

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.:			
93877	with submission date	05.10.2021	will be considered as complete and valid auto-
atically on	04.11.2021	unless otherwise disposed!	

Part Submission Warrant

Part Name	T50R0SBL6UM90SET	Cust. Part Number	LU5T-14E047-SA
Shown on Drawing No.	LU5T-14E047-SA	Org. Part Number	15601571
Engineering Change Level	AELE E 12982958 773	Dated	23-Jan-19
Additional Engineering Changes	n/a	Dated	n/a
Safety and/or Government Regulation	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Purchase Order No.	15601571
Weight (kg)	0,0024		
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

City

Region

25436

Postal Code

Germany

Country

CUSTOMER SUBMITTAL INFORMATION

Nursan Kablo Donanimlari

Customer Name/Division

(**30471**)

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:

967941843

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.**

Date **5-Oct-21**

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) _____

HellermannTyton

Production Part Approval Performance Test Results

Blanket statements of conformance are unacceptable for any test results.

<u>CREATOR</u>	<u>TITLE</u>	<u>DATE</u>
i.A. N. Lohse	Quality Assistant	5-Oct-21

Current Material Certificate



HELLERMANN TYTON
6701 W GOOD HOPE
Milwaukee, WI 53224
Attention: QUALITY DEPARTMENT

Customer Part No: UR0HIRHSUV0
Container ID: SLAY 5303

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

Certificate Date: 08-JAN-21
Delivery No: 0382548104
Shipped Qty: 46,280.000 Lbs
(20,992.608 Kgs)
Customer P.O. No: 146595-04

Certificate of Analysis

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

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

This Nylon Resin meets the relevant requirements of Directive 2011/65/EU ("RoHS 2 Directive") including all amendments through Directive 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and Directive 2012/19/EU on waste electrical and electronic equipment ("WEEE Directive").

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 Type: VYDYNE 47H BK0644 Material No: 10404298 Batch No JA05FY03 Date of Mfg 05-JAN-2021

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Moisture	ASTM D8869	0.10	0.20	0.15	%
Copper	STM 00667	125	250	205	PPM
Strength @ Yld	ISO 527-1,2 / 1A	50	70	58	MPa
Flammability @ 0.8mm	UL 94HB	P	P	P	N/A

Note: This certificate is generated and controlled by electronic means. No signature is required. This document may not be reproduced, except in full, without written consent of the Nylon Plastics and Polymers Department, Ascend Performance Materials Operations LLC.

All information contained in this letter is provided for informational purposes only and is not meant to alter or waive the appropriate contractual product specifications. Moisture values are representative of the product at the time it was sampled. If numerical flame spread ratings appear herein, they are not intended to reflect the hazards presented by this or any other material under actual fire conditions. Each end user should determine whether potential fire hazards are associated with the finished product, and whether this resin is suitable for the particular end use.

This Certificate of Analysis is provided by Ascend Performance Materials (or its authorized distributor) to its direct purchaser only and is intended for internal use. It is not valid if resold, conveyed or otherwise transferred to another party without Ascend's prior written consent. Ascend makes no warranties and assumes no liability for any product or certification obtained from an unauthorized source. Contact Ascend at +1 713-315-5700 to confirm the validity of any third party supplier.

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POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

