HellermannTyton | HellermannTyton GmbH internal remarks: | PB-No.: **66961**
Part Describtion: T50ROSFTOVALR GPN 11-0741

Part Submission Warrant

Part Name **RET WIR HRNS TIE STRAP** | Cust. Part Number **GU5T-14E047-DA** / **GU5T-14E047-DA**
Shown on Drawing No. **GU5T-14E047-DA** | Org. Part Number **157-00232**
Engineering Change Level **AELE-E-12982958-091** | Dated **20151110**
Additional Engineering Changes **n/a** | Dated **n/a**
Safety and/or Government Regulation ☐ Yes ☑ No | Purchase Order No. **157-00232** | Weight (kg) **0,0023**
Checking Aid No. **n/a** | Checking Aid Engineering Change Level **n/a** | Dated **n/a**

ORGANIZATION MANUFACTURING INFORMATION

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

Großer Moorweg 45
Street Address

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

Production Location: USA

CUSTOMER SUBMITTAL INFORMATION

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

Gulçin Akbaş
Buyer/Buyer Code

Ford
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☑ Yes ☐ No ☐ n/a
Submitted by IMDS or other customer format: **ID: 634472488**

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: "We hereby affirm that our production rate is able to fulfill customer demands"

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a
Organization Authorized Signature **i.A.** Stefan Fölster | Date 4-Dec-18
Print Name **I.A. S. Fölster** | Phone No. +49 4122 701 5722 | Fax No. +49 4122 701 241
Title **Quality Assistant** | E-mail stefan.foelster@hellermanntyton.de

FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other
Customer Signature | Date
Print Name | Customer Tracking Number (optional)

Production Part Approval, Dimensional Results

HellermannTyton

Internal PB-No.: **66961**

Production Part Approval
Dimensional Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**GU5T-14E047-DA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**RET WIR HRNS TIE STRAP**
INSPECTION FACILITY:	**QS Laboratory**	DESIGN RECORD CHANGE LEVEL:	12982958-091 20151110
		ENGINEERING CHANGE DOCUMENTS:	

ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK
					mean	**min**	**max**		
1	**219**	**± 6**			**220**	**220**	**222**	☑	☐
2	**5,1**	**± 0,2**			**5,2**	**5,1**	**5,2**	☑	☐
3	**1,5**	**± 0,2**			**1,5**	**1,5**	**1,5**	☑	☐
								☐	☐
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Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
i.A. S. Fölster	Quality Assistant	4-Dec-18

Production Part Approval, Material Test Results

HellermannTyton

Internal PB-No.: **66961**

Production Part Approval
Material Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**GU5T-14E047-DA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**RET WIR HRNS TIE STRAP**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	12982958-091 20151110
*CUSTOMER SPECIFIED SUPPLIER/VENDOR CODE:		ENGINEERING CHANGE DOCUMENTS:	
*If source approval is req`d, include the Supplier (Source) Customer assigned code.		NAME of LABORATORY:	

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
						☐	☐
4	**Part must comply with restricted**				**Part complies with restricted**	☑	☐
	substance management standard				**substance management standard**	☐	☐
	WSS-M99P9999-A1 to safeguard				**WSS-M99P9999-A1 to safeguard**	☐	☐
	health, safety and the environment				**health, safety and the environment**	☐	☐
						☐	☐
	Material:					☐	☐
5	**Nylon 6/6 (WSS-M4D706-B1),**				**Material is Nylon 6/6 black according**	☑	☐
	Color: Black				**to WSS-M4D706-B1**	☐	☐
						☐	☐
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Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
Stefan Fölster i.A. S. Fölster	Quality Assistant	4-Dec-18

