	ISO 11357			261	
Tensile Modulus, Mpa	ISO 527-1&2			2500	
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2			63.0	
HISTORICAL TEST					
Flammability (Burn Rate 1 of 5), mm/min	ISO 3795			B/22.1	
Flammability (Burn Rate 2 of 5), mm/min	ISO 3795			B/24.2	
Flammability (Burn Rate 3 of 5), mm/min	ISO 3795			B/23.9	
Flammability (Burn Rate 4 of 5), mm/min	ISO 3795			B/22.8	
Flammability (Burn Rate 5 of 5), mm/min	ISO 3795			B/25.4	
Flammability, mm/min	ISO 3795		100	B/23.7	
Plaque Thickness, mm	ISO 3795			2.15	

(01) PERFORMED AT 280°C WITH A SHEAR RATE OF 1000/SEC AND A DWELL TIME OF 300 SECS USING AN ORIFICE WITH AN L/D RATIO OF 20:1 RESULTS ARE CORRECTED TO 0.13% MOISTURE.

DU PONT COMPANY
CUSTOMER SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN
Specification: FCA USA LLC MS.50017 / MS-DB-41 (01)

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS	
LOT TEST			LOT NO: NBEVGZ0301		
Melt Viscosity, Pa.s	ISO 11443	30	130	76	(02)
Water Content at Packout, %	ISO 15512		0.20	0.08	
PERIODIC TEST			LAST TEST DATE: December 2020		
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2	50		68	
Density, g/cm3	ISO 1183/Method A	1.08	1.12	1.11	
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA	9.0		18.0	
Tensile Modulus, Mpa	ISO 527-1&2	1700		2500	
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2	52.0		63.0	
HISTORICAL TEST					
Flammability, mm/min	ISO 3795		100	B/23.7	
MAX0T1 Multiaxial Impact	ASTM D3763			44	
Notched Izod Impact,1000Hrs@110C,%Orig	ISO 180 & 188	75.0		95.0	
Tenstres@50Mm/Min,Aged1000Hrs@110C,%Orig	ISO 188/527 1&2	75		92	
multi-Axial Impact,J @23C, 3.2mm, 2.2m/s	ASTM D3763			43	
multi-Axial Impact,J @23C, 3.2mm, 6.6m/s	ASTM D3763			45	

(01) CPN: 1826 ASTM D6779 PA0161 Z1, Z2
(02) PERFORMED AT 280°C WITH A SHEAR RATE OF 1000/SEC AND A DWELL TIME OF 300 SECS USING AN ORIFICE WITH AN L/D RATIO OF 20:1 RESULTS ARE CORRECTED TO 0.13% MOISTURE.

DU PONT COMPANY
CUSTOMER SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN
Specification: GENERAL MOTORS GMW16447P-PA66-T2 (01)

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS	
LOT TEST			LOT NO: NBEVGZ0301		
Melt Viscosity, Pa.s	ISO 11443	40	120	76	(02)
Water Content at Packout, %	ISO 15512		0.20	0.08	
PERIODIC TEST			LAST TEST DATE: December 2020		
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2	55	75	68	
Density, g/cm3	ISO 1183/Method A	1.09	1.13	1.11	
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA	11.0	31.0	18.0	
Temp of melting,2nd melt,10°C/min °C	ISO 11357	257	265	261	
Tensile Modulus, Mpa	ISO 527-1&2	2096	2804	2500	
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2	54	69	63	
HISTORICAL TEST					
Flammability, mm/min	ISO 3795		100	B/23.7	
Notched Izod Impact,1000Hrs@110C,%Orig	ISO 180 & 188	75		95	
Tenstres@50Mm/Min,Aged1000Hrs@110C,%Orig	ISO 188/527 1&2	75		92	

(01) THE PROPERTY REQUIREMENTS LISTED ABOVE ARE CERTIFIED PER AGREED-UPON VALUES ON THE GE TEST SAMPLING PLAN, APPROVED BY GM 01/09/12.
(02) PERFORMED AT 280°C WITH A SHEAR RATE OF 1000/SEC AND A DWELL TIME OF 300 SECS USING AN ORIFICE WITH AN L/D RATIO OF 20:1 RESULTS ARE CORRECTED TO 0.13% MOISTURE.

DU PONT COMPANY
CUSTOMER SPECIFICATION

Product: ZYTEL® MT409AHS BK010 KG HOPPER TRUCK NYLON RESIN
Specification: GENERAL MOTORS GMW16558P-PA66-T1 (01)

TESTS	TEST METHOD	LIMITS MIN	LIMITS MAX	RESULTS	
LOT TEST			LOT NO: NBEVGZ0301		
Melt Viscosity, Pa.s	ISO 11443	40	120	76	(02)
Water Content at Packout, %	ISO 15512		0.20	0.08	
PERIODIC TEST			LAST TEST DATE: December 2020		
Deflection Temperature @1.80 MPa, ºC	ISO 75-1&2	55	75	68	
Density, g/cm3	ISO 1183/Method A	1.09	1.13	1.11	
Notched Charpy Impact @ 23C, kj/m2	ISO 179/1eA	11.0	31.0	18.0	
Temp of melting,2nd melt,10°C/min °C	ISO 11357	257	265	261	
Tensile Modulus, Mpa	ISO 527-1&2	2096	2804	2500	
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2	54	69	63	
HISTORICAL TEST					
Flammability, mm/min	ISO 3795		100	B/23.7	
Notched Izod Impact,1000Hrs@110C,%Orig	ISO 180 & 188	75		95	
Tenstres@50Mm/Min,Aged1000Hrs@110C,%Orig	ISO 188/527 1&2	75		92	

(01) THE PROPERTY REQUIREMENTS LISTED ABOVE ARE CERTIFIED PER AGREED-UPON VALUES ON THE GE TEST SAMPLING PLAN, APPROVED BY GM 01/12/12.
(02) PERFORMED AT 280°C WITH A SHEAR RATE OF 1000/SEC AND A DWELL TIME OF 300 SECS USING AN ORIFICE WITH AN L/D RATIO OF 20:1 RESULTS ARE CORRECTED TO 0.13% MOISTURE.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PFMEA)

PFMEA Number: **US-OP-APQP-2**

Part Name: Clips/Mounts/Brackets/Various Materials/Clamps

Process Description: Inj Molding + Dim / Func / Performance FP + Assy (Auto or Manual) + Packaging