FMEA Number: **MFMEA 62**

Part Number / Name: Customary Clips/Mounts- Unassembled Process Responsibility: HellermannTyton Prepared by: Quality Assurance
 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
1-4 Raw Material Receiving Inspection	Cert matches material and P.O. request	Unacceptable Moisture Levels	Cannot Manufacture	5		Shipping Damage	2	D - Incoming Inspection D-Moisture Testing P - Material Certs	8	80	None						0
				5		Material received with moisture level too high/low	2	D - Incoming Inspection D-Moisture Testing P - Material Certs	8	80	Add moisture analyzing prior to receiving	Mike Wendt - 8/30/13	Moisture Samples taken all material prior to receiving	5	2	2	20
		Incorrect Material Certification	Delay in Manufacturing	5		Material lot received does not match cert	2	D- Incoming Inspection P-Certs Faxed Prior to Arrival	8	80	None						0
		Improperly labeled	Delay in Manufacturing	4		Material received with wrong or missing label	2	D - Incoming Inspection P - Material Certs	8	64	None						0
4-9 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	5	50	Upgrade to Novatech system. Increase Moisture test freq.	Maintenance - 3/4/13 Mike Wendt - 8/30/13	New Dryer system	5	2	2	20
		Contamination	Part Non-Compliance	5		Foreign Matter in Material	2	D - Visual Inspections P - Material Handling Work Instruction	8	80	Develop new material handling procedure	Mike Wendt - 8/30/13	Added color-coded container	5	2	6	60
			Part Non-Compliance	5		Unlike Materials Mixed Together	2	D - Visual Inspections P - Material Handling Work Instruction	8	80	New material ID system	John Gleason - 1/1/13	Material ID added to WO, New process for stickers on	5	2	5	50
		Incorrect Material	Part Non-Compliance	6		Wrong material hooked up to press	2	D/P - Visual to Work Order	8	96	Upgrade to Novatech system.	Maintenance - 3/4/13	ID proofing in new system upgrade	6	2	5	60
10 Injection Molding Process	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	7	56	Electronic Shift Log	John Gleason/Ross H. - 6/13	Computers added to work station. Sharepoint logs implemented	4	2	5	40
		Burning	Part Non-Compliance / Cosmetic Issues	3		Plugged/Warn Vents	3	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule	7	63	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	3	6	54
		Sticking in mold	Part Non-Compliance / Mold Damage	5		Excessive Mold Temperatures	2	D- Visual Inspections P - Mold Cleaning Schedule P-PM	7	70	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
				5		Excessive Hold Pressure	2	D- Visual Inspections P -Mold Cleaning Schedule P-PM	7	70	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
				5		Residue Build-Up	2	D- Visual Inspections P - Mold Cleaning Schedule P-PM	7	70	- PM Schedule - Gauges	Mike Wendt - 9/12 Dean Anderson - 11/13	Ice Blasting to clean mold per shift Go/No Go	5	2	5	50
				5		Water hooked up incorrectly	2	D-Visual Inspection	8	80	None						0
				5		Heaterband malfunctions	3	D- Visual Inspection D - Process Inspection P-PM	8	120	None						0

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Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results			
													Actions Taken Completion Date	Severity	Occurrence	R P N
		Shorts	Part Non-Compliance/Cosmetic/Low Extraction Force	6		Insufficient Injection Pressure compatibility of Process / mold	3	D- Visual Inspections P - First Piece Approvals	8	144	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	72
				3		Plugged/Warm Vents	4	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule	7	84	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	72
				3		Residue Build-Up	4	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule P-PM	7	84	- PM Schedule - Gauges	Mike Wendt - 9/12 Dean Anderson - 11/13	Ice Blasting to clean mold per shift Go/No Go	3	1	15
		Flash	Part Non-Compliance / Cosmetic / High Insertion Force	3		Excessive Injection Pressure	4	D- Visual Inspections P - First Piece Approvals	4	48	None					0
				3		Incorrect Tonnage	4	D- Visual Inspections P - First Piece Approvals	4	48	None					0
		Mold Mismatch	Parting Line Flash	6		Poor Mold Alignment	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals	8	96	None					0
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals	8	96	None					0
		Deep ejector pins	Part Non-Compliance	6		Excessive Hold Pressure	3	D - Visual Inspections D - Process Inspections P - First Piece Approvals	4	72	None					0
				6		Thermolator Malfunction	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals	8	96	Add audible warning	Manit. - 9/13	Audible alarms added to all thermalators to	6	2	36
				6		Fast Cycle Time	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals	8	96	None					0
		Sinks	Part Non-Compliance	3		Insufficient Hold Pressure	2	D- Visual Inspections P - First Piece Approvals	8	48	None					0
				3		Cycle Time Too Fast	2	D- Visual Inspections P - First Piece Approvals	8	48	None					0
		Incorrect Blending	Part Non-Compliance / and Color Match Failure	5		Material blended incorrectly	2	D/P - Visual to Work Order	8	80	Upgrade to Novatech system.	Maintenance - 3/4/13	New Blending System	5	2	20
		Excess Plastic	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections P - Process Inspections	8	80	None					0
		Blocked thru holes/windows	Part Non-Compliance	5		Broken Insert/Ejector Blade	2	D - Visual Inspection P - Final Inspection	8	80	None					0
		Missing Retainer tab insert	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals	6	30	None					0
				5		Improper start-up	1	D - Visual Inspection D - LPA at startup P - Final Inspections	8	40	None					0