Production Part Approval, Performance Test Results

HellermannTyton

Internal PB-No.: **66961**

Production Part Approval
Performance Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**GU5T-14E047-DA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**RET WIR HRNS TIE STRAP**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	12982958-091 20151110
*CUSTOMER SPECIFIED SUPPLIER/VENDOR CODE:		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
								☐	☐
	Reference:							☐	☐
	Performance requirements at dry							☐	☐
	as molded:							☐	☐
6	**Fir tree push in force:**				**mean**	**min.**	**max.**	☐	☐
	45 newtons (10 lbs) max in an oval				**5 lbs**	**4 lbs**	**5 lbs**	☑	☐
	hole that is 6.5mm (+/-0.40) x							☐	☐
	12.5mm (+/-0.40) and a sheet metal							☐	☐
	thickness of 1.8mm (+/-1.0)							☐	☐
								☐	☐
7	**Fir treepull out force:**				**mean**	**min.**	**max.**	☐	☐
	110 newtons (25 lbs) min in an oval				**58 lbs**	**43**	**68 lbs**	☑	☐
	hole that is 6.5mm (+/-0.40) x							☐	☐
	12.5mm (+/-0.40) and a sheet metal							☐	☐
	thickness of 1.8mm (+/-1.0)							☐	☐
								☐	☐
8	**Fir tree push in force:**				**mean**	**min.**	**max.**	☐	☐
	45 newtons (10 lbs) max in an oval				**5.5 lbs**	**3.4 lbs**	**7.6 lbs**	☑	☐
	hole that is 6.2mm (+/-0.20) x							☐	☐
	12.2mm (+/-0.20) and a sheet metal							☐	☐
	thickness of 1.8mm (+/-1.0)							☐	☐
								☐	☐
9	**Fir treepull out force:**				**mean**	**min.**	**max.**	☐	☐
	110 newtons (25 lbs) min in an oval				**83 lbs**	**71 lbs**	**94 lbs**	☑	☐
	hole that is 6.2mm (+/-0.20) x							☐	☐
	12.2mm (+/-0.20) and a sheet metal							☐	☐
	thickness of 1.8mm (+/-1.0)							☐	☐
								☐	☐
10	**Sheet metal thickness range:**				**Is suitable for sheet metal thickness**			☑	☐
	0.60mm - 6.75mm				**range 0.60mm - 6.75mm**			☐	☐
								☐	☐
11	**Bundle range: 2.0mm - 50mm**				**Is sutiable for bundle range 2.0mm -**			☑	☐
					2.0mm - 50mm			☐	☐
								☐	☐
12	**Part must be free of burrs, flash and**				**Part is free of burrs, flash and sharp**			☑	☐
	sharp edges that may affect the				**edges that may affect the function, safe**			☐	☐
	function, safe handling, installation				**handling, installation or removal of the**			☐	☐
	or removal of the part.				**part.**			☐	☐

Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
Stefan Fölster		
i.A. S. Fölster	Quality Assistant	4-Dec-18

ASCEND
PERFORMANCE MATERIALS

TYTON CORPORATION
P.O. BOX 23055
Milwaukee, WI 53224
Attention: QUALITY DEPARTMENT

Customer Part No: UR0HIRHSUV0
Container ID: SLAY 5300

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

Certificate Date: 10-NOV-17
Delivery No: 382404130
Shipped Qty: 41,740.000 Lbs
(18,933.264 Kgs)
Customer P.O. No: 99438-40

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/TS16949:2009 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 4066 PA0161, FMVSS 302, Chrysler MS-DB-41 CPN1826, 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.

Material Type: VYDYNE 47H BK0644 **Material No:** 10404298 **Batch No:** FK10FY02 **Date of Mfg** 10-NOV-2017

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Moisture	ASTM D6869	0.10	0.20	0.12	%
Copper	STM 00667	125	250	176	PPM
Strength @ Yld	ISO 527-1,2 / 1A	50	70	60	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 reproduce 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 spr ratings appear herein, they are not intended to reflect tha hazards presented by this or any other material under actual fire conditions. E end user should determine whether potential fire hazards are associated with the finished product, and whether this resin is suitable for particular end use.

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

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
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	
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

HellermannTyton

☐Prototype ☐Pre-Launch ☑Production

Control Plan

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

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

Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			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 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

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator			Control Method	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		
									Size	Freq	
	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
	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

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator			QA and/or Team Supervisor	Shipping and/or Receiving
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
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 Machine	2	Hand Insertions			No Hard Insertions	Hand Insertion Process Inspection Check per WI-QA-10..3-2	1 Shot	Per Hour for molds under 38 cavities, Every Other Hour for cavitation over 38	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
		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