Process Responsibility: HellermannTyton

Prepared by: QA PRP Team

Model Year(s) / Vehicle(s): NA

Key Date: 12/14/2020

PFMEA Date Org: 12/14/2020

Rev. Date: See Footer

Core Team: Quality Assurance, Manufacturing, Automation, Receiving-Shipping

Rev. Level: See Footer

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
1 QA Receiving Certificate of Analysis (C of A)	HT SPEC and C of A	QA does not receive C of A	Delay in Manufacturing	5		C of A not listed on PO	3	P - WI-PUR-6	5	75	None						0
				5		Supplier forgot to send out C of A to HT QA	3	P - purchase order requirement	5	75	None						0
		Wrong HT SPEC	Delay in manufacturing / Customer Dissatisfaction	5		Incorrect HT SPEC or MTS on PO	3	P-Work instruction D-Visually verify to SPEC in ERP System	5	75	None						0
		Information on C of A does not match HT SPEC	Delay in Customer Shipment	5		HT Spec or MTS does not have the latest released revision.	3	P-Work instruction P-Change management D-Visually verify to SPEC in ERP System	5	75	None						0
				5		Supplier only test to the latest released revision	3	P-Work instruction P-Change management D-Visually verify to SPEC in ERP System	5	75	None						0
				5		Supplier does not test to the latest released revision	3	P-Work instruction P-Change management D-Visually verify to SPEC in ERP System	5	75	None						0
		Timely update of ERP (JDE)	Delay in Customer Shipment	5		Manual operation and no system reminder.	3	P-Work instruction P-Change management D-Visually verify to SPEC in ERP System	5	75	None						0
2 Incoming Receiving, QA Inspection (if required), & Movement to Storage	Verify material / parts have all information per PO	No Label	Loss of Traceability	5		Label falls off	3	D - Incoming Inspection P- Supplier PPAP	5	75	None						0
		Wrong Label	Wrong parts in inventory, delay in manufacturing	5		Wrong product was shipped	2	D - Incoming Inspection P- PO in ERP System	5	50	None						0
		Incorrect material / part	Delay in Customer Shipment	5		Wrong product was shipped	2	D - Incoming Inspection P- PO in ERP System	5	50	None						0
				5		Ordered Part Number entered incorrect	2	D - Incoming Inspection P- PO in ERP System	5	50	None						0
		Wrong Quantity	Customer Dissatisfaction	4		Quantity of product shipped by supplier was incorrect	2	D - Incoming Inspection	7	56	None						0
				4		Order quantity entered incorrect	2	D - Incoming Inspection	7	56	None						0
		Incorrect Packaging	Delay in Customer Shipment	5		Product received did not have correct packaging	2	D - Incoming Inspection	7	70	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
		Poor material / part Quality	Customer Dissatisfaction	5		Product received is non-conforming	2	D - Incoming Inspection P- Supplier PPAP	7	70	None						0
		Moisture Too High / Low	Delay in Customer Shipment	5		Damaged in transit	2	D - Incoming Inspection P- Supplier C of A D - Moisture Log & Share Point	7	70	None						0
		Wrong colorant received (if required)	Delay in Customer Shipment	5		Wrong product was shipped	2	P - ERP System, WI-SR-10.2-1, WI-QA-10.3-1	4	40	None						0
	Non-Silo resins & purchased components moved to storage	Non-Silo resins & purchased components not moved to storage	Delay in Manufacturing	5		Manual operation / operator error	2	D/P - ERP system / WI-SR-10.2-1	4	40	None						0
	Silo-resins moved to storage	Silo-resins not moved to storage	Delay in Manufacturing	5		Manual operation / operator error	2	D/P - ERP system / WI-MH-1	4	40	None						0
3 Cell Clearance	Clear Cell from Previously run job	Cell not cleared of equipment and / or materials from previously run job	Delay in manufacturing	5		Change over checklist not followed	2	D - Production Control System	4	40	None						0
			Wrong material used for product	8		Change over checklist not followed	2	D - Production Control System	4	64	None						0
4 Resin Movement, Resin Ratio Central Material Handling System Operation	Acceptable resin for production	Unacceptable Moisture Levels	Part Non-Compliance	7		Dryer malfunction	2	D - Dryer Alarms D/P - Moisture Testing P - Filter Cleaning	2	28	None						0
		Contamination	Part Non-Compliance	7		Foreign Matter in Material	2	D - Visual Inspections P - Material Handling Work Instruction w/ color-coded containers	6	84	None						0
			Part Non-Compliance	7		Incorrect resins/colorant Mixed Together	2	D - Visual Inspections P - Material Handling Work Instruction	5	70	None						0
		Incorrect Material	Part Non-Compliance	8		Wrong material hook-up at press	2	D/P - Visual to Work Order	5	80	None						0
5 Injection Molding / Cell, Work Order, Press, & Automation Set-up	Instructions for production	All Non-resin items not present at cell	Delay in Manufacturing	5		WI or ERP system not followed	2	P/D- ERP system & WI-SR-10.2-1	4	40	None						0
		Work order not signed off	Word order has incorrect BOM	7		Incorrect set-up BOM in (JDE)	4	D-Change over checklist P- IE Set-up BOM (IMLS)	3	84	None						0
			Incorrect BOM used	7		Wrong label on material	3	P-Work instruction D-Flag system	3	63	None						0
				7		Operator Error	3	P-Work instruction D-Flag system	3	63	None						0
		Work Order Set Up Incorrectly	Delay in Manufacturing	5		Work Order read incorrectly	2	D/P - Work Order D - Set-up Verification	5	50	None						0
		Wrong work order used	Delay in Manufacturing	5		wrong work order sent to machine	2	D/P - Work Order D - Set-up Verification	5	50	None						0
		Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	7		Material blender set incorrectly	2	D/P - Visual to Work Order D- Quality Tree P - First Piece Approvals	5	70	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
		Excess Plastic on Parts	Part Non-Compliance	6		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - In-process Inspections	7	84	None						0
				6		Improper start-up	2	D - Visual Inspection, Quality Tree D - LPA D/P - In-process & Cell Inspections P - First Piece Approvals	5	60	None						0
		Soft Insertions	Part Non-Compliance	6		Thermolator Malfunction	2	D - Visual Inspections D-Audible alarms added to all Thermolator to detect temp. dev. D - In-process Inspections P - First Piece Approvals D - Hand Insertion	3	36	None						0
				6		Incorrect Tonnage	2	D- Visual Inspections P - First Piece Approvals P - In-process PM's	6	72	None						0
				6		Start-up/Cycle Interruptions	2	D- Visual Inspections D - In-process Inspections	7	84	None						0
				6		Fast Cycle Time	2	D - Visual Inspection, Quality Tree D - In-process Inspections P - First Piece Approvals	6	72	None						0
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections, Quality Tree D - In-process Inspections P - First Piece Approvals P - In Process PM	6	72	None						0
		Plugged Sprue Tips / Gates (Hot Manifold/Valve-Gated Molds)	Part Non-Compliance / Unbalanced Fill	7		Material Contamination	2	D- Visual Inspections, Quality Tree D - In-process Inspections P - Magnets in Hopper and Melt Filters on Nozzle	5	70	None						0
		Start up scrap packaged	Customer Dissatisfaction	4		Automation equipment started too early after start up of process re-start.	4	D - Visual Inspections P - Work Instructions P - Automation disable switch during changeover D/P - In-process & Cell Inspections	5	80	None						0
		Camera stops working	Customer Dissatisfaction	6		Mechanical, power failure, lenses blocked, conveyor belt dirty, component failure.	2	P - Master sample (Known Bad and Good parts)	2	24	None						0
		Auto-degator stops working (if required)	Delay in Manufacturing	4		Mechanical failure	2	D - Visual Inspections D/P - In-process & Cell Inspections P - Automation Sensor	4	32	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
		End of Arm Tool stops working (if required)	Delay in manufacturing	4		Mechanical failure	2	D - Visual Inspections D/P - In-process & Cell Inspections P - Automation Sensor	4	32	None						0
		Auxillary Assembly Equipment stops working (if required)	Delay in manufacturing	4		Mechanical failure	2	D - Visual Inspections D/P - In-process & Cell Inspections P - Automation Sensor	4	32	None						0
		Packaging Equipment stops working (if required)	Delay in manufacturing	4		Mechanical failure	2	D - Visual Inspections D/P - In-process & Cell Inspections P - Automation Sensor	4	32	None						0
6 First Piece Approval Injection Molding Process	Manufacturing a conforming part per specifications	Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material Handling Error	2	D/P - Visual to Work Order, Quality Tree	6	60	None						0
		Burnt tips	Part Non-Compliance / Cosmetic Issues / Short	4		Plugged/Worn Vents	3	D- Visual Inspections, Quality Tree P - First Piece Approvals P - In process PM's using Ice Blasting	5	60	None						0
		Sticking in mold	Part Non-Compliance / Mold Damage	5		Excessive Mold Temperatures	2	D- Visual Inspections P - First Piece Approvals D - Audible alarms added to all Thermolators to detect temp. dev.	4	40	None						0
				5		Excessive Hold Pressure	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	60	None						0
				5		Residue Build-Up	2	D- Visual Inspections, Quality Tree P - First Piece Approvals D - Audible alarms added to all Thermolators to detect temp. dev.	4	40	None						0
				5		Water hooked up incorrectly	2	D-Visual Inspections	7	70	None						0
				5		Packaging interruptions Degator Jams	3	D- Visual Inspections P - First Piece Approvals	5	75	None						0
				5		Heater band malfunctions	2	D- Visual Inspections D - In-process Inspections P - PM	5	50	None						0
		Excess Plastic on Parts	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - In-process Inspections P- First Piece Approvals	5	50	None						0
		Shorts	Part Non-Compliance / Cosmetic	5		Insufficient Injection Pressure compatibility of Press / mold	3	D- Visual Inspections P - First Piece Approvals P - In-process PM's	5	75	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
				5		Plugged/Worn Vents	3	D- Visual Inspections P - First Piece Approvals P - In-process PM's	5	75	None						0
				5		Residue Build-Up	2	D- Visual Inspections P - First Piece Approvals P - In-process PM's using Ice Blasting for mold cleaning	5	50	None						0
				5		Lot / Moisture Variations	2	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	50	None						0
				5		Process Interruption	2	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	50	None						0
		Flash	Part Non-Compliance / Insertion Failures / Cosmetic	5		Excessive Injection Pressure	3	D- Visual Inspections, Quality Tree P - First Piece Approvals P - In-process PM's	5	75	None						0
				5		Incorrect Tonnage	2	D- Visual Inspections P - First Piece Approvals P - In-process PM's P - Press Size Callout on Routing	5	50	None						0
				5		Water hook up incorrect on sub gated tools	3	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	75	None						0
				5		Start-up/Cycle Interruptions	3	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	75	None						0
				5		Clamp pressure on press	3	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	75	None						0
				5		Worn inserts	2	D- Visual Inspections D - Tool Tests D - In-process Inspections P - First Piece Approvals	4	40	None						0
				5		Broken Insert/Ejector Blade	3	D- Visual Inspections, Quality Tree D - In-process Inspections P - First Piece Approvals	5	75	None						0
		Mold Mismatch	Part Non-Compliance/High Insertion Force	6		Poor Mold Alignment	2	D - Visual Inspections, Quality Tree D - In-process Inspections P - First Piece Approvals P - In-process PM	5	60	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections, Quality Tree D - In-process Inspections P - First Piece Approvals P - In-process PM	5	60	None						0
		Deep ejector pins	Part Non-Compliance/High Insertion Force	3		Excessive Hold Pressure	3	D - Visual Inspections D - In-process Inspections P - First Piece Approvals P - In Process PM	5	45	None						0
				3		Thermolator Malfunction	2	D - Visual Inspections D - In-process Inspections P - First Piece Approvals P - In-process PM	5	30	None						0
				3		Fast Cycle Time	2	D - Visual Inspections, Quality Tree D - In-process Inspections P - First Piece Approvals P - In-process PM	5	30	None						0
		Plugged Sprue Tips / Gates (Hot Manifold/Valve-Gated Molds)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D- Visual Inspections D - In-process Inspections P - Magnets in Hopper and Melt Filters on Nozzle P - First Piece Approvals	5	30	None						0
				3		Mold Heater Malfunction	2	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	30	None						0
				3		Valve Gate Malfunction	2	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	30	None						0
		Elongated Sprues	Part Non-Compliance	6		Inadequate Cooling	2	D- Visual Inspections D - In-process Inspections P - First Piece Approvals	5	60	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Automation equipment started too early after start up of process re-start.	3	P - Visual Inspections, Quality Tree P - Work Instructions, Training Manual P - Automation disable switch during changeover P - Inspections at the cell D - In-process Inspections	4	36	None						0
		Dimensional check shows out of tolerance condition (if required)	Part Non-Compliance	5		Excessive mold wear	2	P - Dimensional verification using calibrated gauging	5	50	None						0
				5		Process sheet not followed	2	P - Dimensional verification using calibrated gauging	5	50	None						0
		Functional check (if required) shows part does not perform as intended	Part Non-Compliance	6		Process sheet not followed	2	D - First Piece Acceptance Hung at the Cell	6	72	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
		Functional check (if required) shows part has damage	Part Non-Compliance	6		Process sheet not followed	2	D - First Piece Acceptance Hung at the Cell	6	72	None						0
		Performance Testing (if required) shows part does not meet specifications	Part Non-Compliance	6		Process sheet not followed	2	P - Performance verification using calibrated gauging	5	60	None						0
	Product Conforms per specifications before production	First Piece Not Hung	Delay in Manufacturing	3		Failure to hang First Piece	2	D/P - Tool Evaluation Sheet	6	36	None						0
	Revision level	Incorrect revision level produced	Customer Dissatisfaction	5		Work Order not compared to latest revision level drawing in JDE	2	D - First Piece Acceptance Hung at the Cell	6	60	None						0
7 Assembly	Automated Assembly (if required)	Parts not assembled properly	Part Non-Compliance	6		Mechanical Failure	2	D - Visual Inspections D/P - In-process & Cell Inspections P - Automation Sensor	4	48	None						0
	Manual Assembly (if required)	Parts not assembled properly	Part Non-Compliance	6		Work Order or WI not followed	2	D - Visual Inspections D/P - In-process & Cell Inspections	6	72	None						0
8 Packaging & Labeling	Manual placement of parts onto cooling fixture or cooling conveyor (if required)	Parts not placed on cooling fixture or conveyor	Part Non-Compliance	5		Work Order or WI not followed	2	P/D - Visual to Work Order / WI-PRD-200	7	70	None						0
	Automated Packaging	Product not properly packaged or labeled	Customer Dissatisfaction	5		Work Order or WI not followed	2	P/D - Visual to Work Order / WI-PRD-200	7	70	None						0
	Manual Packaging + water (if required)	Product not properly packaged or labeled	Customer Dissatisfaction	5		Work Order or WI not followed	2	P/D - Visual to Work Order / WI-PRD-200	7	70	None						0
9 In-Process Checks	In-process checks for process set-up, part quality - visual appearance	Checks not completed	Non-conforming products ship to customer	6		Process issues/Operator error	3	D-Operator check every other hour. D-Process Tech check every other hour. P-Prouction Control System/Work Order Log P-Work instruction /Process sheet	5	90	None						0
		Incorrect or Missing work order number on Bag	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections P - Inspections at the cell P - Date Code Calendar	5	45	None						0
				3		Operator error	3	D - Visual Inspections P - Inspections at the cell P - Date Code Calendar	5	45	None						0
		Incorrect or Missing Date Code on the Bag	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections P - Inspections at the cell P - Date Code Calendar	5	45	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
				3		Wrong/no date code on packaging - Operator Error	3	D - Visual Inspections P - Inspections at the cell P - Date Code Calendar P - Work Instructions	5	45	None						0
		Degator Jams	Part Non-Compliance	5		Parts Not Aligned	3	D - Visual Inspection p - Degator Guides P - Machine Alarms	4	60	None						0
			Loss Production	5		Dull Cutter Blades	2	D - Visual Inspection D - In-process Inspections P - PM P - Warped Sprue Detection	6	60	None						0
				5		Cylinder Failure	2	D - Visual Inspection D - In-process Inspections P - PM	6	60	None						0
		Incorrect Degator alignment	Part Non-Compliance	5		Improper Set-up	2	D- Visual Inspection D - In-process Inspections P - Degator Guides - PM	5	50	None						0
						Manual Degator Jams	3	D- Visual Inspection D - In-process Inspections P - PM	5	75	None						0
						Automated Degator Jams	3	D- Visual Inspection D - In-process Inspections P - PM P- Degater Alarm	4	60	None						0
						Improper part feed	2	D- Visual Inspection D - In-process Inspections P - PM P- Degater Guides w/ Alarms	4	40	None						0
						Part missing from lead in edge of runner	2	D- Visual Inspection D - In-process Inspections P - PM P- Degater Alarm	4	40	None						0
		Greasy Parts Packaged	Part Non-Compliance	4		Robot Drags the Parts Across the Leader Pins	2	D - Visual Inspection D - In-process Inspections P - PM	6	48	None						0
		Functional check (if required) shows part does not perform as intended	Part Non-Compliance	6		Process sheet not followed	2	D-Operator check every other hour. D-Process Tech check every other hour. P-Prouction Control System/Work Order Log P-Work instruction /Process sheet	5	60	None						0
		Functional check (if required) shows part has damage	Part Non-Compliance	6		Process sheet not followed	2	D-Operator check every other hour. D-Process Tech check every other hour. P-Prouction Control System/Work Order Log P-Work instruction /Process sheet	5	60	None						0

