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.: **99546** with submission date 21.09.2022 will be considered as complete and valid automatically on **21.10.2022** unless otherwise disposed!

HellermannTyton

HellermannTyton GmbH internal remarks: PB-No.: **99546**

Part Describtion: T50ROSFT6SO25B GPN 110572

Part Submission Warrant

Part Name **T50ROSFT6SO25B** Cust. Part Number **EU5T-14E047-BA**

Shown on Drawing No. **11-0572-001-CSU** Org. Part Number **15700200**

Engineering Change Level **06.1** Dated **16.05.2016**

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

Safety and/or Government Regulation ☐ Yes ☑ No Purchase Order No. **15700200** Weight (kg) **0,0028**

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: **586207580**

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.** N. Lohse Date 21-Sep-22

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

Print Name Customer Tracking Number (optional)

Production Part Approval, Dimensional Results

HellermannTyton

Internal PB-No.: **99546**

Production Part Approval
Dimensional Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**EU5T-14E047-BA**	
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSFT6SO25B**	
INSPECTION FACILITY:	**QS-Laboratory**	DESIGN RECORD CHANGE LEVEL:	06.1	16.05.2016
		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	**4,7**	**± 0,5**			**4,7**	**4,7**	**4,8**	☑	☐
2	**1,4**	**± 0,3**			**1,28**	**1,27**	**1,30**	☑	☐
3	**22,3**	**± 1,0**			**22,12**	**21,60**	**22,75**	☑	☐
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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	21-Sep-22

Production Part Approval, Performance Test Results

HellermannTyton

Internal PB-No.: **99546**

Production Part Approval
Performance Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**EU5T-14E047-BA**			
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSFT6SO25B**			
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	06.1	16.05.2016		
*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
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4	**Serrated side**				**Is serrated side**	☑	☐
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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	21-Sep-22

Production Part Approval, Material Test Results

HellermannTyton

Internal PB-No.: **99546**

Production Part Approval
Material Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**EU5T-14E047-BA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSFT6SO25B**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	06.1 16.05.2016
*CUSTOMER SPECIFIED SUPPLIER/VENDOR CODE		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
5	**PA66HIRHS, natural**				**Material is PA66HIRHS, natural**	✓	

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	21-Sep-22

ASCEND.
PERFORMANCE MATERIALS

HELLERMANN TYTON GMBH
GROSSER MOORWEG 45
TORNESCH, GERMANY 25436
Attention : AXEL LANG

Ascend Performance Materials Operations LLC
Nylon Plastics and Polymers
3000 Chemstrand Road
Cantonment, FL 32533
Telephone : (850)968-7000

Certificate Date : 04-Mar-22
Delivery No : 382607871
Shipped Qty : 11,022.928 Lbs
5,000.000 Kgs
Customer P.O. No: 4500171533 AIFREIGHT
Container : 00000000000002089636

Certificate of Analysis

This certifies that Nylon Resin shipped to you from Ascend Performance Materials Operations LLC has been tested and found to meet required specifications.

This material was produced under a Quality System that meets ISO 9001:2015 and IATF 16949:2016 criteria.

If you have questions or concerns about this Certificate of Analysis, please contact Ascend Performance Materials Customer Operations at 1-888-927-2363.

This product meets the requirements of the following specifications: SAE J1639, SAE J1639 PA0171, ASTM D6779-PA0161-Z1Z2, ASTM D4066 PA0161, FMVSS 302, MS-DB-41 CPN 1826, ESB-M4D178-A2, WSS-M99P23-C1/C2, WSS-M99P9999-A1, WSSM4D706B1, WSS-M99P1111-A, WSS-M4D706-A4, WSK-M4D706-A, GMW16447P-PA66-T2, GMW16558P-PA66-T1 and GMP.PA66.015, Ford WQ 100C.

Material: VYDYNE 47H BK0644 **Material No:** 10397365 **Batch No:** KA18FY04 **Date of Mfg:** 18-Jan-2022

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Copper	STM 00667	125	250	202	PPM
Moisture	STM 00835	0.10	0.20	0.10	%
NOTCHED CHARPY	STM 01255	14.0		21.0	kJ/m^2
Strength @ Yld	STM 01253	50	70	58	MPa

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PFMEA)