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Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
				5		Cycle Time Too Fast	1	D - Visual Inspections P - Final Inspections	8	40	None						0
				5		Worn inserts	2	D - Visual Inspections P - Final Inspections	8	80	None						0
				5		Washed out vents	2	D - Visual Inspections P - Final Inspections	8	80	None						0
		Plugged Sprue Tips / Gates (Hot Manifold)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D - Visual Inspections D - Process Inspections P - Magnets in Hopper and	8	48	None						0
				3		Mold Heater Malfunction	2	D - Visual Inspections D - Process Inspections	8	48	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Operator packages parts too soon	4	P - Visual Inspection P - Work Instructions D - Final Inspection	8	96	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	72
11-12 First Piece Acceptance	Product conforms per specifications before production	First Piece Not Hung	Delay in Manufacturing	8		First Piece Not Submitted	1	D - Visual/No First Piece at press. P-Training of Production	5	40	None						0
13 Validation Testing	Validation and documentation of new tooling	Validation is Not Completed	Part Non-Compliance	8		Validation Testing Forgotten	1	D/P-PPAP Matrix	2	16	None						0
14 Packaging and Automation	Package product per customers specifications	Incorrect or Missing Date Code on the Box	Traceability Loss	3		Wrong/ No date code put on packaging	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions	7	63	- Improved Proecdure	- John Gleason - 7/14 - Mike Wendt/Gary	- Electronic shift log - Supervisor	3	4	5	60
		Greasy Parts Packaged	Part Non-Compliance	4		Ejector Pin / Machine Grease	1	D - Visual Inspection D - Process Inspection P - PM	7	28	None						0
		Incorrect / Missing Labels	Customer Dissatisfaction	3		Printer Ribbon not Inserted Properly	2	D/P - Visual Inspections	7	42	None						0
				3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Box and Package Inspection log	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections P - LPA	7	84	None						0
		Insufficient Packaging	Customer Dissatisfaction	3		Insufficient Packaging Supplies/ Component parts	4	D - Visual Inspection D/P- ERP System	8	96	Kanban System	John G. 3/13	- All packaging order by a KANBAN System	3	4	4	48
		Incorrect Quantity in Box	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspection/Hand Count D/P-Scale Inspection @ Shift and Package Change	5	60	None						0
				4		Scale Out of Calibration	1	D/P- Calibration Schedule and Program	5	20	None						0