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													Actions Taken	Severity	Occurrence	Detection	RPN	
		Incorrect Moisture in Bags	Part Non-Compliance / Parts Conditioned Incorrectly	5		Water Dosing system failure	2	D - Monitoring Water P - Inspections at the cell P - Preventative Maintenance P - dosing system monitors flow	4	40	None						0
				5		Water Supply Not On	2	D - Monitoring Water P - Inspections at the cell P - Preventative Maintenance P - dosing system monitors flow	6	60	None						0
				5		Dirty or Clogged Filter	2	D - Monitoring Water P - Inspections at the cell P - Preventative Maintenance P - dosing system monitors flow	4	40	None						0
				5		Improper Timer Setting	3	D - Monitoring Water P-dosing system monitors flow	4	60	None						0
				5		Bad Bag Seals leak water	2	D - Visual Inspection D - Monitoring Water P - Inspections at the cell P - Preventative Maintenance	5	50	None						0
		Mis-labeling	Customer Dissatisfaction	3		Printer Ribbon not Inserted Properly	2	D - Visual Inspections P - Inspections at the cell P-Work order sign-off	7	42	None						0
				3		Wrong Labels Placed on Product	4	D - Visual Inspections P - Inspections at the cell P - LPA P-Work order sign-off	7	84	Implement work order log system for label check.	Trent Carlson 09/16/21	New work order log in place to verify per box correct label.	3	3	3	27
				3		Wrong Pre-labeled Bag for Product	4	D - Visual Inspections P - Inspections at the cell P - LPA P-Work order sign-off	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections P - Inspections at the cell P - LPA P-Work order sign-off	7	84	None						0
		Insufficient Bag Seals	Part Non-Compliance	3		Sealer Tape Worn	4	D - Visual Inspection P - Inspections at the cell P - Electronic Shift Log	6	72	None						0
				3		Bag Wrinkled/Bag Mil Thickness Inconsistencies	4	D - Visual Inspection P - Inspections at the cell	7	84	None						0
				3		Sealer Malfunctions	2	D - Visual Inspection P - Inspections at the cell	7	42	None						0
				3		Material stuck on sealer	4	D - Visual Inspection P - Inspections at the cell P - Incoming Inspection	7	84	None						0

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													Actions Taken	Severity	Occurrence	Detection	RPN
				3		Improperly Adjusted Timer	4	P - Work Instruction D - Visual Inspection	7	84	None						0
				3		Teflon coating worn (Rennco baggers)	2	P - Work Instruction D - Visual Inspection P- In-process PM's	6	36	None						0
		Insufficient Packaging	Customer Dissatisfaction	3		Issues with the Bag Stock (Not Quantity)	3	D - Visual Inspection P - Inspections at the cell	7	63	None						0
				3		Insufficient Packaging Supplies	4	D - Visual Inspection P - Inspections at the cell	7	84	None						0
		Incorrect Quantity in Bag	Customer Dissatisfaction	4		Robot grippers failed to place parts	3	D - Visual Inspection P - Inspections at the cell	7	84	None						0
				4		Pick and Place Grippers Drop Parts	3	D - Visual Inspection P - Inspections at the cell	7	84	None						0
				4		Degator Jams	3	D - Visual Inspection P - Inspections at the cell	7	84	None						0
				4		Inconsistent Bag Width	2	P/D - Visual Inspection	8	64	None						0
		Missing or Incorrect Hang Hole	Customer Dissatisfaction	4		Bag register mark Inconsistencies	2	P/D - Visual Inspection	8	64	None						0
				4		Bags not Webbed Correctly	2	P/D - Visual Inspection	8	64	None						0
				4		Too Much Air in Bag	2	P/D - Visual Inspection	8	64	None						0
				4		Cylinder Failure	2	D - Visual Inspection P - PM	7	56	None						0
		Incorrect Quantity in Boxes	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspections P Inspections at the cell P - Bag Counter	7	84	None						0
				4		Scale Out of Calibration	2	D - Visual Inspections P - Inspections at the cell P - Calibration Schedule	5	40	None						0
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection P - Inspections at the cell	7	56	None						0
10 QA Testing	Validation and documentation of product per specifications	Testing Incomplete	Part Non-Compliance	7		Testing Not Performed by QA	2	D/P - SPC software or WI, First Piece Acceptance. P- Daily Production Meeting	5	70	None						0
11 Layered Process Audit	Audit Production Process per Questions on LPA form F-PRD-9	Audit Missed	Part Non-Compliance	7		Auditor error or improperly trained auditior	2	P - Auditor training & LPA form F-PRD-9	5	70	None						0
		Audit errors and/or incomplete audit	Part Non-Compliance	7		Auditor error or improperly trained auditior	2	P - Auditor training & LPA form F-PRD-10	5	70	None						0
12 Inspection at the Cell	Product conforms per specifications throughout production run.	Bad Product Shipped	Customer Dissatisfaction	6		Inspections Not Performed	2	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				6		Bad Product not Found in Random Sampling	2	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0