PFMEA Number: **MFMEA-1**

Part Number / Name: Cable Ties - Various Materials
Process Responsibility: HellermannTyton
Prepared by: Quality Assurance
Model Year(s) / Vehicle(s): NA
Key Date: 3/11/1994
PFMEA Date Org: 3/11/1994
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
1-2 Material Ratio Central Material Handling System Operation	Acceptable material for production	Unacceptable Moisture Levels	Part Non-Compliance	5		Dryer malfunction	2	D - Dryer Alarms D - Moisture Testing P - Filter Cleaning P - Moisture Testing	2	20	None						0
		Contamination	Part Non-Compliance	5		Foreign Matter in Material	2	D - Visual Inspections P - Material Handling Work Instruction w/ color-coded containers	6	60	None						0
			Part Non-Compliance	5		Unlike Materials Mixed Together	2	D - Visual Inspections P - Material Handling Work Instruction	5	50	None						0
		Incorrect Material	Part Non-Compliance	6		Wrong material hook-up at press	2	D/P - Visual to Work Order	5	60	None						0
3 Molding Machine/ Automation Set-up	Instructions for production	Work Order Set Up Incorrectly	Delay in Manufacturing	4		Work Order read incorrectly	2	D/P - Work Order D - Set-up Verification P-Computers at workstations	5	40	None						0
		Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material blender set incorrectly	2	D/P - Visual to Work Order D- Quality Tree	7	70	None						0
		Excess Plastic on Ties	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - Process Inspections	7	70	None						0
				5		Improper start-up	1	D - Visual Inspection, Quality Tree D - LPA at startup P - Final Inspections	5	25	None						0
		Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D-Audible alarms added to all Thermolator to detect temp. dev. D - Process Inspections P - First Piece Approvals	3	15	None						0
				5		Incorrect Tonnage	2	D- Visual Inspections D- Hand Insertions P - First Piece Approvals P - In Process PM's	5	50	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		Start-up/Cycle Interruptions	4	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	80	None						0
				5		Fast Cycle Time	2	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals	5	50	None						0
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	60	None						0
		Plugged Sprue Tips / Gates (Hot Manifold/Valve-Gated Molds)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D- Visual Inspections, Quality Tree D - Process Inspections P - Magnets in Hopper and Melt Filters on Nozzle	5	30	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Automation equipment started too early after start up of process re-start.	4	P - Visual Inspection P - Work Instructions P - Automation disable switch during changeover D - Final Inspection	5	60	None						0
		Camera stop working	Customer Dissatisfaction	8		Mechanical, power failure, lenses blocked, conveyor belt dirty, component failure.	2	Master sample (Known Bad and Good parts)	2	32	None						0
		Pass Blocked Head and Missing Paw part	Customer Dissatisfaction	8		Mechanical failure and background light	1	Master sample (Known Bad and Good parts)	8	64	None						0
		Rejecting Non-blocked Head and part with Paw	High scrap rate	4		Mechanical failure and background light	1	Master sample (Known Bad and Good parts)	2	8	None						0
4 First Piece Approval Injection Molding Process	Manufacturing a conforming part per specifications	Sinks in heads and straps	Part Non-Compliance Tensile and Wire Bundle Failures	3		Insufficient Hold Pressure	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	36	None						0
				3		Cycle Time Too Fast	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	36	None						0
		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	3		Plugged/Worn Vents	3	D- Visual Inspections, Quality Tree P - First Piece Approvals P - In process PM's using Ice Blasting	6	54	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
		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 Thermolator to detect temp. dev.	5	50	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 Thermolator to detect temp. dev.	5	50	None						0
				5		Water hooked up incorrectly	2	D-Visual Inspection	6	60	None						0
				3		Packaging interruptions Degator Jams	3	D- Visual Inspections P - First Piece Approvals	8	72	None						0
				5		Heater band malfunctions	2	D- Visual Inspection D - Process Inspection P - PM	5	50	None						0
		Excess Plastic on Ties	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - Process Inspections	7	70	None						0
		Blocked / Misformed Head	Part Non-Compliance	5		Broken Insert/Ejector Blade	2	D - Visual Inspection, Quality Tree P - Final Inspection	7	70	None						0
		Cut Head	Part Non-Compliance	5		Automation Malfunction	2	D - Visual Inspection P - Final Inspection D - Alarms allowing Operators to scrap parts after cups are emptied	7	80	None						0
		Missing or Extended Pawl	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None						0
				5		Restart(Mold Cleaning)	1	D/P- Visual Inspections D/P - Hand Insertion	5	25	None						0
				5		Improper start-up	1	D - Visual Inspection, Quality Tree D - LPA at startup P - Final Inspections	5	25	None						0
				5		Cycle Time Too Fast	1	D - Visual Inspections, Quality Tree P - Final Inspections	6	30	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		Worn inserts	1	D - Visual Inspections P - Final Inspections P - PM Schedule	6	30	None						0
		Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None						0
				5		Cycle Time Too Fast	1	D - First Piece D - Visual Inspection, Quality Tree P - Process Inspections	6	30	None						0
		Shorts	Part Non-Compliance / Cosmetic	3		Insufficient Injection Pressure compatibility of Press / mold	3	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's	5	45	None						0
				3		Plugged/Worn Vents	3	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's	5	45	None						0
				3		Residue Build-Up	2	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's using Ice Blasting for mold cleaning	5	30	None						0
				3		Lot / Moisture Variations	2	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	30	None						0
				3		Process Interruption	2	D- Visual Inspections, GO/NOGO Gages D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	30	None						0
		Flash	Part Non-Compliance / Insertion Failures / Cosmetic	5		Excessive Injection Pressure	3	D- Visual Inspections, Quality Tree, GO/NOGO Gages D- Hand Insertions P - First Piece Approvals P - In Process PM's	5	75	None						0
				5		Incorrect Tonnage	2	D- Visual Inspections D- Hand Insertions 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	4	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	80	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		Start-up/Cycle Interruptions	3	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	60	None						0
				5		Clamp pressure on press	3	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	60	None						0
				5		Worn inserts	4	D- Visual Inspections D - Tool Tests D - Process Inspections D- Hand Insertions	3	60	None						0
				5		Broken Insert/Ejector Blade	3	D- Visual Inspections, Quality Tree D - Process Inspections D- Hand Insertions	5	75	None						0
		Breakage	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None						0
				6		Barrel Heat Malfunction	4	D - Visual Inspections D - Process Inspections D - Parameter/Heat Checks D - Hand Insertions P - First Piece Approvals P - SPC Setup to Trigger Faults	3	72	None						0
		Slippage	Part Non-Compliance / Strap Engagement Failure	5		Worn inserts	1	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions	6	30	None						0
				5		Fast Cycle Time	1	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	30	None						0
				5		Dirty Inserts	1	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions D - Parameter/Heat Checks P - First Piece Approvals P - In Process PM	6	30	None						0
				5		High oil temperature on press due to insufficient water to cool	3	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	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
		Mold Mismatch	Part Non-Compliance/High Insertion Force	6		Poor Mold Alignment	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	60	None						0
				6		Leader Pin/Sidelock Wear	1	D - Visual Inspections, Quality Tree D - Process Inspections, Tech now conduct inspections, doing cleaning schedule D - Hand Insertions P - First Piece Approvals P - In Process PM	6	36	None						0
		Deep ejector pins	Part Non-Compliance/High Insertion Force	3		Excessive Hold Pressure	3	D - Visual Inspections D - Process Inspections	6	54	None						0
				3		Thermolator Malfunction	2	D - Visual Inspections D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	3	18	None						0
				3		Fast Cycle Time	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions 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 - Process Inspections P - Magnets in Hopper and Melt Filters on Nozzle	8	48	None						0
				3		Mold Heater Malfunction	2	D- Visual Inspections D - Process Inspections	8	48	None						0
				3		Valve Gate Malfunction	2	D- Visual Inspections D - Process Inspections	8	48	None						0
		Elongated Sprues	Part Non-Compliance / Cut Heads and Missing Pawls	6		Inadequate Cooling	2	D- Visual Inspections D - Process Inspections	7	84	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Automation equipment started too early after start up of process re-start.	3	P - Visual Inspection, Quality Tree P - Work Instructions, Training Manual P - Automation disable switch during changeover D - Final Inspection D - Process Inspection	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
5 First Piece Approval	Product Conforms per specifications before production	First Piece Not Hung	Delay in Manufacturing	6		Failure to hang First Piece	1	D/P - Tool Evaluation Sheet	8	48	None						0
6 Validation Testing	Validation and Documentation of New Tooling	Validation is Not Completed	Part Non-Compliance	6		Validation Testing Forgotten	1	D/P - New Tool Evaluation Sheet	8	48	None						0
7 Work order setup	Work order	Work order not sign off	Word order has in corrective BOM	8		Incorrect setup BOM in (JDE)	6	D-Cell lead checklist P- IE Setup BOM (IMLS)	2	96	None						0
			Incorrect BOM used	8		Wrong label on material	2	P-Work instruction D-Flag system	2	32	None						0
				8		Operator Error	3	P-Work instruction D-Flag system	2	48	None						0
8 In Process Checks	Control Plan	Checks not completed	Nonconformance products ship to customer	3		Process issues/Operator error	3	D-Operator hourly check D-Quality check 2 times in 24 hours D-Process Tech check every other hour. P-SharePoint/Shift Log P-Work instruction /Process sheet	2	18	None						0
9-10 Packaging - Automation and Inspection	Package product per customers specifications	Incorrect or Missing Date Code on the Bag	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45	None						0
				3		Wrong/no date code on packaging - Operator Error	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions	7	63	None						0
		Degator Jams	Part Non-Compliance	5		Parts Not Aligned/cut heads	4	D - Visual Inspection p - Degator Guides P - Machine Alarms	4	80	None						0
			Loss Production	5		Dull Cutter Blades	2	D - Visual Inspection D - Process Inspection P - PM P - Warped Sprue Detection	6	60	None						0
				5		Cylinder Failure	2	D - Visual Inspection D - Process Inspection P - PM	3	30	None						0
		Incorrect Degator alignment	Cut Heads	5		Improper Set-up	2	D- Visual Inspection D - Process Inspection P - Degator Guides	5	50	None						0
						Manual Degator Jams	4	D- Visual Inspection D - Process Inspection P - PM	4	80	None						0
						Automated Degator Jams	3	D- Visual Inspection D - Process Inspection P - PM P- Degater Alarm	4	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
						Improper part feed	2	D- Visual Inspection D - Process Inspection P - PM P- Degater Guides w/ Alarms	3	30	None					0
						Part missing from lead in edge of runner	2	D- Visual Inspection D - Process Inspection P - PM P- Degater Alarm	5	50	None					0
		Greasy Parts Packaged	Part Non-Compliance	4		Robot Drags the Parts Across the Leader Pins	1	D - Visual Inspection D - Process Inspection P - PM	7	28	None					0
		Incorrect Moisture in Bags	Part Non-Compliance / Parts Conditioned Incorrectly	3		Water Dosing system failure	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	5	30	None					0
				3		Water Supply Not On	2	D - Monitoring Water D - Final Inspection	2	12	None					0
				3		Dirty or Clogged Filter	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	2	12	None					0
				3		Improper Timer Setting	3	D - Monitoring Water P-dosing system monitors flow	5	45	None					0
				3		Bad Bag Seals leak water	2	D - Visual Inspection D - Monitoring Water D - Final Inspection P - Preventative Maintenance	6	36	None					0
		Mis-labeling	Customer Dissatisfaction	3		Printer Ribbon not Inserted Properly	2	D - Visual Inspections D - Final Inspections P-Work order sign-off	7	42	None					0
				3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None					0
				3		Wrong Pre-labeled Bag for Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None					0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	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 label provided	3	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	63	None						0
		Insufficient Bag Seals	Part Non-Compliance	3		Sealer Tape Worn	4	D - Visual Inspection D - Final Inspection P - Electronic Shift Log	6	72	None						0
				3		Bag Wrinkled/Bag Mil Thickness Inconsistencies	4	D - Visual Inspection D - Final Inspection	7	84	None						0
				3		Sealer Malfunctions	2	D - Visual Inspection D - Final Inspection	7	42	None						0
				3		Material stuck on sealer	4	D - Visual Inspection D - Final Inspection P - Incoming Inspection	7	84	None						0
				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 D - Final Inspection	7	63	None						0
				3		Insufficient Packaging Supplies	4	D - Visual Inspection D - Final Inspection	7	84	None						0
		Incorrect Quantity in Bag	Customer Dissatisfaction	4		Robot grippers failed to place parts	3	D - Visual Inspection P - Final Inspection	7	84	None						0
				4		Pick and Place Grippers Drop Parts	3	D - Visual Inspection P - Final Inspection	7	84	None						0
				4		Degator Jams	3	D - Visual Inspection P - Final Inspection	5	60	None						0
				4		Inconsistent Bag Width	3	P/D - Visual Inspection	7	84	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	8	64	None						0
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	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
9A-10 Packaging - Manual and Inspection	Package product per customers specifications	Incorrect or Missing work order number on Bag	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45	None						0
				3		Operator error	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45							
		Incorrect or Missing Date Code on the Box	Traceability Loss	3		Operator error	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions P-SharePoint/Shift Log	3	27	None						0
		Incorrect Moisture in Bags	Part Non-Compliance / Parts Conditioned Incorrectly	3		Operator error	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	3	18	None						0
				3		Water Dosing system failure	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	5	30	None						0
				3		Water Supply Not On	2	D - Monitoring Water D - Final Inspection	2	12	None						0
				3		Dirty or Clogged Filter	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	2	12	None						0
				3		Improper Timer Setting	3	D - Monitoring Water P-dosing system monitors flow	5	45	None						0
				3		Bad Bag Seals leak water	2	D - Visual Inspection D - Monitoring Water D - Final Inspection P - Preventative Maintenance	6	36	None						