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator			Quality Assurance	Shipping and/or Receiving
			CHARACTERISTICS			METHODS					
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	NO.	PRODUCT	PROCESS	Special Char. Class	Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	Reaction Plan
									Size	Freq		
		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
		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 D - Hand Insertion	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 switch	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 P - First Piece Approvals	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 D - Hand Insertions P - First Piece Approvals P - In Process PM	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 - PM	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 P - Preventative Maintenance P - dosing system monitors flow	5	30	None						0
		3		Water Supply Not On	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	2	12	None						0
		3		Dirty or Clogged Filter	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	2	12	None						0
		3		Improper Timer Setting	3	D - Monitoring Water P-dosing system monitors flow	5	45	None						0
		3		Bad Bag Seals leak water	2	D - Visual Inspection D - Monitoring Water D - Final Inspection P - Preventative Maintenance	6	36	None						

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 Hole	Customer Dissatisfaction	4		Bag register mark Inconsistencies	2	P/D - Visual Inspection	8	64	None						0
				4		Bags not Webbed Correctly	2	P/D - Visual Inspection	8	64	None						0
				4		Too Much Air in Bag	2	P/D - Visual Inspection	8	64	None						0
				4		Cylinder Failure	2	D - Visual Inspection P - PM	8	64	None						0
		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