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													Actions Taken	Severity	Occurrence	Detection	RPN
		Mis-labeling	Customer Dissatisfaction	3		Wrong Labels Placed on Product	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Wrong Pre-labeled Bag for Product	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Wrong label provided	3	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	54	None						0
		Water Verification Incomplete	Part Non-Compliance	6		Water not Verified During Process Inspection	2	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
		Insufficiant Bag Seals	Part non-compliance	3		Sealer Tape Worn	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Bag Wrinkled/Bag Mil Thickness Inconsistencies	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Sealer Malfunctions	2	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	36	None						0
				3		Material stuck on sealer	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
				3		Improperly Adjusted Timer	4	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off	6	72	None						0
		Incorrect Quantity in Bags	Customer Dissatisfaction	4		Scale issue	3	D - Visual Inspections P - Share Point P - LPA P-Work order sign-off P - Calibration Schedule	5	60	None						0
				4		Operator error	3	P - Work Instructions D - Visual verification D- Share Point/Shift Log	5	60	None						0
		Incorrect Quantity in Boxes	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspections P Share Point P - Bag Counter	5	60	None						0
				4		Scale Out of Calibration	2	D - Visual Inspections P - Share Point P - Calibration Schedule	5	40	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
		Insufficiant Packaging	Customer Dissatisfaction	3		Issues with the Bag Stock (Not Quantity)	3	D - Visual Inspection P - Share Point	7	63	None						0

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	RPN
				3		Insufficient Packaging Supplies	4	D - Visual Inspection P - Share Point	7	84	None						0
		Incorrect or Missing Date Code on the Box	Traceability Loss	3		Operator error	3	D - Visual Inspections P - Date Code Calendar P - Work Instructions P-Share Point/Shift Log	5	45	None						0
13 Validation Testing (Annually if required)	Meet customer requirements	Annual Validation not Completed	Customer Dissatisfaction	5		Customer Specific Requirements Not Met	2	D/P - PPAP Matrix P-Training Quality Personnel	6	60	None						0
14 Finished Goods Movement	Move products from Injection Molding work station to Stock or Shipping Dock	Good product put in Hold	Delay shipment to customer	5		Incorrect cone put on product at Molding Work Station	2	D - Visual Inspections P -Hold ticket attached P-Work instructions	6	60	None						0
		Bad Product Shipped	Customer Dissatisfaction	7		Incorrect cone put on product at Molding Work Station	2	D - Visual Inspections P -Hold ticket attached P-Work instructions	6	84	None						0
	FIFO, Physical Inventory Location, ERP (JDE)	Incorrect receive in ERP	Inaccurate Inventory-Delay Production	5		Operator error	3	P-Work instructions D-Accounting verification D-Inventory cycle count	6	90	None						0
		Inventory put on wrong location	Inaccurate Inventory-Delay Production	5		Operator error	3	P-Rack label D-Inventory cycle count	6	90	None						0
		Damage during transfer	Delay in Customer Shippment	5		Operator error	3	P-Operator training D-Visual Inspections	6	90	None						0
15 Shipping to Warehouse or Customer	Ship Parts per Shipping Specifications	Shipped Incorrectly	Customer Dissatisfaction	4		Late Shipment	3	D/P - Visual Inspections	7	84	None						0
				5		Damaged from Handling	2	D/P - Visual Inspections	7	70	None						0
				5		Damaged Shipment in transit	2	D/P - Visual Inspections	7	70	None						0
				5		Customer Specific Requirements Not Met	2	P-Customer specific packaging requirement P-Work instructions D-Visual inspections	6	60	None						0
	Sales order	Incorrect data on Sales order	Customer Dissatisfaction	5		Operator error	2	D-Visual inspection D-ASN	6	60	None						0
	Manual shipping request	Incorrect data entered in ERP	Customer Dissatisfaction	5		Operator error	2	D-Visual inspection D-ASN	6	60	None						0
	Product package per specifications	Wrong Parts Picked	Customer Dissatisfaction	5		Operator Error	2	D - Staging Visual Inspection P - Pick List	6	60	None						0
		Wrong Quantity Picked	Customer Dissatisfaction	5		Wrong Quantity of Parts Picked	2	D- Visual inspection & sign off P - Staging Inspection	6	60	None						0
		Incorrect Packaging	Customer Dissatisfaction	5		Incorrect Packaging Specifications on Pick List	3	D - Staging Visual Inspection P - Pick List	5	75	None						0
	Product/box label per specifications	Put Label on Wrong Box	Customer Dissatisfaction	5		Operator error	3	D-Visual inspection & sign off D-Scan barcode D-ASN	5	75	None						0
	Ship product per customer requirements	No inventory available	Customer Dissatisfaction	5		Production delay-No FG inventory/Customer order late	3	D- ERP System P - Customer service communication to customer	5	75	None						0

PROCESS FLOW DIAGRAM

Part Description:	Inj Molding + Dim / Func / Performance FP + Assy (Auto or Manual) + Packaging	Program Name:	Clips/Mounts/Brackets/Various Materials/Clamps
HT Dwg.# and Rev:	Various	Created By:	QA PRP Team
Customer P/N and Rev:	Various	Creation Date:	12/14/20
Customer Name:	Various	PFD Number:	US-OP-APQP-2

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Process Name/ Operation Description	Product/Process Characteristics	Control Methods
1	■				QA Receiving Certificate of Analysis	Material Resin Characteristics / Purchased Components	ERP System / WI-QA-7.4
2	■				Incoming Receiving	Non-Silo Resin - Gaylord/Bags Only (Quantity)	ERP System
	■					Non-Silo Resin - Gaylord/Bags Only (Packaging Requirements)	WI-SR-10.2-1
	■				Incoming Receiving (Silo Storage System)	Resin - Silo only	Moisture Log & Share Point
	■				Incoming Receiving (Purchased Components)	Purchased Parts, Customer Returned Product (RGA), Customer Tools Needing Service (RGA), Tooling Components, MRO Items (Quantity)	ERP System
	■					Packaging Requirements	WI-SR-10.2-1
				☒	QA Inspection (if required)	Resin - Colorant	ERP system WI-SR-10.3-1
		◆			Movement to Storage	Non-Silo Resins & Purchased Components	ERP System
		◆				Silo-Resins	ERP System
3	■				Cell Clearance	Clear cell from previously run job	Change over checklist QS-WI-INJ-01
4		◆			Resin Movement	Move Resins to Material Handling System and Check Moistures in Resin Dryers	Material Process Log F-PRD-8.1-4 and Raw Material Moisture Content Test Log F-QA-10.3-9
	■				Resin Ratio	Resin Ratio and Colorant	Material Process Log F-PRD-8.1-4
5	■				Injection Molding / Cell Set-up - Manual Assembly Equipment (if required)	Inventory Parts - Transfer & Move Non-resin items to cell, In-process part assembly	ERP System / Signed Set-up Stamp on Work Order

PROCESS FLOW DIAGRAM

Part Description:	Inj Molding + Dim / Func / Performance FP + Assy (Auto or Manual) + Packaging	Program Name:	Clips/Mounts/Brackets/Various Materials/Clamps
HT Dwg.# and Rev:	Various	Created By:	QA PRP Team
Customer P/N and Rev:	Various	Creation Date:	12/14/20
Customer Name:	Various	PFD Number:	US-OP-APQP-2

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Process Name/ Operation Description	Product/Process Characteristics	Control Methods
	■				Injection Molding / Work Order Set-Up	Ensuring supplies on work order ready at cell, ensure scale & water set-up (if required)	Signed Set-up Stamp on Work Order / WI-PRD-200
	■				Injection Molding / Press Set-up	Mold Installation, Machine Set-up, Cooling Fixture or Cooling Conveyor Set-up (if required)	Work Order / WI-PRD-9.0-2, Part specific Process Sheet F-PRD-9.6-1 and PLC
	■				Automation Set-up - Camera / Vision System Inspection (if required)	In-process Cable Tie Inspection	Run Master Sample through the vision system (1X) per day (MP2)
	■				Automation Set-up - Degator (if required)	In-process automatic runner degator	Signed Set-up Stamp on Work Order
	■				Automation Set-up - EOAT (if required)	In-process End Of Arm Tool used to grab parts and / or runners	Signed Set-up Stamp on Work Order
	■				Automation Set-up - Part Seperator (if required)	In-process part seperator	Signed Set-up Stamp on Work Order
	■				Automation Set-up - Auxillary Assembly Equipment (if required)	In-process part assembly	Signed Set-up Stamp on Work Order
	■				Automation Set-up - Packaging Equipment (if required)	In-process part packaging	Signed Set-up Stamp on Work Order
6				☒	First Piece Approval - Visual Part Quality, Dimensionals and Functional, and Performance Checks (if required), Revision Level	Part Quality and Revision Level	First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3, and Hung at Press
7	■				Assembly / Automated & Manually	Automated and/or Manual In-process Part Assembly	Work Order and/or Drawing

PROCESS FLOW DIAGRAM

Part Description:	Inj Molding + Dim / Func / Performance FP + Assy (Auto or Manual) + Packaging	Program Name:	Clips/Mounts/Brackets/Various Materials/Clamps
HT Dwg.# and Rev:	Various	Created By:	QA PRP Team
Customer P/N and Rev:	Various	Creation Date:	12/14/20
Customer Name:	Various	PFD Number:	US-OP-APQP-2

