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.: **91626** with submission date 21.05.2021 will be considered as complete and valid automatically on **20.06.2021** unless otherwise disposed!

HellermannTyton | HellermannTyton GmbH internal remarks: | PB-No.: **91626**
Part Describtion: T50ROSSBXL6U-SET GPN 140972

Part Submission Warrant

Part Name **T50ROSSBXL6U-SET** Cust. Part Number **FU5T-14E047-DA**
Shown on Drawing No. **14-0972-101-CSU** Org. Part Number **15602604**
Engineering Change Level **00.3** Dated **31.10.2007**
Additional Engineering Changes **n/a** Dated **n/a**
Safety and/or Government Regulation ☐ Yes ☑ No Purchase Order No. **15602604** Weight (kg) **0,0043**
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 **25436** **Germany**
City Region 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: **808316501**

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-May-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)

Production Part Approval, Performance Test Results

HellermannTyton

Internal PB-No.: **91626**

Production Part Approval
Performance Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14E047-DA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSSBXL6U-SET**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	00.3 31.10.2007
*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
1	**Bundle range**	**4 to 50**			**Suitable for bundle range 4,0 to 50,0 mm**	✓	

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-May-21

Production Part Approval, Material Test Results

HellermannTyton

Internal PB-No.: **91626**

Production Part Approval
Material Test Results

ORGANIZATION: **HellermannTyton GmbH**	PART NUMBER: **FU5T-14E047-DA**
SUPPLIER/VENDOR CODE: **DUNS: 315430892**	PART NAME: **T50ROSSBXL6U-SET**
MATERIAL SUPPLIER:	DESIGN RECORD CHANGE LEVEL: 00.3 31.10.2007
*CUSTOMER SPECIFIED SUPPLIER/VENDOR	ENGINEERING CHANGE DOCUMENTS:
*If source approval is req`d, include the Supplier (Source) Customer assigned code.	NAME of LABORATORY:

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
						☐	☐
	Cable tie:					☐	☐
2	**PA66HIRHSUV**				**Material is PA66HIRHS**	☑	☐
3	**Color: black**				**Color of Material is black**	☑	☐
						☐	☐
	Mount					☐	☐
4	**CELCON M90**				**Material is Celcon M90**	☑	☐
5	**Color: Black**				**Color of material is black**	☑	☐
						☐	☐
						☐	☐
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Blanket statements of conformance are unacceptable for any test results.

This letter is done automatically and is valid without signature.

CREATOR	TITLE	DATE
i.A. N. Lohse	Quality Assistant	21-May-21

PM 013
S
14/4

ASCEND
PERFORMANCE MATERIALS

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

ASCEND PERFORMANCE MATERIAL (SINGAPORE)
1 MARINA BOULEVARD 28-00

Container ID: TGHU6170450

Certificate Date: 09-FEB-21
Delivery No: 0860141613
Shipped Qty: 6,613.757 Lbs
(3,000.000 Kgs)
Customer P.O. No: 4300034986

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.

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: ASTM D6779 PA0121, ASTM D4066 PA0121, ASTM D4000 PA012, GMP.PA66.018, WSK-M4D648A, MSDB 41 CPN 1076, MSDB 41 CPN 1899, MSDB 41 CPN 3490, ESF-M4D82-A, CMP NY057 AA, J1639 PA0121, FMVSS 302*, GMW 16036P-PA66, Ford WQ 100A.

Material Type: VYDYNE 22HSP BK **Material No:** 10397771 **Batch No** JA31VY06 **Date of Mfg** 31-JAN-2021

Ascend Performance Materials Operations LLC Specification

Lot Data

Property	Test Method	Min	Max	Result	Units
Relative Visc.	ASTM D 789	45.0	48.0	46.0	N/A
VISCOSITY NUM. SULFURIC	ISO 307	136.9	142.8	139.0	ml/g
Moisture	ASTM D6869	0.12	0.20	0.18	%
Strength @ Yld	ISO 527 1-2	78	98	85	MPa
Notched Izod	ISO 180 / 1A	3.5	8.0	3.9	kJ/m^2

ACCEPT

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.

HellermannTyton

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 Fotter

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	RPN	Recommended Action	Responsibility & Target Completion Date	Action Results: Actions Taken Completion Date	Severity	Occurrence	Detection	RPN
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 production	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 Mositure test freq.	Maintenance - 3/4/13 Mike Wendt - 830/13	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	Matterial ID added to WO, New process for stickers on Material	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 P-PM	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 Gauges	5	2	5	50

HellermannTyton

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

FMEA Number: **MFMEA 62**

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Core Team:	Quality Assurance, Manufacturing, Automation, Receiving-Shipping				Rev. Level: See Fotter