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 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
		Incorrect Component Parts	Part Non-Compliance	6		Wrong component parts brought to press	2	D/P - Visual to Work Order	8	96	- Improved Procedure	- John Gleason - 7/14 - Mike Wendt/Gary Schultz - 5-14	- Electronic shift log - Supervisor CheckList	3	4	5	60
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	None						0
15-18 In Process Inspection	Manufacturing a conforming part per specifications	Bad Product Packaged	Customer Dissatisfaction	6		Inspection Not performed by Mold Tech or Operator	1	D/P-Production Inspection Log	7	42	None						0
				6		Bad Product not Found in Random Sampling	2	D/P- Production Inspection Log	7	84	None						0
19 Final Inspection (Rndv)	Product conforms per specifications after production run	Bad Product Assembled	Customer Dissatisfaction	7		Inspection Not Performed by QA	1	D/P - Final and Live Inspection	7	49	None						0
				7		Bad Product not Found in Random Sampling	2	D/P- Final and Live Inspection	7	98	None						0
20 QA Testing	Validation and documentation per specifications	Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix, First Piece Acceptance. P- Daily Production Meeting./Training Quality	7	42	None						0
21-22 Shipping	Ship product per specifications to warehouse	Shipped Incorrectly	Customer Dissatisfaction	5		Damaged Shipment	2	D - Visual Inspection P - Skid Wrap	8	80	None						0
				5		Customer Specific Requirements Not Met	2	D - Visual Inspection D/P - Final Inspection	8	80	None						0
23 Annual Validation (If Modified)	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

PROCESS FLOW DIAGRAM

Part Description: Customary Clips/Mounts-Unassembled
 HT Dwg.# and Rev: Various
 Customer P/N and Rev: Various
 Customer: Various

Program Name: N/A
 Created By: Chris Burbank
 Creation Date: 09/01/09

	Process "n"	Move "u"	Store "I"	Inspect "X"			
	■	◆	●	☒	Operational Description:	Special Characteristics / Descriptions	Control Methods
1	■				QA Receives C of A from Raw Material Supplier	C of A	ERP System
2	■				Receive in Raw Materials From Suppliers	Quality Approval of Material	ERP System
3				☒	Shipping and Receiving Inspects Raw Material	Review Container, Packaging, Lot Numbers and Quantity of Material	ERP System
4				☒	QA Inspects Color of Material (If Needed)	Review Color of Material	ERP System
5		◆			Material Movement	Move Raw Materials into Storage	ERP System
6			●		Material Storage	Store Materials until Needed	FIFO By Lot
7		◆			Material Movement	Move Materials to material handling system and verify correct material. Check moisture on Silo Materials	Material Process Log F-PRD-8.1-4 and F- QA-10.3-9
8	■				Material Ratio	Verify Correct Material	Material Process Log F-PRD-8.1-4
9		◆			Material Movement Component Parts	Move Component Parts to Press	ERP System
10	■				Molding Machine Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-8.1-4
11				☒	QA Completes First Piece Approval (Injection Molding)	Short Shots, Any Flash, Warpage, or Burning.	First Piece Acceptance F-QA-10.3-5
12	■				Quality Approval of First Piece	Hang First Piece	Visual At Press
13				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
14	■				Work Order Set Up LPA	Validate materials, labels, etc. to work order LPA Random Audit	Visual, Signed Set Up Stamp on Work Order F-PRD-9
15				☒	In Process Checks (Injection Molding)	Short Shots, Any Flash, Warpage, or Burning.	Per Control Plan
16	■				Packaging Requirements Add Component Parts	Add Component Parts Per Work Order	Share Point / F-PRD-1.1
17				☒	Final Product and Packaging is Verified	Check Parts for Visual Defects. Seals, Date Code, Labels, Box Quantity, Component Parts Verified.	Inspection Stamp/Label (Initialed and Dated) on Box / Share Point / F-PRD-1.1
18	■				Full Skid/ Order Complete	Verify and Mark Skid Ready for Inspection	Cone placed on Skid
19				☒	Final Inspection	Quality Approval of Final Product	F-QA-10.4-21 / Share Point
20				☒	QA Testing	Verify Part Testing Has Been Completed	Per Control Plan
21		◆			Material Movement	Move Skid to Shipping Dock	ERP System
22		◆			Material Movement	Ship Product to Warehouse	Shipping Manifest ERP System
23				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