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
		Mis-labeling	Customer Dissatisfaction	3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None						0
				3		Wrong Pre-labeled Bag for Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None						0
				3		Wrong label provided	3	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	63	None						0
		Insufficient Bag Seals	Part Non-Compliance	3		Sealer Tape Worn	4	D - Visual Inspection D - Final Inspection P - Electronic Shift Log	6	72	None						0
				3		Bag Wrinkled/Bag Mil Thickness Inconsistencies	4	D - Visual Inspection D - Final Inspection	7	84	None						0
				3		Sealer Malfunctions	2	D - Visual Inspection D - Final Inspection	7	42	None						0
				3		Material stuck on sealer	4	D - Visual Inspection D - Final Inspection P - Incoming Inspection	7	84	None						0
				3		Improperly Adjusted Timer	4	P - Work Instruction D - Visual Inspection	7	84	None						0
		Incorrect Quantity in Bag	Customer Dissatisfaction	4		Scale issue	3	P - Work Instruction D - Visual verification D-SharePoint/Shift Log P-Calibration	2	24	None						0
				4		Operator error	3	P - Work Instruction D - Visual verification D-SharePoint/Shift Log	5	60	None						0
		Incorrect Quantity in Box	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspection D - Final Inspection P - Bag Counter (T18R-C)	5	60	None						0
				4		Scale Out of Calibration	1	D - Visual Inspection D - Final Inspection P - Calibration Schedule	5	20	None						0
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product	2	D - Visual Inspection D - Final Inspection	6	48	None						0
11 Final and Live Inspection	Product conforms per specifications after production run.	Bad Product Shipped	Customer Dissatisfaction	8		Inspection Not Performed by Cell Lead	1	D /P- In Process Checks	1	8	None						0
				7		Bad Product not Found in Random Sampling	2	D /P- In Process Checks	7	98	None						0
		Water Verification Incomplete	Part Non-Compliance	6		Water not Verified During Process Inspection	1	D/P - Shift Log or Share Point. P- Final and Live Inspection	1	42	None						

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
12-13 QA Testing	Validation and documentation of product per specifications	Weekly Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix P- Daily Production Meeting	3	18	None						0
				5		Damaged Shipment	2	D - Visual Inspection D - Final Inspection	8	80	None						0
				5		Customer Specific Requirements Not Met	2	D - Visual Inspection P - Final Inspection	8	80	None						0
14 Material Movement	Move products from Injection Molding work station to FG	Good product put in Hold	Delay shipment to customer	5		Incorrect cone put on product at Molding Work Station	2	D - Visual Inspection P -Hold ticket attached P-Work instruction	3	30	None						0
		Bad Product Shipped	Customer Dissatisfaction	8	PTC	Incorrect cone put on product at Molding Work Station	1	D - Visual Inspection P -Hold ticket attached P-Work instruction	9	72							0
15 Annual Validation (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	2	20	None						0

PTC = Pass Through Characteristic

FORD PN
BU5T-14E047-DA - Cable Tie Portion (156-00303)
DU5T-14G317-MA - Wide Strap (111-12300)
W703646-S2300 - Cable Tie (T50R0HSM4)

PROCESS FLOW DIAGRAM

Part Description: Cable Tie
HT Dwg.# and Rev: Various
Customer P/N and Rev: Various
Customer Name: Various

Program Name: Cable Ties
Created By: Gwendolyn Benz
Creation Date: 03/11/94

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Process Name/ Operation Description	Product/Process Characteristics	Control Methods
1		◆			Material Movement	Move Materials to material handling system and Verify Correct Material Moisture Check on Silo Materials	Material Process Log F-PRD-8.1-4 and Moisture Log F-QA-10.3-9
2	■				Material Ratio	Verify Correct Material	Material Process Log F-PRD-8.1-4
3	■				Molding Machine/Automation Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-9.6-1
4				☒	First Piece Approval QA Completes (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	First Piece Acceptance F-QA-10.3-5
5	■				First Piece Approval	Hang First Piece	Visual At Press
6				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
7	■				Work order set-up LPA	Validate work order to materials, labels, etc. LPA-Random Audit	Visual, Signed Set-up Stamp on Work Order F-PRD-9
8				☒	In Process Checks (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	Per Control Plan
9	■				Packaging - Automation and Inspection	Verify Seals, Water, Date Code, Labels, Hole Punch, Box Quantity	Inspection Stamp/Label (Initialed and Dated) on Box / Share Point / Shift Log F-PRD-1.1 / Placard
9A	■				Packaging - Manual and Inspection	Verify Seals, Water, Date Code, Labels, Hole Punch, Box Quantity	
10				☒	Visual Appearance	Check Ties for Visual Defects	Per Control Plan
11				☒	Final and Live Inspection	Quality Approval of Final Product	F-QA-10.4-21/ Share Point
13				☒	QA Testing	Verify Weekly Testing Has Been Completed	Per Control Plan
14		◆			Material Movement	Move Skid To Shipping Dock	ERP System
15				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