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				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
		Shorts	Part Non-Compliance/Cosmetic/Low Extraction Force	6		Insufficient Injection Pressure compatibility of Press / mold	3	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	144	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	72
				3		Plugged/Warn Vents	4	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule P-PM	7	84	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	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 Gauges	3	1	5	15
		Flash	Part Non-Compliance / Cosmetic / High Insertion Force	3		Excessive Injection Pressure	4	D- Visual Inspections P - First Piece Approvals P - In Process PM's	4	48	None						0
				3		Incorrect Tonnage	4	D- Visual Inspections P - First Piece Approvals P - In Process PM's	4	48	None						0
		Mold Mismatch	Parting Line Flash	6		Poor Mold Alignment	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In Process PM	8	96	None						0
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In Process PM	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 P - In Process PM	4	72	None						0
				6		Thermolator Malfunction	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In Process PM	8	96	Add audible warning	Manit. - 9/13	Audible alarms added to all thermalators to detect temp. dev.	6	2	3	36
				6		Fast Cycle Time	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In Process PM	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

HellermannTyton

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 Fotter

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	RPN	Recommended Action	Responsibility & Target Completion Date	Action Results: Actions Taken Completion Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
		Incorrect Blending	Part Non-Compliance / and Color Match Failures	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	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
				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 Melt Filters on Nozzle	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 D - Process 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 Personnel	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 Schultz - 5-14	- Electroinic shift log - Supervisor CheckList	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

HellermannTyton

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 Fotter

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	RPN	Recommended Action	Responsibility & Target Completion Date	Action Results: Actions Taken Completion Date	Severity	Occurrence	Detection	RPN
				3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Box and Package Inspection log P - LPA	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections P - LPA	7	84	None						0
				3		Wrong label provided	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	8	96	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
		Incorrect Component Parts	Part Non-Compliance	6		Wrong component parts brought to press	2	D/P - Visual to Work Order	8	96	- Improved Proecdure	- John Gleason - 7/14 - Mike Wendt/Gary Schultz - 5-14	- Electroinic 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 (Body)	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 Personnel.	7	42	None						0
21-22	Ship product per	Shipped Incorrectly	Customer Dissatisfaction	5		Damaged Shipment	2	D - Visual Inspection P - Skid Wrap	8	80	None						0

HellermannTyton

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 Fotter

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	RPN	Recommended Action	Responsibility & Target Completion Date	Action Results: Actions Taken Completion Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
21-22 Shipping	specifications to warehouse			5		Customer Specific Requirements Not Met	2	D - Visual Inspection D/P - Final Inspection	8	80	None						0
23 Annual Validation (If Needed)	Meet Cutstomer 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:	Cable Tie	Program Name:	Cable Ties
HT Dwg.# and Rev:	Various	Created By:	Gwendolyn Benz
Customer P/N and Rev:	Various	Creation Date:	03/11/94
Customer Name:	Various		

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Operational Description:	Special Characteristics / Descriptions	Control Methods
1	■				Incoming Receiving QA Receives C of A from Raw Material Supplier	C of A	ERP system
2	■				Incoming Receiving Receive in Raw Materials From Suppliers	Quality Approval of Material	ERP system
3				☒	Incoming Receiving Shipping and Receiving Inspects Raw Material	Review Container, Packaging, Lot Numbers and Quantity of Material	ERP system
4				☒	Incoming Receiving 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 Movement	Store Raw Materials until needed	FIFO By Lot
7		◆			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
8	■				Material Ratio	Verify Correct Material	Material Process Log F-PRD-8.1-4
9	■				Molding Machine Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-9.6-1
10				☒	First Piece Approval QA Completes (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	First Piece Acceptance F-QA-10.3-5
11	■				First Piece Approval	Hang First Piece	Visual At Press
12				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
13	■				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
14				☒	In Process Checks (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	Per Control Plan
15				☒	Packaging	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
16				☒	Visual Appearance	Check Ties for Visual Defects	

PROCESS FLOW DIAGRAM

Part Description:	Cable Tie	Program Name:	Cable Ties
HT Dwg.# and Rev:	Various	Created By:	Gwendolyn Benz
Customer P/N and Rev:	Various	Creation Date:	03/11/94
Customer Name:	Various		

	Process ■ "n"	Move ◆ "u"	Store ● "l"	Inspect ☒ "x"	Operational Description:	Special Characteristics / Descriptions	Control Methods
17				☒	Final and Live Inspection	Quality Approval of Final Product	F-QA-10.4-21/ Share Point
18				☒	QA Testing	Verify Daily Testing Has Been Completed	Per Control Plan
19				☒	QA Testing	Verify Weekly Testing Has Been Completed	Per Control Plan
20		◆			Material Movement	Move Skid To Shipping Dock	ERP System
21		◆			Material Movement	Ship Product to Warehouse	Shipping Manifest ERP System
22				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

PROCESS FLOW DIAGRAM

Part Description:	Customary Clips/Mounts-Unassembled	Program Name:	N/A
HT Dwg.# and Rev:	Various	Created By:	Chris Burbank
Customer P/N and Rev:	Various	Creation Date:	09/01/09
Customer	Various		

	Process ■ "n"	Move ◆ "u"	Store ● "l"	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
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