PTC = Pass Through Characteristic

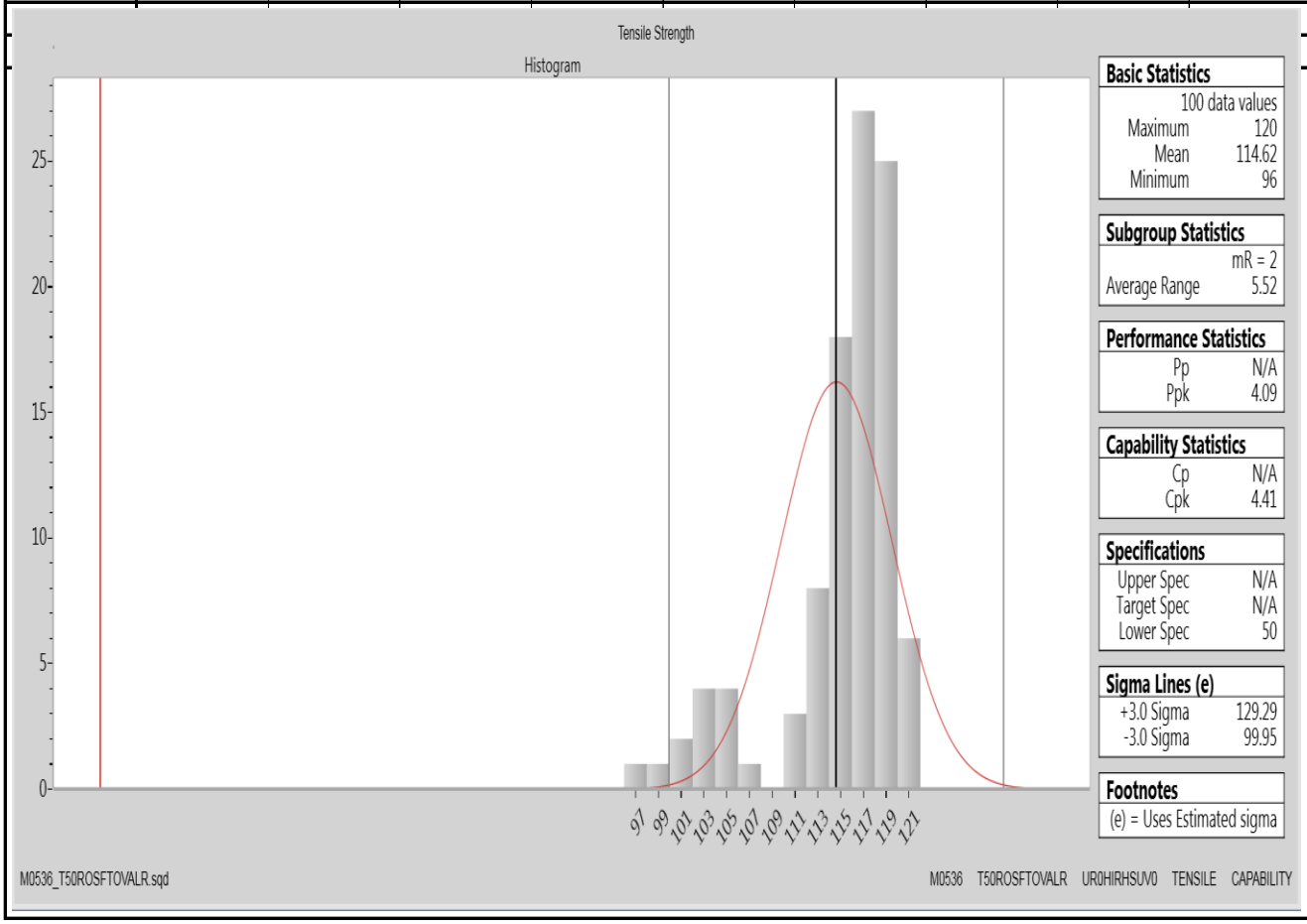
Initial Process Study

Part No.	Part Description	Supplier
157-00232	One Piece 50LB Cable Tie With	HellermannTyton

Drawing No.	Drawing Date	Drawing Revision	Inspection Facility
11-0741-001-CSU	3/4/2014	01.00	HT-Milwaukee

Production Date	Material	Tool No.	Inspector
11/16/2017	UR0HIRHSUV0	M0536	TM

DATA	Tensile Strength (lbs)								
1-9	113.00	113.00	114.00	119.00	116.00	115.00	96.00	115.00	112.00
10-18	118.00	119.00	115.00	118.00	101.00	115.00	120.00	117.00	118.00
19-27	104.00	111.00	116.00	113.00	115.00	111.00	119.00	116.00	119.00
28-36	117.00	115.00	103.00	112.00	111.00	101.00	120.00	105.00	118.00
37-45	119.00	119.00	117.00	119.00	114.00	104.00	115.00	119.00	118.00
46-54	115.00	116.00	116.00	119.00	106.00	118.00	115.00	103.00	117.00
55-63	112.00	118.00	117.00	114.00	120.00	113.00	117.00	117.00	117.00
64-72	120.00	116.00	119.00	116.00	116.00	116.00	117.00	99.00	118.00
73-81	117.00	115.00	115.00	117.00	117.00	105.00	116.00	120.00	120.00
82-90	117.00	114.00	118.00	116.00	119.00	115.00	116.00	115.00	103.00
91-99	117.00	118.00	115.00	119.00	103.00	116.00	112.00	119.00	118.00
100-108	119.00								



Gage R&R

R&R Study Results Using Specifications

2/1/2018

Gage number:	TGM-850	Done by:	Donna Szczepanski
Gage description:	Tensile Tester	Part name:	T120R
Gage type:	Tensile Tester	Characteristics:	Tensile Strength
Study name:	Anova Gage R & R	Specifications:	LSL=120 Nominal=158 USL=196
Study date:	10/17/2017	Number of Distinct Categories:	35.33951

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 = 0.1764119

%EV = 1.392726

Reproducibility - Appraiser Variation (AV)
AV = 0.4731652

%AV = 3.735514

Repeatability & Reproducibility (R&R)
R&R = 0.5049616

%R&R = 3.986697

Part Variation (PV)
PV = 12.6566

%PV = 99.9205

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

Appraiser	Replication	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Joyce	1	150.45	156.85	154.74	153.07	157.58	158.25	162.5	159.96	159.26	162.5
Joyce	2	150.68	157	154.87	153.07	157.62	158.32	162.52	160.1	159.31	162.52
Joyce	3	151.2	157.07	155.11	153.28	157.59	158.33	162.53	160.31	159.38	162.53
Taleala	1	151.81	157.11	155.55	153.49	157.7	158.43	162.56	160.5	159.49	162.56
Taleala	2	151.86	157.13	155.96	153.8	157.76	158.65	162.84	160.65	159.77	162.84
Taleala	3	151.91	157.25	156.13	154.17	157.88	158.84	162.92	160.73	159.77	162.92
Robin	1	152.44	157.34	156.23	154.21	157.99	158.91	163.06	160.74	159.8	163.06
Robin	2	152.65	157.4	156.73	154.51	158.08	159.16	163.66	160.79	159.84	162.66
Robin	3	152.67	157.48	156.78	154.64	158.14	159.25	163.67	161.2	159.95	162.67