HellermannTyton

☐ Prototype ☐ Pre-Launch ☑ Production

Control Plan

Control Plan Number: **MCP-1**	Key Contact/Phone: **414.355.1130**	Date (Orig.) **03/11/94**	Date & Revision **See Footer**
Part Number/Latest Change Level: **Cable Ties - Various Materials**	Core Team: **Quality Assurance, Manufacturing, Automation, Receiving-Shipping**	Customer Engineering Approval/Date (If Req'd) **NA**	
Part Name/Description **Cable Ties - Various Materials**	Supplier/Plant Approval/Date **07/28/05**	Customer Quality Approval/Date (If Req'd) **NA**	
Supplier/Plant: **HellermannTyton MKE** / Supplier Code: **NA**	Other Approval/Date (If Req'd) **NA**	Other Approval/Date (If Req'd) **NA**	

Quality Assurance	Material Handler	Process Tech / Auto Technician	Operator	QA and/or Team Supervisor	Shipping and/or Receiving

Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS NO.	CHARACTERISTICS PRODUCT	CHARACTERISTICS PROCESS	Special Char. Class	METHODS Product/Process Specification/ Tolerance	METHODS Evaluation/ Measurement Technique	METHODS SIZE Size	METHODS SIZE Freq	METHODS Control Method	Reaction Plan
1	Material Movement	Material Handling System	1		Move Material to Material Handling System		Correct Material is set up in the Material Handling System per Work Order	Visual	Each Material Change	Each Material 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
			2		Check moistures in Silo Materials		Perform Moistures per TS-WI-MAX400XL	Computrac Max 4000XL	1 Sample/ Material	One /Shift	Raw Material Moisture Content Test Log F-QA-10.3-9	Notify Production Team Supervisor and QA, Adjust Dryers and Re-check. Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
2	Material Ratio	Material Handling System	1		Material Ratio		Set up Per Work Order	Visual machine setting	Each material Change	Each Material 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
			2		Colorant (When Needed)		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
3	Molding Machine / Automation Setup	Injection Molding Machine	1		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: Tool Evaluation.	Review of Set-Up Specs and fill out applicable sections of F-PM-9.8-3: Tool Evaluation.	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
		Thermal Transfer Machine (If Needed)	2		Machine Set-Up		Set up Foil Applicator for Stripes (If Necessary)	Review of Set-Up Specs	Each Set Up	Each Set Up	Work Order	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Camera Vision Inspection (If applicable)	3		In process Cable Tie Head inspection		No blocked Head or Missing Paw	Vision system	Each cable tie	100%	Run Master Sample through the Vision System one per day (MP2)	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
4-5	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked/cut Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Notify Team Supervisor/Process Tech, Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
	First Piece Approval Hand Insertion	Injection Molding Machine	2	Insertion Properties of Cable Tie			No Hard Insertions, Slippage or Cracked Inserts Allowed. Breakage Testing According to WI -QA-10.3-2	Hand Insertion Process Inspection Check Per WI-QA-10.3-2	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator			QA and/or Team Supervisor	Shipping and/or Receiving
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS NO.	CHARACTERISTICS PRODUCT	CHARACTERISTICS PROCESS	Special Char. Class	METHODS Product/Process Specification/ Tolerance	METHODS Evaluation/ Measurement Technique	METHODS SIZE Size	METHODS SIZE Freq	METHODS Control Method	Reaction Plan
	First Piece Approval Check Diaphragm (dimension to print at first pc if applicable)	Injection Molding Machine	3	Part Quality			Per Drawing	Caliper	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
6	Validation Testing	Injection Molding Machine	1	Push In / Push On Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine	2	Pull Out/Pull Off Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine	3	Dimensional			Perform Dimensional on the Part per Print	Calibrated Gages per Dimensional Study	1 shot	At Annual Validation Testing	Dimensional Study F-QA-10.4-2	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine	4	Test for Minimum Wire Bundle			Minimum Wire Bundle Requirements Per Print	Wire Bundle Test	1 Shot	At Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine	5	Tensile Strength			Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester WI-QA-10.3-14	1 Shot or 100pcs Minimum	At Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
7	Work Order Set-Up Team Supervisor or Cell Leader	Packaging Equipment	1	Packaging Requirements			Validate Material and Packaging Requirements per Work Order	Visual	1	Each Work Order	Signed Set-Up Stamp on Work Order	Adjust Process, Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
	Layered Process Audit	Production Process	2		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)
8	In Process Checks Completed Hand Insertion/Visual Process Inspection	Injection Molding Machine	1	Hand Insertions			No Hard Insertions, Slippage or Cracked Inserts Allowed. Breakage Testing According to WI -QA-10.3-2	Hand Insertion Process Inspection Check Per WI-QA-10.3-2	1 Shot	Every 2 Hours	Share Point or Shift Log F-PRD-1.1	WI-PRD-13.1-3 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	2	Process Set-Up			Work Order Matches MIU / Cavity Count Matches Actual / Cycle Time is to Standard or Adjusted Notes	Visual	Once	Per Shift	Share Point or Shift Log F-PRD-1.1	WI-PRD-13.1-3 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	3	Part Quality			Check For Flash, Shorts, Mismatch, Blocked/cut Heads, Missing Paw/Fir Tree, Burning/Splay, Broken Insert/Pin, and Color(If Needed)	Visual	1 Shot	4x per Shift and 1 x per each start-up	Share Point or Shift Log F-PRD-1.1	WI-PRD-13.1-3 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		Material Handler	Process Tech / Auto Technician				Operator	QA and/or Team Supervisor			Shipping and/or Receiving
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
9-10	Packaging Auto Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Ties for Visual Defects - WI-PRD-200: Packaging Operator Training Manual	Visual	1 Shot	Every 2 Hours	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	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
		Sealer	3	Proper Bag Seal			Bag Must Have a Complete and Un-Wrinkled Seal	Visual and Pull at Seams	1 bag	Twice per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor or QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Waters in Bag	4	Amount of Water Added Per Bag			Per Work Order	Actual value on PLC or manually measure.	1 measurement	2 Times Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor and Quality Assurance / Adjust Process Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Date Code	5	Date Code Stamp			Bag Must Have Correct Data Code Date Code Calendar S-PRD-8.1-6	Visual	Once	One Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	6	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	One box One bag	Twice Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Packaging Equipment	7	Hole Punch (Where Applicable)			Hole Punch Must Be Within Header Boundaries and Complete	Visual	Once bag	One Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	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		Material Handler	Process Tech / Auto Technician				Operator	QA and/or Team Supervisor			Shipping and/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		
9A-10	Packaging Manual Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Ties for Visual Defects - WI-PRD-200: Packaging Operator Training Manual	Visual	1 Shot	Every 2 Hours	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Sealer	3	Proper Bag Seal			Bag Must Have a Complete and Un-Wrinkled Seal	Visual and Pull at Seams	1 bag	Twice per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor or QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Water in Bag	4	Amount of Water Added Per Bag			Per Work Order	Manually measure.	1 measurement	2 Times Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor and Quality Assurance / Adjust Process Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Date Code	5	Date Code Stamp			Operator inspection Sticker Must Have Correct Date Code S-PRD-8.1-6	Visual	Once	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	6	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	One box One bag	Twice Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Packaging Equipment	7	Hole Punch (Where Applicable)			Hole Punch Must Be Within Header Boundaries and Complete	Visual	Once	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	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	8	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	Once	Twice Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	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		Material Handler	Process Tech / Auto Technician				Operator	QA and/or Team Supervisor			Shipping and/or Receiving
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS				Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
11	Final Inspection at the Cell	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked/cut Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	2	Box Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	3	Bag Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Waters in Bag	4	Water Verification			Verify Water is in Bag where required	Visual	1 Bag	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Sealer	5	Proper Bag Seal			Bag Must Have a Complete Seal	Visual and Pull at Seams	1 bag	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Correct Amount of Parts in Box	6	Quantity in Box			Boxes Must Have Specified Amount of Bags per Box	Hand Count	1 Sample	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Packaging	7	Packaging Requirements			Verify per Work Order correct Box	Visual	1 check	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Stamp	8	Date Code Stamp / Printer			Date Code Calendar S-PRD-8.1-6	Visual match	1 check	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator			Shipping and/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		
12-13	Weekly Testing	Injection Molding Machine	1	Test for Minimum Wire Bundle			Minimum Wire Bundle Requirements Per Print	Wire Bundle Test	1 Shot	Weekly	SPC Software	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine	2	Test for Tensile Strength			Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester	1 Shot	Weekly	SPC Software	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine	3	Part Quality			T18RA and T30RA ran through a tool	Tool	4 pcs welded together	Daily	Weekly Matrix F-QA-10.3-8 / SPC Software	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine	3	Force Testing Push On, Push In, Pull Off, Pull Out (If Required)			Per Print	Tensile Tester / Force Gauge	1pc	Weekly	SPC Software	Notify Team Supervisor/Process Tech Adjust Process Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
14	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
15	Annual Validation (If Required)		1		Validation of Product		Re-Validation of Product to Customer Requirements	PPAP	Per Customer Requirements	Per Customer Requirements	PPAP Matrix	Control of Non-Conforming Product per PR-QA-13.1-2