☐ Prototype ☐ Pre-Launch ☒ Production

Control Plan

Control Plan Number: MCP 62			Key Contact/Phone: 414-355-1130				Date (Orig.) 09/01/09		Date (Rev.)			
Part Number/Latest Change Level: Various			Core Team: Quality Assurance, Engineering, Manufacturing, Processing				Customer Engineering Approval/Date (If Req'd) N/A					
Part Name/Description Customary Clips/Mounts- Unassembled			Supplier/Plant Approval/Date N/A				Customer Quality Approval/Date (If Req'd) N/A					
Supplier/Plant: HellermannTyton MKE		Supplier Code: N/A		Other Approval/Date (If Req'd) N/A				Other Approval/Date (If Req'd) N/A				
Quality Assurance		Team Supervisor		Material Handler		Mold Technician		Operator		QA and/or Team Supervisor	Shipping/Receiving/PIC	
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	
1-4	Incoming Receiving		1	Material Characteristics			Per Certificate of Analysis	Visual Material Cert	Each Lot	Each Lot	ERP System	Isolate lot PR-QA-13.1-2
			2	Quantity			Per Packing List	Gaylord Count	Each Lot	Each Lot	ERP System	Notify Purchasing
			3	Packaging Requirements			Packaging meets Requirements	Gaylord Visual	Each Lot	Each Lot	WI-SR-10.2-1	Notify Purchasing and QA
			4	Lot Number			Per Packing List	Gaylord Visual	Each Lot	Each Lot	ERP System	Notify QA
			5	Material Color			Per Color Chip	Material Visual	Each Lot	Each Lot	ERP System	Isolate Lot PR-QA-13.1-2
5-7	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	Isolate Lot PR-QA-13.1-2
			2		Check Moisture in Silo Materials		Perform Moistures per TS-WI-MAX4000XL	Computrac Max 4000XL Tester.	1 Sample / Material	Daily	Moisture Log F-QA-10.3-9	Check and Adjust Dryers/ Control of Non-Conforming Product PR-QA-13.1-2
8	Material Ratio	Material Handling System	1		Material Ratio		Set Up Per Work Order	Visual	Each Material Change	Each Material Change	Material Process Log F-PRD-8.1-4	Isolation PR-QA-13.1-2 Adjust Ratio
			2		Colorant (When Needed)		Mix Ratio Setting / Set Up Per Work Order	Ratio Setting	Each Lot	Each Colorant	Material Process Log F-PRD-8.1-4	Isolation PR-QA-13.1-2 Adjust Ratio
9	Material Movement		1		Move Component Parts to Press		Correct component parts are set-up per Work Order	Visual	Each Work order	Each Work Order	ERP System	Notify Supervisor
10	Injection Molding Part	Injection Molding Machine	1		Machine Set-Up		Per Mattec, Set-Up Sheet, and Acceptable Visual Part	Review of Set-Up Specs	Each Set Up	Each Set Up	Machine Set-Up Sheet F-PRD-9.6-1	Adjust Process/Recheck Isolation PR-QA-13.1-2
11-12	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp that will effect Fit, Form or Function of the Clip/Mount	Visual Inspection	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Adjust Process Recheck / Control of Non-Conforming Product PR-QA-13.1-2
			2	Stud Verification			Check M6 and M5 Studs on Fixture for size	WI-QA-10.4-8	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5	Notify Supervisor and Tool Room Retest / Control of Non-Conforming Product PR-QA-13.1-2
13	Initial Validation Testing	Injection Molding Machine	1	Dimensional			Perform Dimensional on the Part to Print	Calibrated Gages	1 Shot	At Capability	Dimensional Study F-QA-10.4-2	Control of Non-Conforming Product PR-QA-13.1-2
			2	Push In/Push On Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 Shot	At Initial Validation	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
			3	Pull Out / Pull Off Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 Shot	At Initial Validation	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
			4	Capability Study			Per Drawing/SQCPack File	Calibrated Gages	100pcs	At Capability	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2