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Process Name/ Operation Description	Product/Process Characteristics	Control Methods
8	■				Packaging and Labeling / Automated & Manually	Automated Packaging / Manual Packaging + water (if required)	Per work order / WI-PRD-200
9				☒	In Process Checks / Visual Process set-up, Part Quality	Process Set-up, Part Quality - Visual Appearance	Production Control System
				☒	In-Process Checks	Apply part to Cooling Fixture or Cooling Conveyor (if required), Visual Appearance, Amount of Water Added Per Bag (if required), Proper Bag Seal, Date Code Stamp, Bag and Box Labels, Hole Punch (if required), Scale / Conveyor Verification for Count	Inspection Label (Date Code Stamped & Operator ID) / Production Control System
10				☒	QA Testing	Part Quality - Dimensional Check, Functional Check, and Performance Testing, (if required)	SPC Software
11				☒	Layered Process Audit	Production Process	Layered Process Audit Form F-PRD-9
12				☒	Inspection at the Cell	Part Quality, Box Label, Bag Label, Water Verification (if required), Proper Bag Seal, Quantity in Box, Packaging Requirements, Date Code Stamp / Printer	Share Point
13				☒	Validation Testing (Annually if Required)	Push In / Push On, Pull Out / Pull Off (if required), Dimensional, Functional (if required)	SPC Software / WI, and Dimensional Study F-QA-10.4-10
14		◆			Finished Goods Movement	Move Parts to Stock or Shipping Dock	ERP System
15		◆		☒	Shipping to Warehouse or Customer	Finished Goods Product, Label, Ship Wrap Material, Shipping Documents, ERP System	ERP System and Shipping Manifest (F-SR-15.1-3

☐ Prototype ☐ Pre-Launch ☑ Production

Control Plan

Control Plan Number:	Key Contact/Phone:	Date (Orig.)	Date (Rev.)
US-OP-APQP-2	**Plant Quality Manager - 414.355.1130**	**12/14/20**	**See Footer**

Process Description/Part Number	Core Team:	Customer Engineering Approval/Date (If Req'd)
Clips, Mounts, Brackets, Clamps / Various	**Quality Assurance, Engineering, Manufacturing, Processing**	**N/A**

Part Name/Description:	Supplier/Plant Approval/Date	Customer Quality Approval/Date (If Req'd)
Inj Molding + Dim / Func / Performance FP + Assy (Auto or Manual) + Packaging	**N/A**	**N/A**

Supplier/Plant:	Supplier Code:	Other Approval/Date (If Req'd)	Other Approval/Date (If Req'd)
HellermannTyton-MKE	**N/A**	**N/A**	**N/A**

Quality Assurance		Automation Technician	Material Handler/ICC		Process/Mold Technician	Operator			Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS			METHODS				
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE: Size	SIZE: Freq	Control Method	Reaction Plan
1	QA Receiving Certificate of Analysis			Material resin Characteristics			Certificate of Analysis verify per MTS and DTL/D of FMVSS302	Visual Material Cert	Each Lot	Each Lot	ERP System / WI-QA-7.4	Notify purchasing Isolate Lot per PR-QA-13.1-2
				Purchased Components			Certificate of Analysis verify per MTS	Visual Material Cert	Each Lot	Each Lot	ERP System / WI-QA-7.4	Notify purchasing Isolate Lot per PR-QA-13.1-2
2	Incoming Receiving	Resin		Resin			Per Packing List and WI-SR-10.2-1, WI-MH-1	Visual Material #, Lot#, and Quantity / QA Approval in ERP system	Each Gaylord	Each Lot	ERP System	Notify purchasing and QA Isolate Lot per PR-QA-13.1-2
				Non-Silo Resin - Gaylord/Bags only (Packaging Requirements)			No damage on packaging	Gaylord/Bag Visual	Each Gaylord/Bag	Each Gaylord/Bag	WI-SR-10.2-1	Notify purchasing and QA Isolate Lot per PR-QA-13.1-2
				Resin -Silo only			Material SPEC WI-MH-1	Perform Moisture Test per TS-WI-MAX400XL	Each Lot	Each Lot	Moisture Log and Share Point	Notify purchasing and plant management / Do Not Unload
		Purchased Components		Purchased Parts, Customer Returned Product (RGA), Customer Tools needing Service (RGA), Tooling/Components, MRO Items (Quantity)			Per Quantity of Product on Packing List and PO	Visual Material #, Lot#, and Quantity / QA Approval in ERP system	Each Lot	Each Lot	ERP System	Notify purchasing and QA Isolate Lot per PR-QA-13.1-2
				Packaging Requirements			No damage on packaging	Visual	Each Lot	Each Lot	WI-SR-10.2-1	Notify purchasing and QA Isolate Lot per PR-QA-13.1-2
	QA Inspection (If Required)			Resin - Colorant			Per Color Chip and WI-SR-10.2-1	Material Visual	Each drum	Each drum	ERP System / WI-QA-10.3-1	Notify purchasing and QA Isolate Lot per PR-QA-13.1-2
	Movement to Storage			Non-silo resins & purchased components			Per WI-SR-10.2-1	Visual	Each packaging unit	Each pacakaging unit	ERP System	Notify Supervisor
				Silo - resins			Per WI-MH-1	Visual	Each Load	Each Load	ERP System	Notify-Supervisor

Quality Assurance		Automation Technician	Material Handler/ICC			Process/Mold Technician	Operator			Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS				METHODS				
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	Reaction Plan
									Size	Freq		
3	Cell Clearance				Clear Cell from Previously run job		Remove all equipment and materials used for previous production run.	Visual / Manually	Each set-up	Each set-up	Production Control System	Notify Supervisor
4	Resin Movement	Material Handling System			Move Resin to Material Handling System		Correct Resin is set up in the Material Handling System per Work Order	Visual	Each Resin Change	Each Resin Change	Material Process Log F-PRD-8.1-4	Notify Team Supervisor and QA, Isolate Lot per WI-PRD-13.1-3 & PR-QA-13.1-2
					Check moistures in Resin Dryers		Perform Moisture Test per TS-WI-MAX400XL	Computrac Max 4000XL	1 Sample/ Dryer	One /Shift	Raw Material Moisture Content Test Log F-QA-10.3-9, Production Control System	Notify Production Team Supervisor and QA, Adjust Dryers and Re-check. Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
	Resin Ratio	Material Handling System			Resin Ratio		Set up Per Process sheet	Visual machine setting	Each Resin Change	Each Resin Change	Material Process Log F-PRD-8.1-4	Notify Production Team Supervisor and QA, Adjust Ratio Isolate, Product per WI-PRD-13.1-3 & PR-QA-13.1-2
					Colorant (if Required)		Mix Ratio Setting According to S-PRD 9.1-19 / Set Up Per Work Order	Visual machine setting	Each Lot	Each Colorant	Material Process Log F-PRD-8.1-4	Notify Production Team Supervisor and QA, Adjust Ratio, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
5	Injection Molding / Cell Set-up			Inventory Parts	Transfer & Move Non-resin items to Cell		WI-SR-10.2-1 and ERP System	Visual	Each Work Order	Each Work Order	ERP System	Notify Supervisor
		Manual Assembly Equipment (if Required)			In-process part assembly		Part assembled per work order and/or drawing	Visual	Each Work Order	Each Work Order	Signed Setup stamp on work order	Notify Supervisor
	Injection Molding / Work Order Set-Up				Ensuring supplies on work order ready at cell		Validate supplies per work order	Visual	Each Work Order	Each Work Order	Signed Set-Up Stamp on Work Order	Notify Supervisor / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
					Ensure scale & Water set-up (if required)		WI-PRD-200	Visual	Each Work Order	Each Work Order	Signed Set-Up Stamp on Work Order / WI-PRD-200	Notify Supervisor
	Injection Molding / Press Set-up	Mold Installation			Mold Installation		Per Work Order	WI-PRD-9.1-2	Each Set Up	Each Set Up	Work Order / WI-PRD-9.1-2	Notify Supervisor
		Injection Molding Machine			Machine Set-Up		Mattec, F-PRD-9.6-1: Part specific Process Sheet, WI-PRD-202: Process Technician Training Manual, F-PM-9.8-3, WI-PRD-9.1-10	Review of Set-Up Specs and fill out applicable sections of F-PM-9.8-3	Each Set Up	Each Set Up	Part specific Process Sheet F-PRD-9.6-1 and PLC	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Cooling fixture or Cooling conveyor (if required)			Set-up cooling fixture or cooling conveyor (if required)		Parts cool on fixture or conveyor per work order	Visual	Each Set Up	Each Set Up	Work Order	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
	Injection Molding / Automation Set-up	Camera / Vision System Inspection (If Required)			In-process Inspection		Produced parts match master sample	Vision system	Each Part	100%	Run Master Sample through the Vision System (1X) per day (MP2)	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Degator (if Required)			In-process automatic runner degator		Runners removed with no part damage	Visual	One Shot	Setup	Signed Setup stamp on work order	Notify Supervisor
		EOAT (if Required)			In-process End Of Arm Tool used to grab parts and/or runners		Parts and/or runner grabbed and placed as required	Visual	One Shot	Setup	Signed Setup stamp on work order	Notify Supervisor