Parts Include:

T18 Series	IT Ties
T30 Series	All Wide Straps
T40 Series	All releasable
T50 Series	SR255
T120 Series	Double Headed
T150 Series	DCT 9 & 11
T250 Series	SDCT
T255 Series	Screw Mount
CTT Series	All Outside Serrated Ties
PAT100 Series	Stud Mounts

NOTE * All Series Include: PE, PER, TAS, SM, OSSFT, WPM'S, SF, RTM, DP,OSFT

HellermannTyton

Initial Process Study

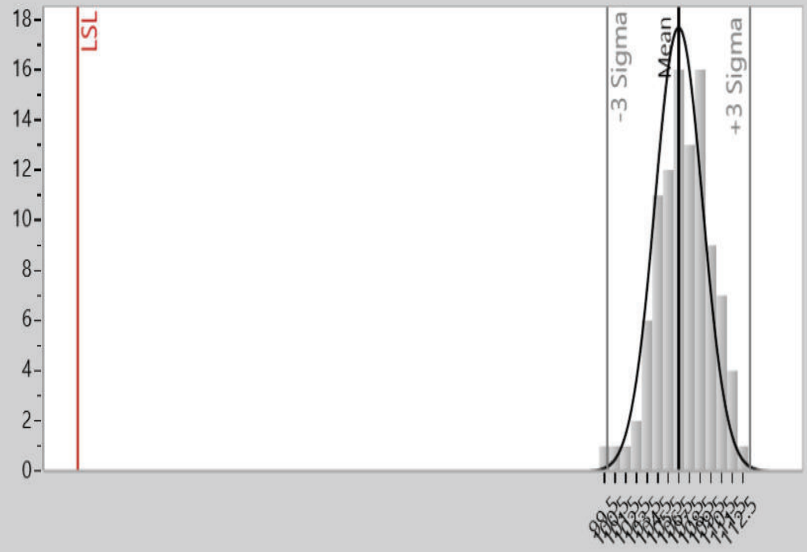
HT Part No.	Customer Part No.	Part Description	Supplier
157-00200	15700200	T50ROS WITH 25mm OFFSET AND FT6	HellermannTyton

Drawing No.	Drawing Date	Drawing Revision
11-0572-001-CSU	5/16/2016	06.1

Production Date	Material	Inspection Facility	Inspector
9/1/2020	UR0HIRHS9	HT-Milwaukee	AH

Study	Sample	Data								
Loop Tensile Strength	1-9	111.00	112.00	108.00	108.00	107.00	108.00	103.00	110.00	105.00
	10-18	108.00	111.00	106.00	107.00	104.00	101.00	109.00	110.00	110.00
	19-27	109.00	109.00	109.00	110.00	105.00	104.00	106.00	108.00	103.00
	28-36	108.00	103.00	105.00	105.00	106.00	106.00	106.00	107.00	104.00
	37-45	107.00	110.00	108.00	111.00	110.00	108.00	108.00	106.00	104.00
	46-54	109.00	103.00	103.00	102.00	107.00	105.00	108.00	106.00	107.00
	55-63	106.00	110.00	106.00	104.00	105.00	104.00	108.00	107.00	105.00
	64-72	108.00	106.00	104.00	107.00	100.00	107.00	105.00	108.00	111.00
	73-81	104.00	105.00	105.00	103.00	107.00	104.00	108.00	109.00	108.00
	82-90	107.00	106.00	104.00	107.00	102.00	106.00	105.00	106.00	109.00
	91-99	105.00	104.00	106.00	99.00	106.00	106.00	108.00	107.00	109.00
	100-108	109.00								

M0692 T50ROSFT6SO25B
UR0HIRHS9 TENSILE
CAPABILITY Tensile Strength



Basic Statistics

100 data values	
Maximum	112
Mean	106.480
Minimum	99
Sigma of the individuals	2.533
Dpm (e)	0
Within 1 Sigma (e)	57.000%
Within 2 Sigma (e)	90.000%
Within 3 Sigma (e)	99.000%

Capability Statistics

Cp	N/A
Cpk	8.410
Cpm	N/A

Specifications

Upper Spec	
Target Spec	
Lower Spec	50.0000000

Subgroup Statistics

	mR = 2
Estimated Sigma	2.239

Out-of-spec

Below	0.000%
Total	0.000%

Performance Statistics

Pp	N/A
Ppk	7.434

Footnotes

(e) = Uses Estimated sigma

Attributes R&R study
HellermannTyton 12/6/2019

Event name: Visual Attribute
Entered by: Danielle Oldham.
Date: 12/6/2019
Appraisers: 3
Parts: 50
Replications: 3

Cross Tabulation

Marreall * Zanetta Cross Tabul

			Zanetta		
			.00	1.00	Total
Marreall	.00	Count	46	4	50
		Expected count	18.0	32.0	50.0
	1.00	Count	8	92	100
		Expected count	36.0	64.0	100.0
Total		Count	54	96	150
		Expected count	54.0	96.0	150.0

Marreall * Coleman Cross Tabu

			Coleman		
			.00	1.00	Total
Marreall	.00	Count	45	5	50
		Expected count	16.0	34.0	50.0
	1.00	Count	3	97	100
		Expected count	32.0	68.0	100.0
Total		Count	48	102	150
		Expected count	48.0	102.0	150.0

Zanetta * Coleman Cross Tabul

			Coleman		
			.00	1.00	Total
Zanetta	.00	Count	43	11	54
		Expected count	17.3	36.7	54.0
	1.00	Count	5	91	96
		Expected count	30.7	65.3	96.0
Total		Count	48	102	150
		Expected count	48.0	102.0	150.0

Marreall * REF Cross Tabulatio

			REF		
			.00	1.00	Total
Marreall	.00	Count	47	3	50
		Expected count	18.0	32.0	50.0
	1.00	Count	7	93	100
		Expected count	36.0	64.0	100.0
Total		Count	54	96	150
		Expected count	54.0	96.0	150.0