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☐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.	PRODUCT	PROCESS	Special Char. Class	METHODS Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE Size	Freq	Control Method	Reaction Plan
1-4	Incoming Receiving		1	Material Characteristics			Per Certificate of Analysis DTL/D of FMVSS302	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 meet 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 moisutres in Silo Materials		Perform Moistures per TS-WI-MAX400XL	Computrac Max 4000XL	1 Sample/Material	Daily	Moisure 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 According to S-PRD 9.1-19 / 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	Molding Machine Set-up	Injection Molding Machine	1		Machine Set-Up		Per Mattec, Set-Up Sheet, and Acceptable Visual Part and Hand Insertion	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
		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 Isolation PR-QA-13.1-2
10-11	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Adjust Process Retest / Control of Non-Conforming Product 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	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2

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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		
	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	Control of Non-Conforming Product PR-QA-13.1-2
12	Validation Testing	Injection Molding Machine	1	Push In / Push On Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Initial 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 Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Dimensional			Perform Dimensional on the Part	Calibrated Gages per Dimensional Study	1 shot	At Initial 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 Initial 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 Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
13	Work Order Set-Up TEAM SUPERVISOR or MOLD TECH	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 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 PR-QA-13.1-2 (if applicable)
14	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	Twice 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 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 PR-QA-13.1-2
		Injection Molding Machine	3	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, 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 PR-QA-13.1-2
15-16	Packaging Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Ties for Visual Defects	Visual	1 Shot	Per Hour	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding						Hand Insertion Process		Per Hour for molds under 38 cavities,	Inspection Label (Initialed and	Notify Supervisor, Processing Tech and QA

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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.	PRODUCT	PROCESS	Special Char. Class	METHODS Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE Size	Freq	Control Method	Reaction Plan
		Injection Molding Machine	2	Hand Insertions			No Hard Insertions	Inspection Check per WI-QA-10..3-2	1 Shot	Every Other Hour for cavitation over 38	Dated) / Share Point or F-PRD-1.1	Recheck / Control of Non-Conforming Product 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 PR-QA-13.1-2
		Waters in Bag	4	Amount of Water Added Per Bag			Per Work Order	Scale WI-PRD-10.3-1	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 PR-QA-13.1-2
		Date Code	5	Date Code Stamp			Bag and Box Must Have Correct Data 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 PR-QA-13.1-2
		Labels	6	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	2 Checks	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 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 PR-QA-13.1-2
		Scale / Conveyor Check	8	Scale / Conveyor Verification for Count			Verify Scale is Couting Correctly / Conveyor has correct number of parts	Using Scales to Package Product WI-PRD-16 or Hand Count	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 PR-QA-13.1-2
17	Final Inspection at the Cell	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	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
		Labeles	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
		Labeles	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	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	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
		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
18	QA Daily Testing	Injection Molding Machine	1	QA Lab Tech Hand Insertion			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	Daily	Weekly Matrix F-QA-10.3-8	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Daily	Weekly Matrix F-QA-10.3-8	Adjust Process Retest / Control of Non-Conforming Product 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	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
19	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	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Monitor Tensile Strength			Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester	1 Shot	Weekly	SPC Software	Adjust Process Retest / Control of Non-Conforming Product 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	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
20	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
21	Material Movement		1		Ship Product to Warehouse		Per Shipping Requirements	Visual	Each Skid	Each Shipment	Shipping Manifest and ERP System	Notify Supervisor
22	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 PR-QA-13.1-2

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	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
1-4 Incoming Receiving	Cert matches material and P.O. request	Unacceptable Moisture Levels	Cannot Manufacture	5	PTC	Shipping Damage	2	D - Incoming Inspection P - Material Certs	8	80	None						0
				5	PTC	Material received with moisture too high/low	2	D - Incoming Inspection P - Material Certs	8	80	None						0
		Improperly labeled	Delay in Manufacturing	4		Material received with wrong/missing label	2	D - Incoming Inspection P - Material Certs	8	64	None						0
5-8 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
9 Molding Machine 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
				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	5	60	None						0
10 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
		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
				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
				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
		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
11 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
12 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

13-16 Packaging and Automation	Package product per customers specifications	Incorrect or Missing Date Code on the Bag/Box	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	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	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						
						Automated Degator Jams	3	D- Visual Inspection D - Process Inspection P - PM P- Degater Alarm	4	60	None						
						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						
		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	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	6	36	None						
		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
				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	Customer Dissatisfaction	4		Bag register mark Inconsistencies	2	P/D - Visual Inspection	8	64	None						0

		Hole		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
		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 from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	None						0
17 Final and Live Inspection	Product conforms per specifications after production run.	Bad Product Shipped	Customer Dissatisfaction	8		Inspection Not Performed by QA	1	D/P - Final and Live Inspection	1	8	None						0
				7		Bad Product not Found in Random Sampling	2	D /P- Final and Live Inspection	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						
18-19 QA Testing	Validation and documentation of product per specifications	Daily Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix, First Piece Acceptance. P- Daily Production Meeting	3	18	None						0
		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
20-21 Material Movement Shipping	Ship Product per Specifications to Warehoues	Shipped Incorrectly	Customer Dissatifaction	5		Late Shipment	2	D - Visual Inspection D - Final Inspection	8	80	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
22 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