Quality Assurance		Automation Technician	Material Handler/ICC			Process/Mold Technician	Operator			Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS				METHODS				
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	Reaction Plan
									Size	Freq		
		Part Seperator (if required)			In-process part seperator		Parts seperated as required	Visual	One Shot	Setup	Signed Setup stamp on work order	Notify Supervisor
		Assembly Equipment (if Required)			In-process part assembly		Part assembled per work order and/or drawing	Visual	One Shot	Setup	Signed Setup stamp on work order	Notify Supervisor
		Packaging Equipment (If Required)			In-process part packaging		Package parts per work order	Visual	One Shot	Setup	Signed Setup stamp on work order	Notify Supervisor
6	First Piece Approval	First Piece Approval - Visual		Part Quality			Check For Flash, Shorts, Mismatch, Color(If Required)	Visual	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3 and Hung at Press	Notify Team Supervisor/Process Tech, Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		First Piece Approval - Dimensionals Check (dimensions to drawing - if Required)		Part Quality			Per Drawing / SPC Software	Calibrated Gauging	1 Shot	Each Set Up	SPC Software, First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3 and Hung at Press	Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		First Piece Approval - Functional Check (functional check per SPC Software or WI - if required)		Part Quality			Per SPC Software or WI (if required)	Manually or with fixtures (if required)	1 Shot	Each Set up	SPC Software, WI, First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3 and Hung at Press	Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		First Piece Approval - Performance Testing (performance test per SPC Software, WI, and/or ITS - if required)		Part Quality			Per SPC Software, WI and/or ITS (if required)	Force Tester - Specific ITS	1 Shot	Each Set up	SPC Software, WI, ITS, First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3 and Hung at Press	Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-3
		Revision Level		Revision Level			Comparison of Drawing in JDE to Revision on Work Order	Visual	Each Set-up	Each Set-up	First Piece Acceptance F-QA-10.3-5, WI-QA-10.3-3 and Hung at Press	Notify Engineering
7	Assembly	Automated (if required)			Automated In-process part assembly		Part assembled per work order and/or drawing	Visual	Each Assembly	Each Assembly	Work order and/or drawing	Notify Automation Technician Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Manually (if required)			Manual In-process part assembly		Part assembled per work order and/or drawing	Visual	Each Assembly	Each Assembly	Work order and/or drawing	Notify Supervisor / Technician Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
8	Packaging and Labeling	Automated			Automated Packaging		Per Work Order	Visual	Each packaging unit	Each packaging unit	Per work order / WI-PRD-200	Notify Automation Technician Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2

Quality Assurance		Automation Technician	Material Handler/ICC			Process/Mold Technician	Operator			Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS				METHODS				
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	Reaction Plan
									Size	Freq		
		Cooling fixture or Cooling conveyor (if required)		Part Quality			Apply part to cooling fixture or conveyor (if required)	Visual	Each part	Each part	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Notify Supervisor, Processing Tech and QA (WI-PRD-13.1-3) Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Manually			Manual Packaging + water (if required)		Per Work Order	Visual	Each packaging unit	Each packaging unit	Per work order / WI-PRD-200	Notify Supervisor / Technician Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
9	In-Process Checks	Injection Molding Machine		Process Set-Up			Check control parameters, Work Order Matches MIU / Cavity Count Matches Actual / Cycle Time is to Standard or Adjusted Notes	Visual	Once	Per Shift	Production Control System	WI-QA-10.3-2, WI-PRD-9.1-14, Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine		Part Quality			Check For Flash, Shorts, Mismatch, Burning/Splay, Broken Insert/Pin, and Color(If Required)	Visual	1 Shot	Every two hours (1X) per each start-up	Production Control System	WI-QA-10.3-2, WI-PRD-9.1-14, Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine		Visual Appearance			Check Parts for Visual Defects - Flash, Shorts, Mismatch, Burning/Splay, Broken insert/Pin, and Color (if required) WI-PRD-200: Packaging Operator Training Manual	Visual	1 Shot	Every two hours	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Notify Supervisor, Processing Tech and QA (WI-PRD-13.1-3) Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Water in Bag (if required)		Amount of Water Added Per Bag			Per Work Order	Manually measure.	1 measurement	Twice Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Notify Supervisor and Quality Assurance / Adjust Process Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Sealer		Proper Bag Seal			Bag Must Have a Complete and Un-Wrinkled Seal	Visual and Pull at Seams	1 bag	Twice Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Adjust Process/ Notify Supervisor or QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Date Code		Date Code Stamp / Printer			Operator inspection Sticker Must Have Correct Date Code S-PRD-8.1-6	Visual	1 Label	Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels		Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	One box One bag	Twice Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2

Quality Assurance		Automation Technician	Material Handler/ICC			Process/Mold Technician	Operator		Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS				METHODS			
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE: Size	SIZE: Freq	Control Method	Reaction Plan
		Packaging Equipment		Hole Punch (Where Applicable)			Hole Punch Must Be Within Header Boundaries and Complete	Visual	1 bag	Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Scale / Conveyor Check (if required)		Scale / Conveyor Verification for Count			Verify Scale is Counting Correctly / Conveyor has correct number of parts	Using Scales to Package Product WI-PRD-16 or Hand Count	1 Scale	Twice Per Shift	Inspection Label (Date Code Stamped & Operator ID) / Production Control System	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
10	QA Testing	Injection Molding Machine		Dimensionals Check (dimensions to drawing/SPC software - if Required)			Per SPC Software or WI (if required)	Calibrated Gauging	per SPC software or WI	per SPC software or WI	SPC Software or WI	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
				Functional Check (functional check per SPC Software or WI - if required)			Per SPC Software or WI (if required)	Manually or with fixtures (if required)	per SPC software or WI	per SPC software or WI	SPC Software or WI	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
				Performance Testing (performance test per SPC Software, WI, and/or ITS - if required)			Per SPC Software, WI, or ITS (if required)	Force Tester - Specific ITS	per SPC software, WI, and/or ITS	per SPC software, WI, and/or ITS	SPC Software, WI, and/or ITS	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
11	Layered Process Audit	Production Process			Production Process		Per questions on LPA form F-PRD-9	Visual	1	Shift	Layered Process Audit Form F-PRD-9	Adjust Process, Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2 (if applicable)
12	Inspection at Cell	Injection Molding Machine		Part Quality			Check for Burns, Shorts, Flash and Warp	Work Order	1 Shot	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Labels		Box Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Labels		Bag Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Waters in Bag		Water Verification (if required)			Verify Water is in Bag where required	Visual	1 Bag	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Sealer		Proper Bag Seal			Bag Must Have a Complete Seal Where Required	Visual and Pull at Seams	1 bag	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Correct Amount of Parts in Box		Quantity in Box			Boxes Must Have Specified Amount of Bags per Box	Hand Count	1 Sample	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2

Quality Assurance		Automation Technician	Material Handler/ICC			Process/Mold Technician	Operator			Cell Lead and/or Team Supervisor	Shipping or Receiving
			CHARACTERISTICS				METHODS				
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	Reaction Plan
									Size	Freq		
		Packaging		Packaging Requirements			Verify per Work Order correct Box	Visual	1 check	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
		Stamp		Date Code Stamp / Printer			S-PRD-8.1-6	Visual match	1 check	Shift	Share Point	Control of Non-Conforming Product PR-QA-13.1-2
13	Validation Testing (Annually if required)	Injection Molding Machine		Dimensional			Perform Dimensional on the Part per Drawing	Calibrated Gauging	1 shot / minimum 5pcs	At Annual	Dimensional Study F-QA-10.4-10 / Drawing	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine		Functional Check (if required)			Perform Functional check per SPC Software or WI (if required)	Manually or with fixtures (if required)	1 shot / minimum 5pcs	At Annual	SPC Software / WI	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine		Performance Testing (If Required)			Perform Performance Testing Per Drawing / SPC Software, ITS (if required)	Force Tester - Specific ITS	1 shot / minimum 5pcs	At Annual	SPC Software, ITS / Drawing	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine			Capability		Per Drawing / SPC Software	Calibrated Gauging	125pcs Minimum	At Annual	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-3
14	Finished Goods Movement				Move Parts to Stock or Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
15	Shipping to Warehouse or Customer	Move		Finished Goods Product			WI-SR-15.2-1, F-SR-15.1-3 and ERP System	Visual Per Pick List	Each Order	Per Pick List	ERP System and Shipping Manifest (F-SR-15.1-3)	Notify Shipping/Receiving Supervisor. Isolate products per Control of Non-Conforming Product PR-QA-13.1-2
		Final Wrap and Label		Product, Label, and Ship Wrap Material			WI-SR-15.2-1, F-SR-15.1-3 and ERP System	Visual Per Pick List	Each Order	Per Pick List	ERP System and Shipping Manifest (F-SR-15.1-3)	Notify Shipping/Receiving Supervisor. Isolate products per Control of Non-Conforming Product PR-QA-13.1-2
		Shipping		Product, Shipping Documents, ERP System	Ship to customer		WI-SR-15.2-1, F-SR-15.1-3 and ERP System	Per Packing Slip	Each Package	Per Shipment	ERP System and Shipping Manifest (F-SR-15.1-3)	Notify Shipping/Receiving Supervisor. Isolate products per Control of Non-Conforming Product PR-QA-13.1-2

Notes: See Parts and Engineering Change Level on US-OP-APQP-2-PARTS & ENG. LEVEL.