Zanetta * REF Cross Tabulatio

Gage R&R USA

Attributes R&R study
HellermannTyton

12/6/2019

			REF		
			.00	1.00	Total
Zanetta	.00	Count	50	4	54
		Expected count	19.4	34.6	54.0
	1.00	Count	4	92	96
		Expected count	34.6	61.4	96.0
Total		Count	54	96	150
		Expected count	54.0	96.0	150.0

Coleman * REF Cross Tabulati

			REF		
			.00	1.00	Total
Coleman	.00	Count	45	3	48
		Expected count	17.3	30.7	48.0
	1.00	Count	9	93	102
		Expected count	36.7	65.3	102.0
Total		Count	54	96	150
		Expected count	54.0	96.0	150.0

Kappa values

0.82 - Marreall * Zanetta
0.88 - Marreall * Coleman
0.76 - Zanetta * Coleman
0.85 - Marreall * REF
0.88 - Zanetta * REF
0.82 - Coleman * REF

Kappa value guidelines

0.75 < k <= 1.0 indicates good to excellent agreement
0.40 <= k <= 0.75 indicates adequate (acceptable) agreement
-1.0 <= k < 0.4 indicates poor (unacceptable) agreement

Effectiveness

% Appraiser

Source	Inspected	Matched	95% UCI	Score	95% LCI
Marreall	50	49	100%	98%	89%
Zanetta	50	45	97%	90%	78%
Coleman	50	50	100%	100%	93%

%Score vs. Attribute

Source	Inspected	Matched	95% UCI	Score	95% LCI
Marreall	50	46	98%	92%	81%
Zanetta	50	45	97%	90%	78%
Coleman	50	46	98%	92%	81%

%Effective Score

	Inspected	Agreed	95% UCI	Score	95% LCI
	50	42	93%	84%	71%

System % Effective

Gage R&R USA

Attributes R&R study
HellermannTyton 12/6/2019

	Inspected	Agreed	95% UCI	Score	95% LCI
	50	42	93%	84%	71%

Summary

Appraiser	Effectiveness	Miss Rate	False Alarm Rate
Marreall	92%	13.0%	3.1%
Zanetta	90%	7.4%	4.2%
Coleman	92%	16.7%	3.1%

Gage R&R USA

R&R Study Results Using Specifications

1/10/2020

Gage number:	TGM-760	Done by:	Danielle Oldham.
Gage description:	Micro-Vu	Part name:	133-03809
Gage type:	Micro-Vu	Characteristics:	Length-Vision System
Study name:	Annual Gage R & R	Specifications:	LSL=39.5 Nominal=40 USL=40.5
Study date:	01/10/2020	Number of Distinct Cate	50.39

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.00439

%EV = %2.634

Reproducibility - Appraiser Variation (AV)
AV = %0.001568

%AV = %0.9405

Repeatability & Reproducibility (R&R)
R&R = %0.004662

%R&R = %2.797

Part Variation (PV)
PV = %0.1666

%PV = %99.96

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %0.1667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Nick K	1	39.756	39.558	39.784	39.752	39.761	39.847	40.027	39.612	39.776	39.596
Nick K	2	39.756	39.559	39.784	39.756	39.761	39.84	40.026	39.611	39.794	39.596
Nick K	3	39.758	39.557	39.779	39.757	39.762	39.859	40.029	39.614	39.794	39.595
Rob S	1	39.756	39.559	39.802	39.754	39.744	39.861	40.025	39.611	39.794	39.596
Rob S	2	39.756	39.556	39.806	39.753	39.759	39.849	40.037	39.611	39.792	39.595
Rob S	3	39.755	39.559	39.788	39.754	39.761	39.855	40.036	39.598	39.793	39.595
Tom H	1	39.756	39.55	39.768	39.765	39.762	39.855	40.007	39.61	39.794	39.596
Tom H	2	39.75	39.559	39.785	39.754	39.773	39.859	40	39.617	39.793	39.593
Tom H	3	39.755	39.558	39.781	39.755	39.758	39.858	39.997	39.615	39.794	39.592

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Gage R&R USA

R&R Study Results Using Specifications

10/10/2019

Gage number:	TGM-850	Done by:	Danielle Oldham.
Gage description:	Tensile Tester	Part name:	T120R
Gage type:	Tensile Tester	Characteristics:	Tensile Strength
Study name:	Annual Gage R & R	Specifications:	LSL=120 Nominal=158 USL=196
Study date:	10/10/2019	Number of Distinct Cate	42.67

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.3047

%EV = %2.405

Reproducibility - Appraiser Variation (AV)
AV = %0.2867

%AV = %2.263

Repeatability & Reproducibility (R&R)
R&R = %0.4183

%R&R = %3.303

Part Variation (PV)
PV = %12.66

%PV = %99.95

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %12.67

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
App 1	1	148.69	157.22	153.07	160.5	157.82	152.24	157.99	157.92	163.06	159.25
App 1	2	148.95	157.4	153.17	160.65	157.47	152.15	158.08	158.126	162.66	158.99
App 1	3	148.15	157.48	153.48	160.73	158.04	153.21	158.14	158.252	162.67	158.8
App 2	1	146.28	157.11	153.49	158.15	159.18	153.75	155.55	158.378	163.02	159.67
App 2	2	145.32	157.13	153.8	158.04	159.84	154.74	155.96	158.548	163.66	160.25
App 2	3	145.41	157.25	154.17	158.22	159.95	153.98	156.13	158.645	163.67	159.25
App 3	1	149.48	156.85	154.21	158.38	157.09	153.49	157.58	157.518	162.5	163.06
App 3	2	149.73	157	154.51	158.28	157.19	154.21	157.62	157.601	162.32	163.66
App 3	3	150.36	157.07	154.64	158.62	157.66	153.13	157.59	157.733	162.53	163.67

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Gage R&R USA

R&R Study Results Using Specifications

1/10/2020

Gage number:	TGM-888	Done by:	Danielle Oldham.
Gage description:	Digital Caliper	Part name:	T50R
Gage type:	Caliper	Characteristics:	Width
Study name:	Annual Gage R & R	Specifications:	LSL=4.2 Nominal=4.4 USL=4.6
Study date:	01/10/2020	Number of Distinct Categories	17.46

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.005316

%EV = %7.974

Reproducibility - Appraiser Variation (AV)
AV = %0.000740

%AV = %1.111

Repeatability & Reproducibility (R&R)
R&R = %0.005367

%R&R = %8.051

Part Variation (PV)
PV = %0.06645

%PV = %
99.68

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %0.06667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Danielle	1	4.7	4.65	4.88	4.69	4.7	4.69	4.7	4.81	4.69	4.49
Danielle	2	4.69	4.64	4.88	4.7	4.7	4.68	4.69	4.8	4.69	4.51
Danielle	3	4.69	4.65	4.89	4.7	4.69	4.69	4.7	4.81	4.69	4.5
Marreall	1	4.69	4.65	4.89	4.7	4.68	4.68	4.69	4.8	4.68	4.5
Marreall	2	4.69	4.65	4.89	4.7	4.69	4.69	4.69	4.81	4.68	4.49
Marreall	3	4.69	4.64	4.88	4.7	4.69	4.69	4.7	4.81	4.69	4.49
Zanetta	1	4.7	4.64	4.89	4.69	4.69	4.68	4.7	4.8	4.7	4.49
Zanetta	2	4.69	4.65	4.89	4.69	4.69	4.68	4.69	4.8	4.7	4.5
Zanetta	3	4.69	4.65	4.88	4.7	4.7	4.69	4.69	4.8	4.69	4.5

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Gage R&R USA

R&R Study Results Using Specifications

1/8/2020

Gage number:	TGM-914	Done by:	Danielle Oldham.
Gage description:	Digital Scale	Part name:	T120R
Gage type:	Scale	Characteristics:	Weight
Study name:	Annual Gage R & R	Specifications:	LSL=5.3 Nominal=5.5 USL=5.8
Study date:	01/08/2020	Number of Distinct Cate	58.22