☐ 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	
									Size	Freq		
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

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		
			4	Capability Study			Per Drawing/SQCPack File	Calibrated Gages	100pcs	At Capability	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
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

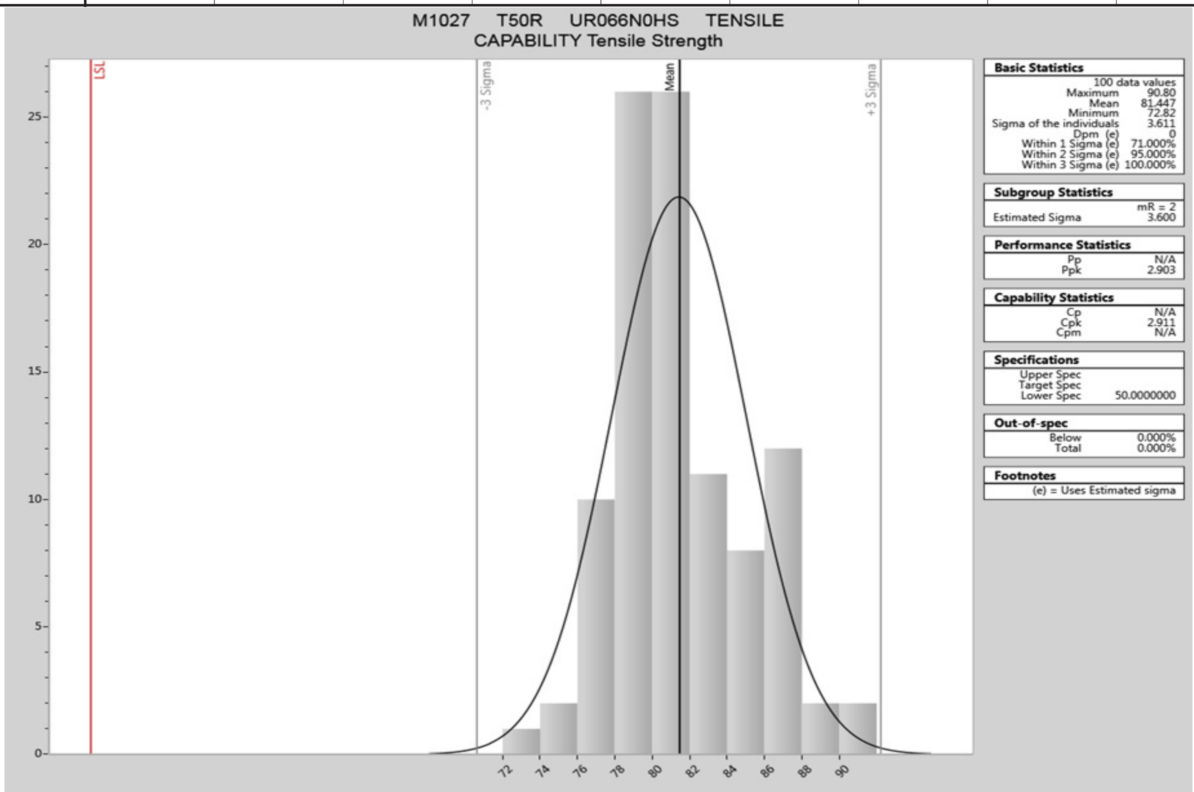
Quality Assurance		Team Supervisor	Material Handler			Mold Technician		Operator		QA and/or Team Supervisor		Shipping/Receiving/PIC
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE: Size	SIZE: Freq	Control Method	
		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
		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	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	Per Customer Requirements	PPAP Matrix	Control of Non-Conforming Product PR-QA-13.1-2

HellermannTyton

Initial Process Study

Part No.	Part Description		Supplier
T50R0HIRM4	T50R Standard Cable Tie		HellermannTyton
Drawing No.	**Drawing Date**	**Drawing Revision**	**Inspection Facility**
CT2050007CST	4/15/2015	11	HT-Milwaukee
Production Date	**Material**	**Tool No.**	**Inspector**
12/5/2018	UR0HIRHSUV0	M1027	DC

DATA	Tensile Strength (lbs)								
1-9	102.80	108.89	107.28	105.82	105.44	99.44	105.81	106.22	99.19
10-18	97.66	97.63	93.70	100.90	102.79	113.79	106.68	101.89	102.17
19-27	99.20	99.16	99.64	98.75	96.57	100.11	98.79	99.72	100.04
28-36	105.65	93.49	99.53	99.49	98.41	101.14	103.85	98.55	107.11
37-45	90.27	91.44	104.90	101.94	102.93	100.68	99.28	99.86	100.47
46-54	99.38	100.93	100.52	99.89	96.03	94.99	101.44	101.29	100.29
55-63	100.16	105.28	107.39	104.32	99.23	104.62	95.73	96.68	108.64
64-72	101.94	98.63	99.71	96.61	106.49	99.94	96.40	104.09	91.51
73-81	101.34	103.52	100.39	100.08	103.16	101.63	102.30	102.27	106.02
82-90	99.52	102.86	101.54	103.53	102.36	103.75	100.01	100.59	98.00
91-99	104.18	95.84	103.24	101.92	99.66	102.42	103.24	101.36	101.92
100-108	104.11								