HellermannTyton

Gage R&R

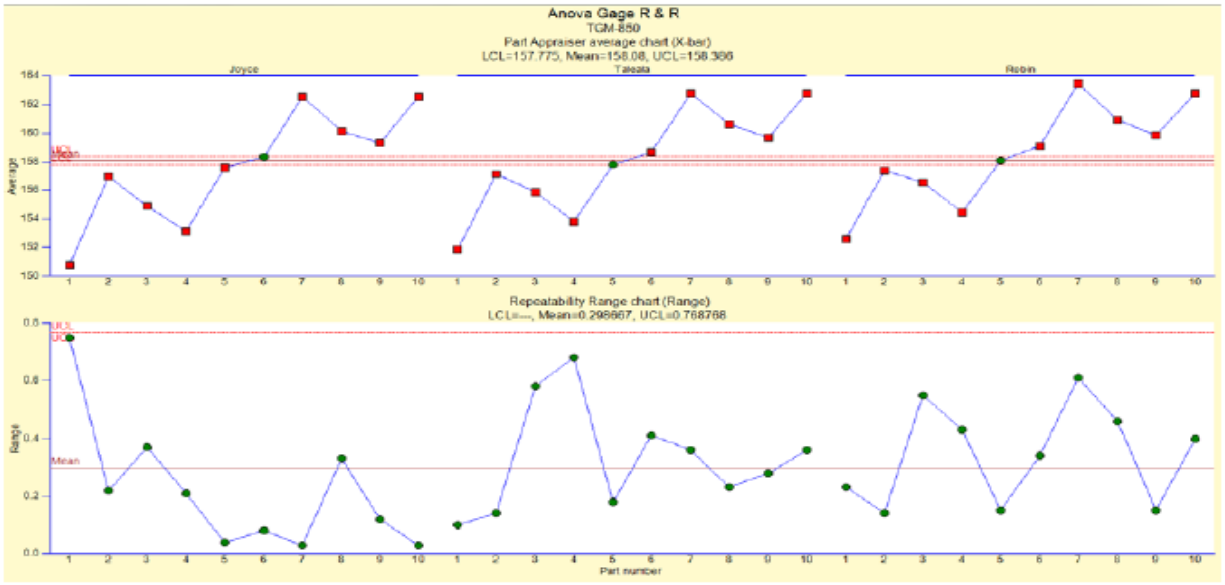
ANOVA report
HellermannTyton 2/1/2018

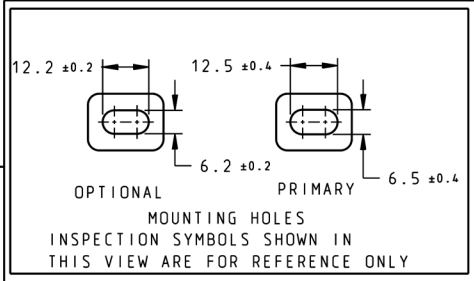
Gage number: TGM-850
Study name: Anova Gage R & R
Study date: 10/17/2017
Appraisers: 3
Parts: 10
Replications: 3
Alpha: 0.1

Source	DF	SS	MS	F	Significant	P-value
App (AV)	2	12.34	6.169	174.2	Significant	0
Parts (PV)	9	1063	118.2	3337	Significant	0
AV x PV	18	4.056	0.2253	6.364	Significant	2.365e-08
Error (EV)	60	2.124	0.0354			
Total (TV)	89	1082				

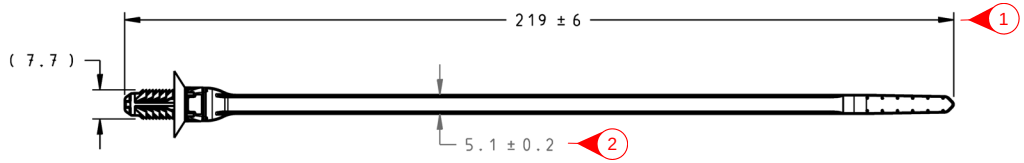
	Confidence limits			% of study	% of	% contribution
	LCL	1 sigma	UCL	parameters	tolerance	study params
Repeatability (EV)	0.1639	0.1882	0.2218	5.139	1.485	0.2641
Reproducibility (AV)	0.2244	0.4522	1.998	12.35	3.57	1.525
AV x PV	0.2137	0.2516	0.4577	6.872	1.986	0.4722
Gage R&R (EV+AV)	0.3998	0.5506	2.025	15.04	4.347	2.261
Part variation (PV)	2.306	3.62	6.232	98.86	28.58	97.74
Total variation (TV)		3.661				