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.00189

%EV = %2.268

Reproducibility - Appraiser Variation (AV)
AV = %0.000705

%AV = %0.8468

Repeatability & Reproducibility (R&R)
R&R = %0.002018

%R&R = %2.421

Part Variation (PV)
PV = %0.08331

%PV = %99.97

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %0.08333

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Zanetta	1	5.52	5.399	5.58	5.577	5.509	5.575	5.805	5.542	5.517	5.519
Zanetta	2	5.522	5.397	5.584	5.578	5.511	5.573	5.806	5.544	5.519	5.519
Zanetta	3	5.523	5.396	5.586	5.581	5.512	5.572	5.803	5.545	5.516	5.516
Marreall	1	5.52	5.398	5.584	5.581	5.508	5.572	5.802	5.543	5.516	5.522
Marreall	2	5.524	5.397	5.59	5.58	5.511	5.575	5.805	5.54	5.52	5.521
Marreall	3	5.522	5.4	5.587	5.576	5.511	5.574	5.803	5.542	5.519	5.523
Danielle	1	5.522	5.398	5.586	5.577	5.51	5.577	5.803	5.542	5.52	5.524
Danielle	2	5.524	5.399	5.59	5.579	5.509	5.574	5.804	5.545	5.521	5.526
Danielle	3	5.524	5.397	5.589	5.578	5.508	5.576	5.805	5.543	5.518	5.523

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Gage R&R USA

R&R Study Results Using Specifications

1/13/2020

Gage number:	TGM-966	Done by:	Danielle Oldham,
Gage description:	Global Performance 7-10-7	Part name:	133-03809 Coordinates
Gage type:	Coordinate Measuring Machine	Characteristics:	
Study name:	Annual Gage R & R	Specifications:	LSL=39.5 Nominal=40 USL=40.5
Study date:	01/13/2020	Number of Distinct Cate	45.68414

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 = 0.003996833

%EV = 2.3981

Reproducibility - Appraiser Variation (AV)
AV = 0.003234357

%AV = 1.940614

Repeatability & Reproducibility (R&R)
R&R = 0.005141569

%R&R = 3.084941

Part Variation (PV)
PV = 0.1665873

%PV = 99.9524

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.1666667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Nick	1	39.6507	39.5662	39.5797	39.6401	39.6549	39.7154	39.729	39.5296	39.6751	39.5842
Nick	2	39.6453	39.5666	39.5845	39.6399	39.6637	39.7197	39.7271	39.5268	39.6739	39.5828
Nick	3	39.6507	39.5662	39.5797	39.6401	39.6549	39.7154	39.729	39.5296	39.6751	39.5842
Rob	1	39.6673	39.5685	39.5846	39.6452	39.6747	39.7237	39.7282	39.5338	39.6762	39.5931
Rob	2	39.6539	39.5797	39.5904	39.6445	39.6749	39.7212	39.7316	39.5372	39.6766	39.5953
Rob	3	39.6503	39.5658	39.5931	39.6444	39.659	39.7261	39.732	39.5297	39.6746	39.5946
Tom	1	39.6537	39.5653	39.5848	39.6429	39.6734	39.7182	39.7288	39.5289	39.6712	39.5925
Tom	2	39.6466	39.5696	39.5833	39.66	39.6698	39.7201	39.7316	39.5256	39.6806	39.5973
Tom	3	39.6366	39.5655	39.5807	39.6448	39.6654	39.7238	39.7159	39.5274	39.6727	39.5866

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Gage R&R USA

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R&R Study Results Using Specifications

1/10/2020

Gage number:	TGM-983	Done by:	Danielle Oldham.
Gage description:	Indicator	Part name:	T150R
Gage type:	Indicator	Characteristics:	Height
Study name:	Annual Gage R & R	Specifications:	LSL=0.065 Nominal=0.075 USL=0.085
Study date:	01/10/2020	Number of Distinct Cate	23.77

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.000124

%EV = %3.721

Reproducibility - Appraiser Variation (AV)
AV = %0.000153

%AV = %4.608

Repeatability & Reproducibility (R&R)
R&R = %0.000197

%R&R = %5.923

Part Variation (PV)
PV = %0.003326

%PV = %99.82

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %0.003333

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Danielle	1	0.0708	0.0714	0.0713	0.0671	0.0716	0.0724	0.0718	0.0712	0.0713	0.0706
Danielle	2	0.0706	0.0711	0.0712	0.0671	0.0719	0.0721	0.0716	0.0713	0.0712	0.071
Danielle	3	0.0704	0.0716	0.0713	0.0671	0.0717	0.0721	0.0718	0.0712	0.0713	0.0706
Tom	1	0.0707	0.0713	0.0712	0.0671	0.0715	0.0722	0.0715	0.0706	0.0712	0.0696
Tom	2	0.0707	0.0712	0.0716	0.067	0.0716	0.0722	0.0714	0.0705	0.0713	0.0694
Tom	3	0.0705	0.0711	0.0712	0.0671	0.0716	0.0723	0.0715	0.0706	0.0712	0.0697
Marreall	1	0.0708	0.0713	0.0713	0.067	0.0715	0.0723	0.0716	0.0697	0.0713	0.0695
Marreall	2	0.0703	0.0713	0.0712	0.0674	0.0716	0.0726	0.0714	0.0698	0.0712	0.0695
Marreall	3	0.0706	0.0712	0.0713	0.067	0.0715	0.0722	0.0716	0.0699	0.0713	0.0696

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Gage R&R USA

R&R Study Results Using Specifications

1/16/2020

Gage number:	TGM-1040	Done by:	Danielle Oldham.
Gage description:	IMAGE DIMENSION MEASURING SYSTE	Part name:	110-10577
Gage type:	KEYENCE	Characteristics:	Vision System-Profile
Study name:	Annual Gage R & R	Specifications:	LSL=2.98 Nominal=3.0226 USL=3.0988
Study date:	01/17/2020	Number of Distinct Cate	17.2

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)/%10

Repeatability - Equipment Variation (EV)
EV = %0.001524

%EV = %7.697

Reproducibility - Appraiser Variation (AV)
AV = %0.000543

%AV = %2.745

Repeatability & Reproducibility (R&R)
R&R = %0.001618

%R&R = %8.171

Part Variation (PV)
PV = %0.01973

%PV = %99.67

Specification Spread (USL-LSL)/%10
(USL - LSL)/%10 = %0.0198

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Travis M	1	3.0063	3.0106	3.0134	2.999	3.0053	3.0293	3.0267	3.0267	3.0007	3.0052
Travis M	2	3.0074	3.0043	3.0088	2.9978	3.0074	3.0305	3.0286	3.0255	3.0001	3.0088
Travis M	3	3.0071	3.0101	3.0076	3.0041	3.01	3.0318	3.0276	3.0257	3.0017	3.0075
Danielle O	1	3.0057	3.0081	3.0121	3.0025	3.0082	3.0313	3.0278	3.0246	3.0005	3.0035
Danielle O	2	3.0102	3.0079	3.013	2.9987	3.01	3.0296	3.0267	3.0236	2.9981	3.0022
Danielle O	3	3.0057	3.0087	3.0119	3.0034	3.0037	3.0313	3.0271	3.0262	2.9972	3.0071
Ryley W	1	3.0043	3.0077	3.0076	2.9997	3.0047	3.0295	3.0274	3.0258	3.0005	3.0064
Ryley W	2	3.0044	3.0082	3.0077	2.9996	3.0045	3.0323	3.0277	3.0255	3.0005	3.0065
Ryley W	3	3.0039	3.0066	3.0075	2.9997	3.0039	3.0301	3.027	3.0256	2.9992	3.0086