HellermannTyton

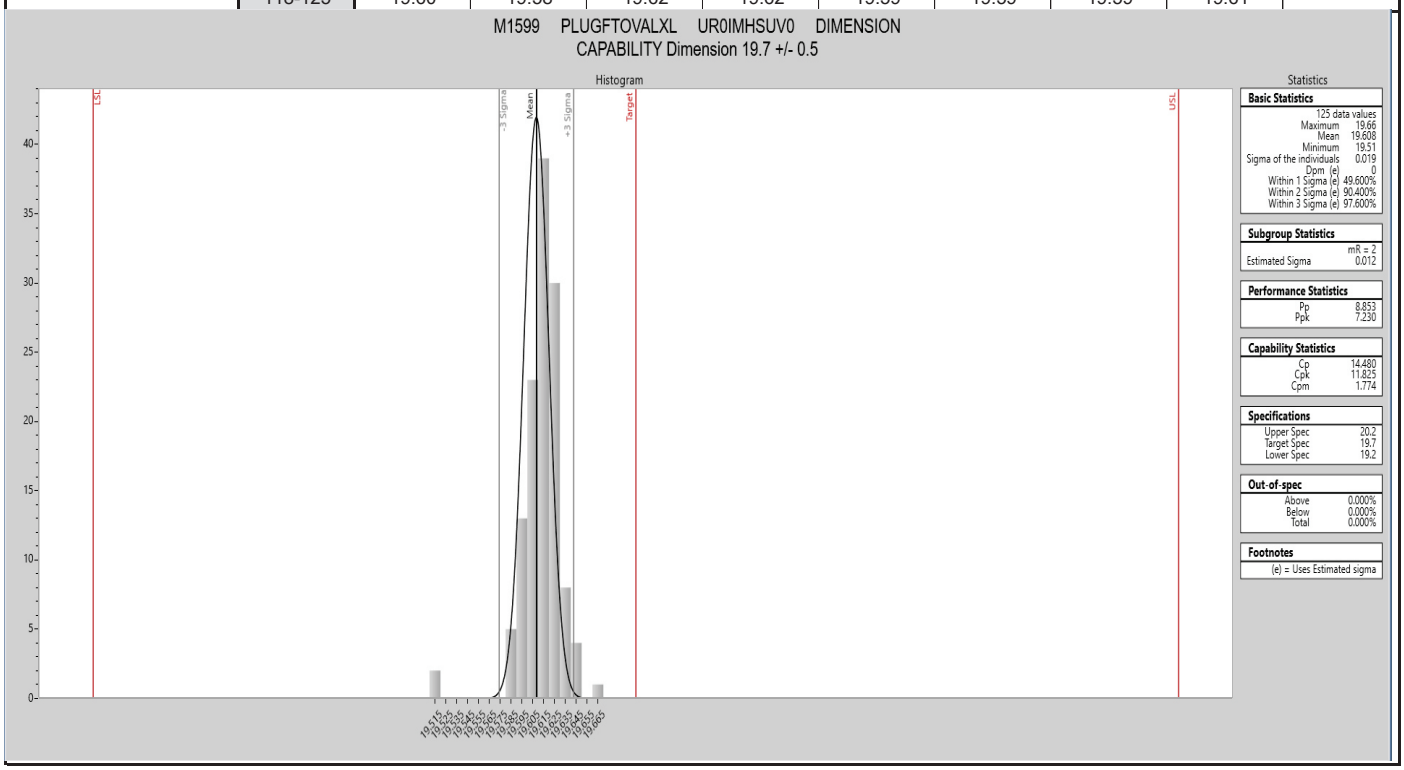
Initial Process Study

HT Part/Item No.	Part Description	Internal No.
133-02029	OVAL FIR TREE PLUG LONG	N/A

Customer Part No.	Drawing No.	Drawing Date	Drawing Revision
13302029	15-0345-001-CSU	4/30/2015	00.0

Production Date	Material	Inspection Facility	Inspector
10/27/2022	UR0IMHSUV0	HT-Milwaukee	R Schwark

Study	Sample	Data								
Dimension & Tolerance 19.7 +/- 0.5 mm	1-9	19.62	19.64	19.62	19.63	19.62	19.62	19.66	19.62	19.60
	10-18	19.63	19.63	19.62	19.60	19.61	19.63	19.61	19.58	19.59
	19-27	19.61	19.58	19.59	19.59	19.58	19.61	19.61	19.64	19.62
	28-36	19.61	19.60	19.62	19.62	19.61	19.64	19.62	19.62	19.62
	37-45	19.63	19.64	19.62	19.63	19.61	19.62	19.62	19.61	19.60
	46-54	19.61	19.60	19.61	19.61	19.62	19.60	19.61	19.61	19.59
	55-63	19.59	19.62	19.51	19.51	19.60	19.60	19.62	19.60	19.61
	64-72	19.60	19.62	19.61	19.61	19.60	19.61	19.62	19.61	19.59
	73-81	19.61	19.60	19.61	19.61	19.61	19.61	19.62	19.62	19.61
	82-90	19.61	19.61	19.60	19.60	19.59	19.59	19.60	19.61	19.61
	91-99	19.60	19.60	19.60	19.62	19.61	19.62	19.61	19.62	19.63
	100-108	19.61	19.62	19.62	19.62	19.63	19.60	19.61	19.61	19.61
	109-117	19.59	19.61	19.61	19.60	19.61	19.60	19.60	19.58	19.59
	118-125	19.60	19.58	19.62	19.62	19.59	19.59	19.59	19.61	



R&R Study Results Using Specifications

1/11/2022

Gage number:	TGM-330	Done by:	April Gary
Gage description:	Caliper-6"	Part name:	151-01153
Gage type:	Caliper	Characteristics:	Length
Study name:	Annual Gage R & R	Specifications:	LSL=34 Nominal=35.5 USL=37
Study date:	01/11/2022	Number of Distinct Cate: 11.3	

Objective:

Comment:

	Interpretation guidelines
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis — Specification Spread (USL-LSL)/6

Repeatability - Equipment Variation (EV)
EV = 0.005316 — %EV = 1.063

Reproducibility - Appraiser Variation (AV)
AV = 0.002612 — %AV = 0.5224

Repeatability & Reproducibility (R&R)
R&R = 0.005923 — %R&R = 1.185

Part Variation (PV)
PV = 0.5 — %PV = 99.99

Specification Spread (USL-LSL)/%10
(USL - LSL)0.5

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
April	1	35.45	35.44	35.45	35.45	35.47	35.5	35.3	35.54	35.47	35.43
April	2	35.46	35.44	35.45	35.45	35.46	35.49	35.29	35.54	35.47	35.43
April	3	35.46	35.42	35.42	35.46	35.47	35.5	35.3	35.54	35.46	35.43
Marreall	1	35.46	35.43	35.43	35.45	35.45	35.5	35.28	35.53	35.46	35.43
Marreall	2	35.46	35.44	35.43	35.45	35.46	35.48	35.28	35.53	35.46	35.43
Marreall	3	35.47	35.42	35.43	35.46	35.46	35.5	35.29	35.53	35.46	35.43
Felicia	1	35.45	35.44	35.42	35.45	35.46	35.5	35.3	35.53	35.47	35.43
Felicia	2	35.46	35.43	35.42	35.45	35.46	35.5	35.27	35.53	35.46	35.43
Felicia	3	35.46	35.43	35.41	35.45	35.46	35.51	35.28	35.53	35.46	35.43

GAGE pack

R&R Study Results Using Specifications

1/11/2022

Gage number:	TGM-760	Done by:	April Gary
Gage description:	Micro-Vu	Part name:	133-03809
Gage type:	Micro-Vu	Characteristics:	Length-Vision System
Study name:	Annual Gage R & R	Specifications:	LSL=39 Nominal=40 USL=41
Study date:	01/11/2022	Number of Distinct Cate	37.87838

Objective:

Comment:

Interpretation guidelines

< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis — Specification Spread (USL-LSL)/

Repeatability - Equipment Variation (EV)
EV = 0.01059283 — %EV = 3.177848

Reproducibility - Appraiser Variation (AV)
AV = 0.006445212 — %AV = 1.933564

Repeatability & Reproducibility (R&R)
R&R = 0.01239955 — %R&R = 3.719864

Part Variation (PV)
PV = 0.3331026 — %PV = 99.93079

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.3333333

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Rob S.	1	39.388	39.594	39.212	39.643	39.636	39.746	39.647	39.76	39.755	39.754
Rob S.	2	39.38	39.589	39.142	39.634	39.629	39.739	39.666	39.766	39.773	39.755
Rob S.	3	39.386	39.588	39.135	39.636	39.673	39.754	39.668	39.777	39.772	39.758
Sam M.	1	39.375	39.582	39.141	39.633	39.625	39.739	39.658	39.754	39.737	39.749
Sam M.	2	39.376	39.584	39.129	39.632	39.627	39.741	39.655	39.764	39.765	39.752
Sam M.	3	39.382	39.587	39.136	39.631	39.629	39.74	39.651	39.766	39.675	39.754
April G.	1	39.372	39.586	39.141	39.637	39.631	39.743	39.649	39.769	39.737	39.751
April G.	2	39.376	39.588	39.141	39.637	39.63	39.745	39.657	39.75	39.756	39.751
April G.	3	39.376	39.487	39.14	39.636	39.629	39.739	39.656	39.768	39.768	39.751

GAGE pack

R&R Study Results Using Specifications

1/11/2022

Gage number:	TGM-850	Done by:	April Gary
Gage description:	Tensile Tester	Part name:	T30L
Gage type:	Tensile Tester	Characteristics:	Tensile Strength
Study name:	Annual Gage R & R	Specifications:	LSL=30 Nominal=80 USL=130
Study date:	01/10/2022	Number of Distinct Cate	19.14576

Objective:

Comment:

Interpretation guidelines	
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis

Specification Spread (USL-LSL)/

Repeatability - Equipment Variation (EV)
EV = 1.18734

%EV = 7.124041

Reproducibility - Appraiser Variation (AV)
AV = 0.2977762

%AV = 1.786657

Repeatability & Reproducibility (R&R)
R&R = 1.224111

%R&R = 7.344665

Part Variation (PV)
PV = 16.62165

%PV = 99.7299

Specification Spread (USL-LSL)/
(USL - LSL)/ = 16.66667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
April	1	54.641	56.102	51.765	51.187	50.959	50.051	51.567	49.102	49.628	48.566
April	2	54.819	56.19	52.352	51.425	48.538	50.544	50.13	49.605	51.879	48.018
April	3	53.191	55.972	52.223	52.87	52.502	52.725	52.259	51.16	50.35	50.48
Tamera	1	54.73	56.253	52.969	51.991	50.07	52.008	49.454	49.32	47.165	48.872
Tamera	2	53.913	55.003	52.11	49.633	51.468	49.594	48.458	50.673	49.348	49.969
Tamera	3	54.424	56.53	52.079	52.529	51.257	49.013	50.464	50.203	49.676	48.271
Marreall	1	54.515	56.371	50.573	50.161	51.652	48.507	51.987	49.378	50.964	51.958
Marreall	2	54.823	57.02	52.859	52.732	52.714	50.898	51.528	52.338	52.585	50.354
Marreall	3	52.751	56.443	53.168	52.174	47.928	50.357	51.051	49.128	50.839	50.807