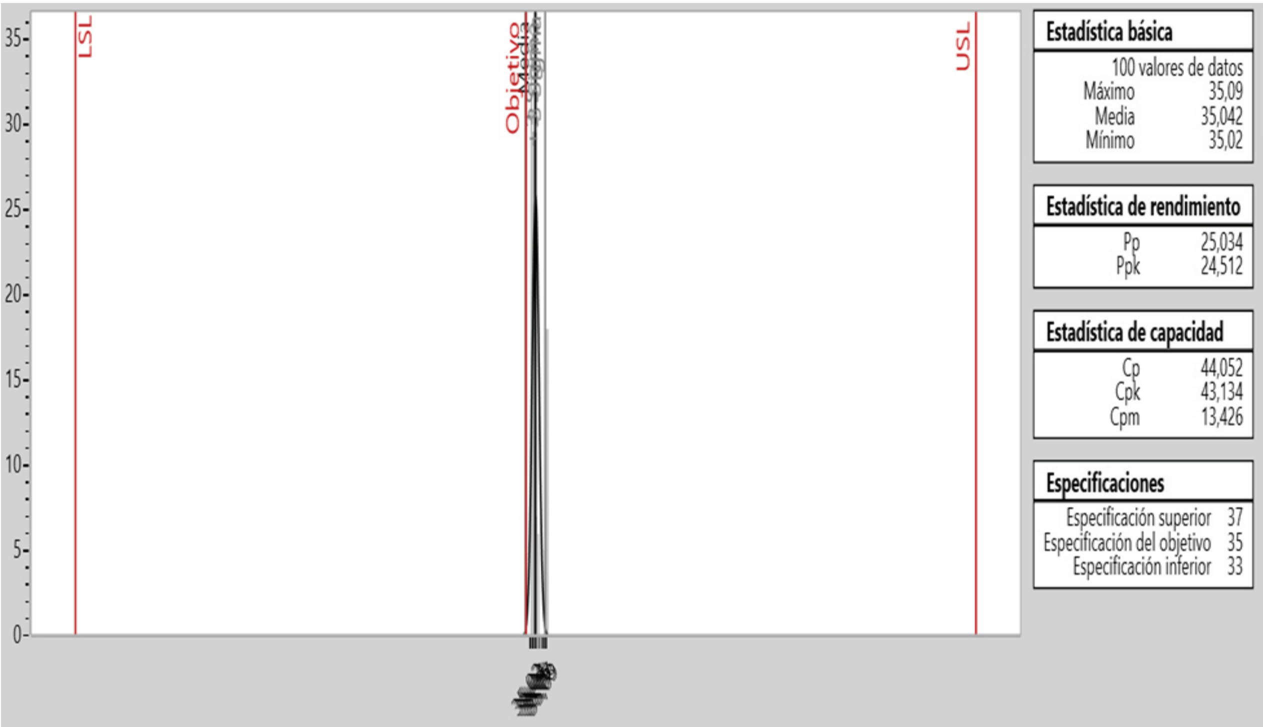


HellermannTyton

Initial Process Study

Part No.	Part Description	Supplier	
151-02743	SBXL6U	HellermannTyton	
Drawing No. 14-0972-001-CSU	Drawing Date 9/2/2018	Drawing Revision 0.3	Inspection Facility HT-Monterrey
Production Date 1/29/2019	Material URACETAL9	Tool No. M1122	Inspector Miguel Martínez

DATA	35 +/- 2 mm								
1-9	35.03	35.02	35.03	35.08	35.09	35.09	35.03	35.02	35.03
10-18	35.03	35.02	35.02	35.03	35.04	35.05	35.02	35.02	35.03
19-27	35.09	35.09	35.09	35.03	35.02	35.02	35.08	35.09	35.09
28-36	35.03	35.02	35.03	35.03	35.02	35.02	35.03	35.04	35.05
37-45	35.03	35.02	35.02	35.03	35.04	35.05	35.02	35.02	35.03
46-54	35.09	35.09	35.09	35.03	35.02	35.03	35.03	35.02	35.02
55-63	35.02	35.02	35.03	35.09	35.09	35.09	35.03	35.02	35.02
64-72	35.08	35.02	35.02	35.03	35.04	35.05	35.03	35.02	35.02
73-81	35.03	35.04	35.02	35.03	35.09	35.09	35.09	35.03	35.02
82-90	35.02	35.08	35.09	35.09	35.03	35.02	35.08	35.02	35.02
91-99	35.03	35.04	35.05	35.03	35.02	35.02	35.03	35.04	35.05
100-108	35.02								