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Gage R&R USA

R&R Study Results Using Specifications

1/8/2020

Gage number:	TGM-1135	Done by:	Danielle Oldham.
Gage description:	3D Metrology system	Part name:	VW PRP17-0816
Gage type:	3D Scanner	Characteristics:	Structured 3D Light Scanne
Study name:	Gage R&R	Specifications:	LSL=39.5 Nominal=40 USL=40.5
Study date:	09/30/2019	Number of Distinct Cate	32.25076

Objective: VW PRP17-0816
M1671
Print # 8Qo.971.930

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 = 0.007226069

%EV = 4.335641

Reproducibility - Appraiser Variation (AV)
AV = 0.0008819934

%AV = 0.529196

Repeatability & Reproducibility (R&R)
R&R = 0.007279697

%R&R = 4.367818

Part Variation (PV)
PV = 0.1665076

%PV = 99.90456

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.1666667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
RS	1	39.95	39.807	39.895	39.989	39.95	40.029	39.938	39.701	39.993	39.924
RS	2	39.953	39.802	39.892	39.987	39.962	40.036	39.926	39.715	40.004	39.924
RS	3	39.958	39.797	39.9	40.005	39.951	40.019	39.941	39.709	39.995	39.931
JF	1	39.951	39.787	39.912	39.985	39.956	39.98	39.939	39.677	40.013	39.946
JF	2	39.958	39.808	39.891	40.008	39.955	39.982	39.948	39.693	40.015	39.961
JF	3	39.951	39.787	39.912	39.985	39.956	39.98	39.939	39.677	40.013	39.946
NK	1	39.948	39.799	39.884	39.985	39.956	39.997	39.916	39.685	40.032	39.941
NK	2	39.964	39.816	39.892	39.997	39.968	39.994	39.936	39.678	40.011	39.937
NK	3	39.944	39.8	39.885	39.988	39.962	39.996	39.923	39.691	40.028	39.939

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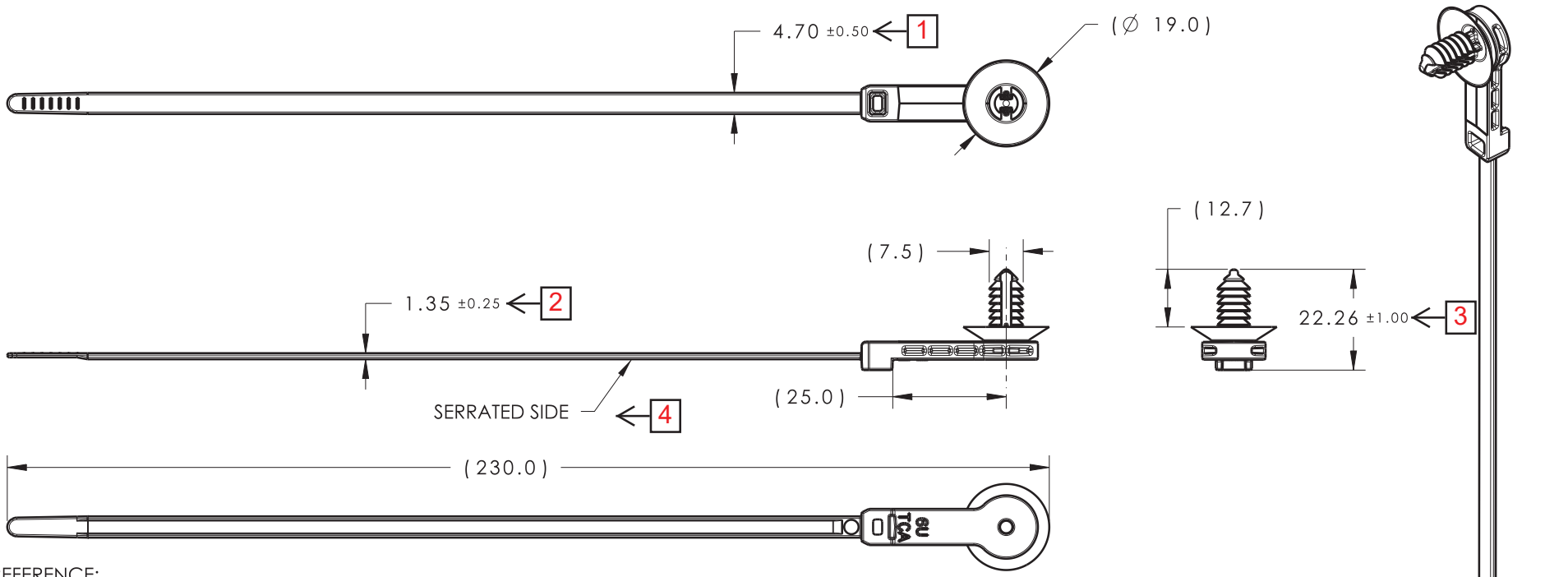
CATIA V5

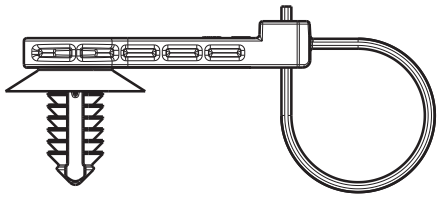
Revision Level			Revision Record	Changed	Date	Approved	Date
Drawing	State	Part					
06.1	Design Release	A	SEE ECN# 013477	EJF	5/16/16	KVH	5/16/16



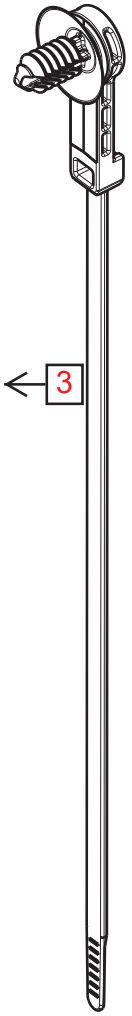
REFERENCE:
PERFORMANCE REQUIREMENTS AT DRY AS MOLDED:
1. FIR TREE PUSH IN FORCE: 45 NEWTONS (10 LBS) MAX IN THE APPLICABLE NOMINAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm.
2. FIR TREE PULL OUT FORCE: 110 NEWTONS (25 LBS) MIN IN THE APPLICABLE NOMINAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm.
3. SHEET METAL THICKNESS RANGE: 0.60mm - 6.65mm
4. APPLICABLE HOLE SIZE:
   A. 6.5mm +0.5/- 0.4
   B. 6.35mm +/- 0.25 HEX
5. CABLE TIE MIN LOOP TENSILE STRENGTH: 225 NEWTONS (50 LBS)
6. BUNDLE RANGE: 2.0mm TO 50.0mm
7. MAXIMUM PERCENT REGRIND PERMISSIBLE: 25%
8. MAX ALLOWABLE FLASH OR MISMATCH TO BE: 06.1

MATERIAL	COLOR
PA66HIRHS	GRAY
PA66HIRHS	BLACK
PA66HIRHS	NATURAL
PA46	BROWN

5



ASSEMBLY VIEW
SCALE 1:1



ISOMETRIC VIEW

Material: SEE CHART COLOR: SEE CHART	Units: millimeters Tolerance defined on each dimension		Drawn: SJA 6/14/11 Approved: KVH 11/19/12 HellermannTyton North America Email: corp@htamericas.com Web: www.hellermann.tyton.com	Article/Type-No: T50ROSFT6SO25B Title: T50ROS WITH 25mm OFFSET AND FT6 FIR TREE (B-SERIES) Drawing-No: 11-0572-001-CSU PRODUCTION : Phase	Scale: 3:4 Project Number: 11-0572 Format: AH Sheet: 1/1