GAGE pack

R&R Study Results Using Specifications

1/12/2022

Gage number:	TGM-983	Done by:	April Gary
Gage description:	Indicator	Part name:	151-01043
Gage type:	Indicator	Characteristics:	Height
Study name:	Annual Gage R & R	Specifications:	LSL=28.7 Nominal=29.7 USL=30.7
Study date:	01/12/2022	Number of Distinct Cate	21.17149

Objective:

Comment:

	Interpretation guidelines
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis — Specification Spread (USL-LSL)/

Repeatability - Equipment Variation (EV)
EV = 0.008761562 — %EV = 2.628469

Reproducibility - Appraiser Variation (AV)
AV = 0.02034414 — %AV = 6.103242

Repeatability & Reproducibility (R&R)
R&R = 0.0221506 — %R&R = 6.64518

Part Variation (PV)
PV = 0.3325966 — %PV = 99.77897

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.3333333

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Tamera M	1	29.55	29.615	29.594	28.7	29.192	29.622	29	29.601	29.618	29.617
Tamera M	2	29.605	29.612	29.596	28.747	29.179	29.614	29.018	29.62	29.624	29.612
Tamera M	3	29.607	29.61	29.597	28.728	29.196	29.633	29.044	29.62	29.629	29.615
April G	1	29.636	29.631	29.634	28.702	29.198	29.633	29.037	29.655	29.62	29.639
April G	2	29.643	29.635	29.634	28.756	29.196	29.631	29.031	29.657	29.621	29.646
April G	3	29.635	29.639	29.637	28.761	29.19	29.625	29.047	29.65	29.641	29.643
Sam M	1	29.646	29.639	29.65	28.759	29.197	29.659	29.066	29.667	29.664	29.649
Sam M	2	29.656	29.648	29.659	28.75	29.199	29.655	29.055	29.664	29.664	29.652
Sam M	3	29.644	29.636	29.658	28.755	29.194	29.657	29.056	29.666	29.665	29.656

GAGE pack

R&R Study Results Using Specifications

1/11/2022

Gage number:	TGM-1325	Done by:	April Gary
Gage description:	Artifact	Part name:	133-00878
Gage type:	CT Scannner Artifact	Characteristics:	Width
Study name:	Annual Gage R & R	Specifications:	LSL=10.6 Nominal=10.85 USL=11.1
Study date:	01/11/2022	Number of Distinct Cate	21.86764

Objective:

Comment:

	Interpretation guidelines
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis

Specification Spread (USL-LSL)/

Repeatability - Equipment Variation (EV)
EV = 0.005099388

%EV = 6.119265

Reproducibility - Appraiser Variation (AV)
AV = 0.001657823

%AV = 1.989388

Repeatability & Reproducibility (R&R)
R&R = 0.005362102

%R&R = 6.434522

Part Variation (PV)
PV = 0.08316065

%PV = 99.79277

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.08333334

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Joseph F	1	10.908	10.912	10.893	10.273	10.87	10.916	10.899	10.902	10.429	10.887
Joseph F	2	10.904	10.911	10.88	10.268	10.876	10.912	10.891	10.889	10.429	10.894
Joseph F	3	10.917	10.912	10.892	10.275	10.871	10.91	10.906	10.887	10.431	10.897
James P	1	10.908	10.904	10.89	10.285	10.873	10.925	10.899	10.9	10.442	10.895
James P	2	10.911	10.911	10.889	10.267	10.878	10.927	10.905	10.898	10.432	10.903
James P	3	10.898	10.915	10.893	10.27	10.865	10.93	10.903	10.899	10.436	10.899
Nick K	1	10.912	10.901	10.885	10.261	10.87	10.92	10.9	10.888	10.428	10.89
Nick K	2	10.912	10.908	10.89	10.272	10.881	10.92	10.912	10.893	10.429	10.896
Nick K	3	10.911	10.915	10.891	10.276	10.874	10.924	10.905	10.89	10.435	10.894

GAGE pack

R&R Study Results Using Specifications

2/2/2022

Gage number:	TGM-966	Done by:	April Gary
Gage description:	Global Performance 7-10-7	Part name:	133-00878
Gage type:	CMM Coordinate Measuring Machine	Characteristics:	Width
Study name:	Annual Gage R & R	Specifications:	LSL=92 Nominal=92.2 USL=92.4
Study date:	02/01/2022	Number of Distinct Cate	26.96861

Objective:

Comment:

	Interpretation guidelines
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	considered to be not acceptable - every effort should be made to improve the measurement system

Results based on specifications

Measurement Unit Analysis — Specification Spread (USL-LSL)/6

Repeatability - Equipment Variation (EV)
EV = 0.002740363 — %EV = 4.110529

Reproducibility - Appraiser Variation (AV)
AV = 0.002146237 — %AV = 3.219342

Repeatability & Reproducibility (R&R)
R&R = 0.003480793 — %R&R = 5.22117

Part Variation (PV)
PV = 0.066576 — %PV = 99.86361

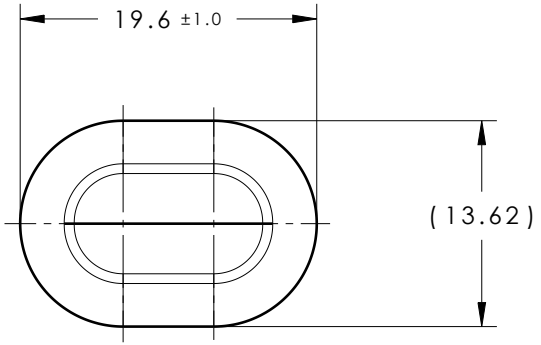
Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.06666692

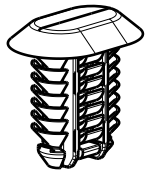
Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Rob S	1	92.1929	92.2152	92.2189	91.9201	92.2519	92.2244	92.1938	92.0249	92.2016	92.218
Rob S	2	92.1952	92.2132	92.2165	91.9193	92.2522	92.2293	92.1957	92.0237	92.2005	92.2198
Rob S	3	92.1906	92.219	92.2214	91.9209	92.2548	92.2294	92.1993	92.0237	92.2005	92.214
Sam M	1	92.1902	92.2104	92.2151	91.9194	92.2495	92.2209	92.1889	92.0335	92.195	92.2123
Sam M	2	92.1889	92.2116	92.2142	91.9187	92.2456	92.22	92.1887	92.0309	92.1939	92.2085
Sam M	3	92.1864	92.2112	92.2157	91.9192	92.2449	92.22	92.1881	92.0278	92.19559	92.2091
Nick K	1	92.1913	92.2089	92.2145	91.92	92.2462	92.2203	92.191	92.0315	92.194	92.21
Nick K	2	92.1868	92.2121	92.2167	91.9202	92.2554	92.2234	92.1941	92.0227	92.2004	92.2163
Nick K	3	92.1978	92.2168	92.22	91.9208	92.2536	92.2277	92.1938	92.0235	92.2084	92.218

GAGE pack

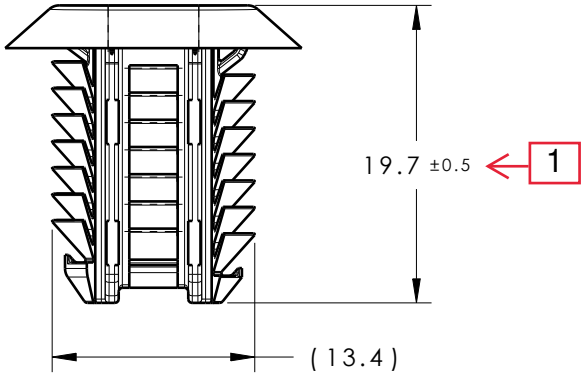
CATIA V5

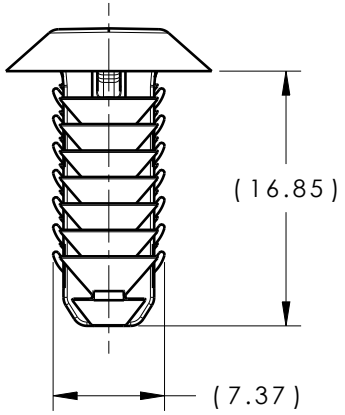
Revision Level			Revision Record	Changed	Date	Approved	Date
Drawing	State	Part					
00.0	Design Release	A	SEE ECN# 013091	EJH	4/30/15	SJA	4/30/15





ISOMETRIC VIEW
SCALE 1:1





REFERENCE: 2
PERFORMANCE REQUIREMENTS AT DRY AS MOLDED:
1. FIR TREE PUSH IN FORCE: REF. 10 LBS MAX IN EACH APPLICABLE OVAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm
2. FIR TREE PULL OUT FORCE: REF. 25 LBS MIN IN EACH APPLICABLE OVAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm
3. SHEET METAL THICKNESS RANGE: 0.60mm - 8.0mm
4. APPLICABLE OVAL HOLE SIZES:
   A. 6.2 X 12.2mm
   B. 6.5 x 12.5mm
   C. 6.5 x 13.0mm
   D. 7.0 x 12.0mm

Material: PA66HIRHS, COLOR: BLACK (3)	Units **millimeters** Tolerance defined on each dimension		Drawn: EJH 3/12/15 Approved: KVH 3/12/15	Article/Type-No: PLUGFTOVALXL Title: OVAL FIR TREE PLUG LONG	Scale: 2:1 Project Number: 15-0345
			HellermannTyton North America Email: corp@htamericas.com Web: www.hellermann.tyton.com	Drawing-No: **15-0345-001-CSU** PRODUCTION : Phase	Format: AH Sheet: 1/1