R&R Study Results Using Specifications

2/1/2018

Gage number:	TGM-628	Done by:	Donna Szczepanski
Gage description:	Scale	Part name:	151-01314
Gage type:	Scale	Characteristics:	weight
Study name:	Anova Gage R & R	Specifications:	LSL=2.4 Nominal=2.5 USL=2.6
Study date:	01/26/2018	Number of Distinct Categories:	116.6139

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 = 0.0003189476 | %EV = 0.9568438

Reproducibility - Appraiser Variation (AV)
AV = 0.0002463516 | %AV = 0.7390556

Repeatability & Reproducibility (R&R)
R&R = 0.0004030096 | %R&R = 1.20903

Part Variation (PV)
PV = 0.03333087 | %PV = 99.99269

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.0333333

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Donna	1	2.5679	2.568	2.5509	2.5709	2.5694	2.5403	2.5431	2.5706	2.5698	2.5382
Donna	2	2.568	2.5682	2.5511	2.5709	2.5683	2.5409	2.5431	2.5703	2.5696	2.5384
Donna	3	2.5671	2.5688	2.5511	2.5708	2.5691	2.5406	2.5436	2.5705	2.5698	2.5388
Taleala	1	2.5671	2.5677	2.551	2.5708	2.569	2.5406	2.5434	2.5696	2.57	2.5385
Taleala	2	2.5678	2.5682	2.5512	2.5711	2.569	2.5409	2.543	2.5705	2.5698	2.5385
Taleala	3	2.5676	2.5685	2.5513	2.5712	2.5695	2.5403	2.5433	2.5707	2.57	2.5387
Rob	1	2.568	2.5687	2.5516	2.5703	2.5691	2.5408	2.5438	2.5709	2.5698	2.5387
Rob	2	2.5685	2.5689	2.5519	2.5716	2.5698	2.5416	2.5436	2.5708	2.5701	2.539
Rob	3	2.5681	2.5691	2.5514	2.5715	2.5698	2.5415	2.5439	2.5705	2.5703	2.539

R&R Study Results
Using Specifications

2/6/2018

Gage number:	TGM-537	Done by:	QA_Admin
Gage description:	Digital Indicator	Part name:	T50R0
Gage type:	Indicator	Characteristics:	Head Height
Study name:	ANOVA Scale R&R	Specifications:	LSL=5.3 Nominal=5.9 USL=6.5
Study date:	01/15/2018	Number of Distinct Categories:	80.32957

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 = 0.003347164	%EV = 1.673582
Reproducibility - Appraiser Variation (AV) AV = 0.001056678	%AV = 0.528339
Repeatability & Reproducibility (R&R) R&R = 0.003509997	%R&R = 1.754999
Part Variation (PV) PV = 0.1999692	%PV = 99.9846

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.2

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Taleala	1	5.74	5.74	5.72	5.75	5.72	5.77	5.74	5.75	5.74	5.72
Taleala	2	5.73	5.74	5.73	5.75	5.72	5.78	5.75	5.75	5.74	5.72
Taleala	3	5.74	5.74	5.73	5.75	5.72	5.77	5.75	5.76	5.75	5.72
Felicia	1	5.73	5.74	5.72	5.74	5.72	5.77	5.74	5.75	5.74	5.72
Felicia	2	5.74	5.74	5.73	5.74	5.73	5.78	5.74	5.75	5.74	5.73
Felicia	3	5.73	5.74	5.72	5.74	5.72	5.77	5.74	5.75	5.74	5.72
Joyce	1	5.74	5.74	5.72	5.74	5.72	5.77	5.74	5.76	5.74	5.73
Joyce	2	5.73	5.74	5.73	5.74	5.72	5.78	5.74	5.75	5.74	5.72
Joyce	3	5.73	5.74	5.72	5.74	5.72	5.77	5.74	5.75	5.75	5.72

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Gage R&R

R&R Study Results Using Specifications

2/6/2018

Gage number:	TGM-760	Done by:	QA_Admin
Gage description:	Micro-Vu	Part name:	T50R0
Gage type:	Micro-Vu	Characteristics:	Length
Study name:	Anova Gage RR	Specifications:	LSL=196 Nominal=202 USL=208
Study date:	01/12/2018	Number of Distinct Categories:	1633.901

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 = 0.0009959223 | %EV = 0.04979611