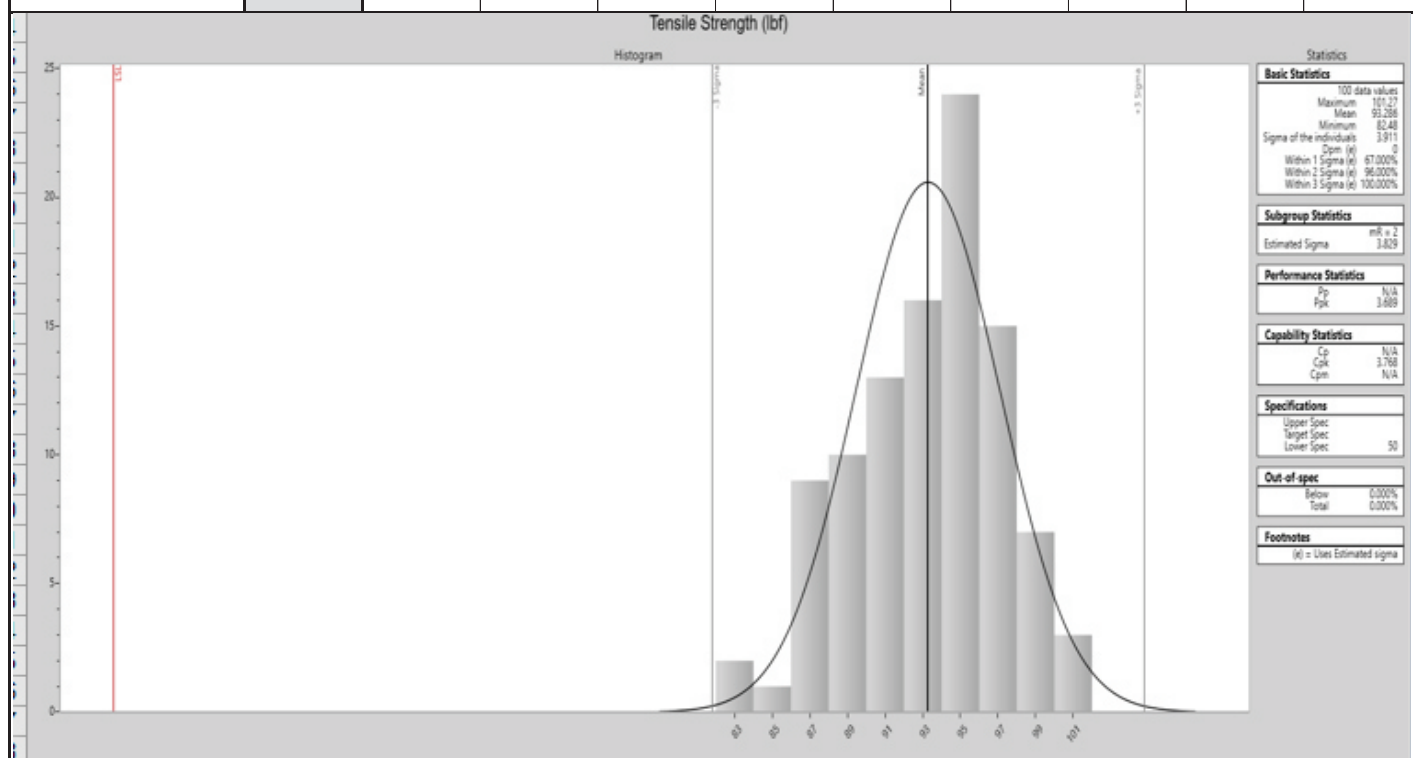
Quality Assurance		Team Supervisor	Material Handler		Mold Technician		Operator		QA and/or Team Supervisor		Shipping/Receiving/PIC	
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
14	Work Order Set-Up TEAM SUPERVISOR or PROCESSING TECH	Packaging Equipment	1	Packaging Requirements			Validate Material and Packaging Requirements per Work Order	Visual	Once	Each Work Order	Signed Set-Up Stamp on Work Order	Adjust Process Control of Non-Conforming Product PR-QA-13.1-2
	Layered Process Audit	Production Process	2		Production process		Per questions on LPA form F-PRD-9	Visual	Once	Shift	Layered Process Audit Form F-PRD-9	Adjust Process Control of Non-Conforming Product PR-QA-13.1-2 (if applicable)
15	Processing Tech Completed Visual Process Inspection	Injection Molding Machine	1	Part Quality			No Burns, Shorts, Flash, Warp or Part Damage Allowed.	Visual Inspection	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 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	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 PR-QA-13.1-2
16-18	Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Parts for Visual Defects	Visual	1 Shot	Per Hour	Inspection Label (Initialed and Dated) on Box and Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Component Parts	2	Packaging Requirements	Add Component Parts		Add Component Parts Per Work Order	Visual	Each Box	Each Box	Share Point or F-PRD-1.1	Notify Supervisor/PIC
		Scale / Conveyor Check	3	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	Two Checks	Shift	Inspection Label (Initialed and Dated) on Box and Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Date Code	4	Date Code Stamp			Bag and Box Must Have Correct Date Code S-PRD-8.1-6	Visual	Once	Shift	Inspection Label (Initialed and Dated) on Box and Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Labels	5	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	Two Checks	Shift	Inspection Label (Initialed and Dated) on Box and Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Sealer	6	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) on Box and Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
19	Final Inspection at Cell	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp	Work Order	1 Shot	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Labels	2	Box Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Labels	3	Bag Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Waters in Bag	4	Water Verification			Verify Water is in Bag where required	Visual	1 Bag	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Sealer	5	Proper Bag Seal			Bag Must Have a Complete Seal Where Required	Visual and Pull at Seams	1 bag	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2