Reproducibility - Appraiser Variation (AV)
AV = 0.0014096 | %AV = 0.07048

Repeatability & Reproducibility (R&R)
R&R = 0.00172593 | %R&R = 0.08629649

Part Variation (PV)
PV = 1.999999 | %PV = 99.99996

Specification Spread (USL-LSL)/
(USL - LSL)/ = 2

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Barry	1	197.9685	197.9134	197.8128	197.828	197.7084	197.8157	198.0724	197.6714	197.9272	198.0251
Barry	2	197.9657	197.911	197.8131	197.8262	197.7127	197.8153	198.0736	197.6719	197.9272	198.0263
Barry	3	197.9667	197.9111	197.813	197.8269	197.7125	197.8127	198.0763	197.6731	197.9272	198.0271
Donna	1	197.967	197.9108	197.814	197.8282	197.7128	197.812	198.0751	197.6749	197.9277	198.027
Donna	2	197.9677	197.9099	197.8139	197.8273	197.7106	197.812	198.075	197.6779	197.9287	198.0277
Donna	3	197.9681	197.9096	197.8153	197.8279	197.7139	197.8135	198.0746	197.6779	197.9293	198.0279
Taleala	1	197.968	197.9102	197.8166	197.8304	197.7147	197.815	198.0754	197.6788	197.9295	198.028
Taleala	2	197.9682	197.9109	197.8174	197.8319	197.7153	197.8154	198.0754	197.6809	197.9286	198.0289
Taleala	3	197.9692	197.9101	197.818	197.8307	197.7154	197.8145	198.076	197.6801	197.9315	198.0289

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R&R Study Results Using Specifications

1/31/2018

Gage number:	TGM-966	Done by:	Donna Szczepanski
Gage description:	Global Performance 7-10-7	Part name:	133-01339
Gage type:	Coordinate Measuring Machine	Characteristics:	
Study name:	Anova Gage R & R	Specifications:	LSL=193.77 Nominal=194.47 USL=195.17
Study date:	01/26/2018	Number of Distinct Categories:	15.66439

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 = 0.01851334	%EV = 7.934321
Reproducibility - Appraiser Variation (AV) AV = 0.009738355	%AV = 4.173599
Repeatability & Reproducibility (R&R) R&R = 0.02091839	%R&R = 8.965065
Part Variation (PV) PV = 0.2323928	%PV = 99.59733

Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.2333323

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Tom	1	184.2818	184.3054	184.2134	184.3446	184.2817	184.4099	184.1092	184.3943	184.5566	184.5174
Tom	2	184.311	184.2812	184.2398	184.3407	184.2711	184.4173	184.092	184.3912	184.5438	184.5198
Tom	3	184.2663	184.2774	184.2218	184.3436	184.2964	184.4163	184.1053	184.4084	184.5551	184.5127
Dave	1	184.2344	184.305	184.1868	184.3155	184.2766	184.3772	184.0993	184.4225	184.5465	184.5188
Dave	2	184.2632	184.2456	184.2533	184.3096	184.2957	184.4001	184.0926	184.3564	184.5102	184.4883
Dave	3	184.2346	184.2579	184.2209	184.2919	184.2628	184.3929	184.1042	184.3468	184.5107	184.5146
Rob	1	184.2706	184.2944	184.2427	184.3427	184.2969	184.3777	184.1079	184.3828	184.5559	184.506
Rob	2	184.3106	184.3253	184.188	184.3414	184.2729	184.3944	184.0905	184.392	184.5135	184.5014
Rob	3	184.2378	184.3008	184.2495	184.3303	184.273	184.3649	184.0979	184.351	184.5271	184.4758

Gage R&R

R&R Study Results Using Specifications

10/18/2018

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:	10/12/2018	Number of Distinct Cate	44.97344

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 = 0.2463085	%EV = 1.944541
Reproducibility - Appraiser Variation (AV) AV = 0.3112622	%AV = 2.457333
Repeatability & Reproducibility (R&R) R&R = 0.3969283	%R&R = 3.133644
Part Variation (PV) PV = 12.66045	%PV = 99.95089

Specification Spread (USL-LSL)/
(USL - LSL)/ = 12.66667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Danielle	1	150.2	145.32	157.82	157.02	151.69	159.67	153.49	162.61	158.38	150.2
Danielle	2	150.48	145.41	157.47	156.7	152.26	160.25	153.02	162.53	158.28	149.73
Danielle	3	150.45	145.48	158.04	157.07	151.28	159.25	153.43	162.81	158.62	150.36
Zanetta	1	150.9	146.26	157.42	154.45	151.45	159.34	152.81	161.61	158.15	149.28
Zanetta	2	150.86	146.51	157.19	154.13	152.36	159.36	152.36	161.49	158.04	149.04
Zanetta	3	150.91	146.39	157.25	154.02	151.45	159.45	152.98	161.71	158.22	149.73
Mareall	1	151.15	147.82	157.09	154	152.07	159.25	152.24	161.05	158.13	148.69
Mareall	2	151.13	147.59	157.19	153.84	151.58	158.99	152.15	161.02	158.05	148.95
Mareall	3	151.22	147.99	157.02	153.52	152.05	158.8	151.99	160.53	158.04	148.15

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Gage R&R

R&R Study Results
Using Specifications

2/6/2018

Gage number:	TGM-918	Done by:	Donna Szczeparski
Gage description:	Caliper	Part name:	151-01314
Gage type:	Caliper	Characteristics:	Width
Study name:	Anova Gage R & R	Specifications:	LSL=22.15 Nominal=23.15 USL=24.15
Study date:	01/26/2018	Number of Distinct Categories:	76.27592