Quality Assurance		Team Supervisor	Material Handler		Mold Technician		Operator		QA and/or Team Supervisor		Shipping/Receiving/PIC	
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		
		Correct Amount of Parts in Box	6	Quantity in Box			Boxes Must Have Specified Amount of Bags per Box	Hand Count	1 Sample	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Packaging	7	Packaging Requirements			Verify per Work Order correct Box	Visual	1 check	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
		Stamp	8	Date Code Stamp / Printer			S-PRD-8.1-6	Visual match	1 check	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2
20	QA Testing	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp that will effect Fit, Form or Function of the Clip/Mount	Visual Inspection	1 Shot	Daily	Shift Log F-PRD-1.1 or Weekly Matrix	Adjust Process
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Push In/Push On Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 part	Weekly	SPC Software	Adjust Process
												Retest / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Pull Out / Pull Off Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 part	Weekly	SPC Software	Adjust Process
												Retest / Control of Non-Conforming Product PR-QA-13.1-2
21	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
22	Material Movement		1		Ship Product		Per Shipping Requirements	Visual	Each Skid	Each Shipment Per	Shipping Manifest and ERP System	Notify Supervisor
23	Annual Validation (If Required)		1		Validation of Product		Re-Validation of Product to Customer Requirements	PPAP	Per Customer Requirements	Customer Requireme nts	PPAP Matrix	Control of Non-Conforming Product PR-QA-13.1-2

Initial Process Study

HT Part No. T50R0HIRM4	Customer Part No. 15601571	Part Description T50R STANDARD CABLE TIE	Supplier HellermannTyton
Drawing No. CT2050007CST	Drawing Date 4/15/2020	Drawing Revision 11	
Production Date 9/28/2020	Material UR0HIRHSUV0	Inspection Facility HT-Milwaukee	Inspector Sam Moyer

Study	Sample	Data								
Tensile Min 60 lbs lbf	1-9	91.97	91.30	96.02	85.47	90.96	94.42	86.17	91.64	94.90
	10-18	95.79	90.62	92.72	93.14	91.20	94.54	86.76	95.80	89.67
	19-27	94.24	89.97	90.86	94.36	98.64	100.10	97.46	93.26	96.60
	28-36	98.95	98.12	98.03	94.65	94.97	93.79	90.75	86.79	95.25
	37-45	99.29	91.94	94.76	97.29	89.53	93.58	96.13	94.58	90.70
	46-54	93.27	96.53	87.53	86.40	88.94	93.64	92.83	87.41	89.84
	55-63	91.46	91.87	87.61	87.61	93.02	92.06	93.01	96.90	97.56
	64-72	90.01	95.65	94.67	94.40	96.81	94.73	94.18	92.81	97.06
	73-81	92.58	98.74	97.89	95.64	101.27	95.86	89.40	95.28	97.81
	82-90	94.36	90.89	99.82	87.92	96.21	88.48	96.07	89.24	100.86
	91-99	83.32	93.08	97.94	88.43	95.34	89.97	92.93	94.87	92.55
	100-108	82.48								



Gage R&R USA

Attributes R&R study HellermannTyton

12/6/2019

Event name: Visual Attribute
Entered by: Danielle Oldham
Date: 12/8/2019
Appraisers: 3
Parts: 50
Replications: 3

Cross Tabulation

Marreall * Zanetta Cross Tabul

			Zanetta		Total
			.00	1.00	
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
			Expected count	54.0	96.0

Marreall * Coleman Cross Tabu

			Coleman		Total
			.00	1.00	
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
			Expected count	48.0	102.0

Zanetta * Coleman Cross Tabul

			Coleman		Total
			.00	1.00	
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
			Expected count	48.0	102.0

Marreall * REF Cross Tabulatio

			REF		Total
			.00	1.00	
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
			Expected count	54.0	96.0

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	54
		Expected count	19.4	54.0
	1.00	Count	4	96
		Expected count	34.6	96.0
Total		Count	54	150
		Expected count	54.0	150.0

Coleman * REF Cross Tabulation

		REF		
		.00	1.00	Total
Coleman	.00	Count	45	48
		Expected count	17.3	48.0
	1.00	Count	9	102
		Expected count	36.7	102.0
Total		Count	54	150
		Expected count	54.0	150.0

Kappa values

0.82 - Marreall * Zanetta
0.88 - Marreall * Coleman
0.78 - 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

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

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 = %0.005318 %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	Replicate	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

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	5.398	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	5.578	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

Gage R&R USA

R&R Study Results Using Specifications

1/13/2020

Gage number:	TGM-986	Done by:	Danielle Oldham.
Gage description:	Global Performance 7-10-7	Part name:	133-03809
Gage type:	Coordinate Measuring Machine	Characteristics:	Coordinates
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)/
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Repeatability - Equipment Variation (EV)	
EV = 0.003998833	%EV = 2.3981

Reproducibility - Appraiser Variation (AV)	
AV = 0.003234357	%AV = 1.940614

Repeatability & Reproducibility (R&R)	
R&R = 0.005141589	%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	39.5862	39.5797	39.6401	39.6549	39.7154	39.729	39.5296	39.6751	39.5842
Nick	2	39.6453	39.5866	39.5845	39.6399	39.6637	39.7197	39.7271	39.5268	39.6739	39.5828
Nick	3	39.6507	39.5862	39.5797	39.6401	39.6549	39.7154	39.729	39.5296	39.6751	39.5842
Rob	1	39.6673	39.5885	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	39.6786	39.5953
Rob	3	39.6503	39.5858	39.5931	39.6444	39.659	39.7261	39.732	39.5297	39.6746	39.5946
Tom	1	39.6537	39.5853	39.5848	39.6429	39.6734	39.7182	39.7288	39.5289	39.6712	39.5925
Tom	2	39.6466	39.5896	39.5833	39.66	39.6698	39.7201	39.7316	39.5256	39.6806	39.5973
Tom	3	39.6366	39.5855	39.5807	39.6448	39.6654	39.7238	39.7159	39.5274	39.6727	39.5866

Gage R&R USA

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 Cts	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	Replicate	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

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	3.0282	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

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 Scanner
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 = 0.007279897 %R&R = 4.367818

Part Variation (PV)
 PV = 0.1665076 %PV = 99.90456

Specification Spread (USL-LSL)/
 (USL - LSL) = 0.166667

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