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 = 0.006103516 — %EV = 1.831055

Reproducibility - Appraiser Variation (AV)
AV = 0.0008380898 — %AV = 0.2514269

Repeatability & Reproducibility (R&R)
R&R = 0.006160787 — %R&R = 1.848236

Part Variation (PV)
PV = 0.3332764 — %PV = 99.98293

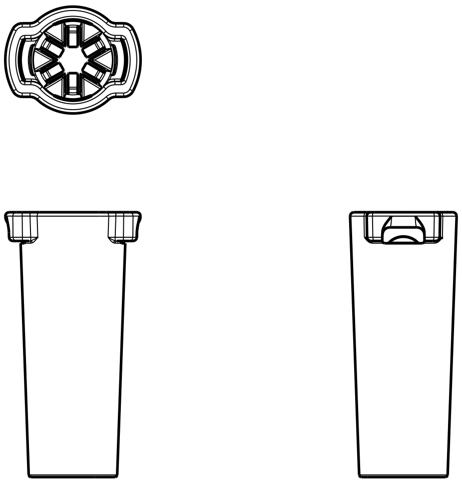
Specification Spread (USL-LSL)/
(USL - LSL)/ = 0.3333333

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Donna	1	23.15	23.18	23.23	23.22	23.21	23.22	23.19	23.21	23.19	23.19
Donna	2	23.14	23.17	23.22	23.21	23.19	23.23	23.18	23.22	23.18	23.18
Donna	3	23.15	23.17	23.22	23.22	23.2	23.23	23.18	23.22	23.18	23.18
Taleala	1	23.15	23.17	23.21	23.21	23.21	23.22	23.17	23.22	23.18	23.18
Taleala	2	23.15	23.18	23.2	23.22	23.2	23.23	23.19	23.21	23.18	23.18
Taleala	3	23.14	23.17	23.21	23.21	23.2	23.22	23.19	23.21	23.19	23.18
Rob	1	23.15	23.17	23.22	23.22	23.21	23.23	23.19	23.21	23.19	23.18
Rob	2	23.16	23.18	23.21	23.22	23.2	23.23	23.19	23.2	23.18	23.18
Rob	3	23.16	23.17	23.22	23.22	23.2	23.21	23.17	23.21	23.19	23.18

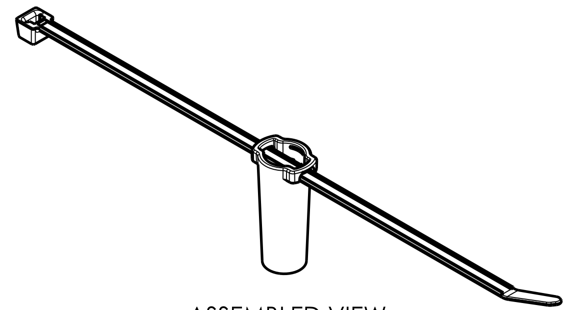
HellermannTyton

CATIA V5

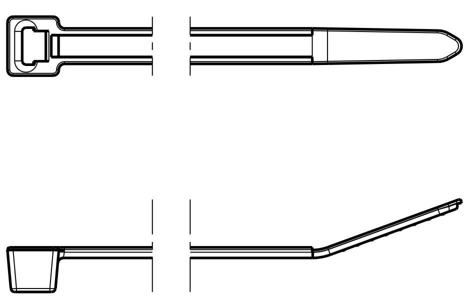
Revision Level			Revision Record	Changed	Date	Approved	Date
Drawing	State	Part					
00.0	Design Release	-	SEE ECN# 014646	HDC	01/14/19	NHK	01/14/19



SBXL6U
DELIVERY CONDITION: UNASSEMBLED SET



ASSEMBLED VIEW
FOR REFERENCE ONLY
SCALE 1:2



T50R
DELIVERY CONDITION: UNASSEMBLED SET

GLOBAL PART DESCRIPTION	BUNDLE RANGE (1)	CABLE TIES			MOUNT		
		DRAWING	MATERIAL (2)	COLOR (3)	DRAWING	MATERIAL (4)	COLOR (5)
T50RSBXL6U-SET-PA66HIRHSUV/POM-BK	4 TO 50	CT2050007CST	PA66HIRHSUV	BLACK	14-0972-001-CSU	CELCON M90	BLACK

Material: SEE CHART COLOR: SEE CHART	Units: millimeters Tolerance defined on each dimension	Drawn: HDC 11/09/18 Approved: NHK 11/09/18	Article/Type-No: T50RSBXL6USET
			Title: 6mm STUD MOUNT 35mm LONG w/ T50R
			Drawing-No: **14-0972-101-CSU** — PRODUCTION : Phase
Scale: 1:1	Project Number: 14-0972	Format: AH	Sheet: 1/1

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