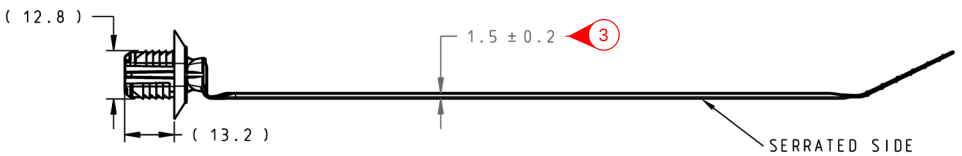
ndc = 9.3 (-> 9)

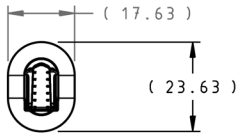




RECOMMENDED STRAP
TRIM TOLERANCE







ISOMETRIC VIEW

LTRS	REVISIONS			
ORIGINATOR	CHECKER	ENGR APP	MATL APP	
RELEASED: GU5T-14E047-DA				
AELE-E-12982958-091			21051110	
EHAFTAR	TPUSILO	RVITALI		

REFERENCE:
PERFORMANCE REQUIREMENTS AT DRY AS MOLDED:

6. FIR TREE PUSH IN FORCE: 45 NEWTONS (10 LBS) MAX IN AN OVAL HOLE THAT IS 6.5mm (+/- 0.40) X 12.5mm (+/- 0.40) AND A SHEET METAL THICKNESS OF 1.8mm (+/- 1.0)
7. FIR TREE PULL OUT FORCE: 110 NEWTONS (25 LBS) MIN IN AN OVAL HOLE THAT IS 6.5mm (+/- 0.40) X 12.5mm (+/- 0.40) AND A SHEET METAL THICKNESS OF 1.8.0mm (+/- 1.0)
8. FIR TREE PUSH IN FORCE: 45 NEWTONS (10 LBS) MAX IN AN OVAL HOLE THAT IS 6.2mm (+/- 0.20) X 12.2mm (+/- 0.20) AND A SHEET METAL THICKNESS OF 1.8mm (+/- 1.0)
9. FIR TREE PULL OUT FORCE: 110 NEWTONS (25 LBS) MIN IN AN OVAL HOLE THAT IS 6.2mm (+/- 0.20) X 12.2mm (+/- 0.20) AND A SHEET METAL THICKNESS OF 1.8.0mm (+/- 1.0)
10. SHEET METAL THICKNESS RANGE: 0.60mm - 6.75mm
11. BUNDLE RANGE: 2.0mm - 50mm
7. RECOMMENDED TENSION FORCE: 135N +/- 30N (30lbs +/- 7lbs) BUNDLES COMPRISED OF SOFT OR COMPRESSIBLE MATERIALS SHOULD BE EVALUATED FOR EFFECTS OF VARIOUS TENSION SETTINGS.

UNLESS OTHERWISE SPECIFIED:

12. PART MUST BE FREE OF BURRS, FLASH AND SHARP EDGES THAT MAY AFFECT THE FUNCTION, SAFE HANDLING, INSTALLATION OR REMOVAL OF THE PART.

PART AS RECEIVED AT THE FORD PLANT OR SERVICE PART PACKAGER/WAREHOUSE SHALL BE FREE OF ANY CORROSION ALIGNED WITH THE FORD CUSTOMER SERVICE DIVISION (FCSD) PACKAGING AND SHIPPING GUIDE. CORROSION INHIBITORS OR FOREIGN MATERIALS DETRIMENTAL TO THE INSTALLATION OR FUNCTION OF THE PART MUST BE REMOVABLE BY INTENDED CLEANING METHOD.

ENGINEERING APPROVAL OF SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PART PRODUCTION

CHANGES TO DESIGN, COMPOSITION OR PROCESSING OF THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRE PRIOR APPROVAL FROM FORD MOTOR COMPANY PRODUCT ENGINEERING
REFER TO ISO/TS 16949.

FOR CURRENT RELEASE STATUS SEE THE WERS ENGINEERING NOTICE

SOURCES FOR MATERIALS DEFINED BY FORD MATERIAL SPECIFICATIONS SHALL BE SELECTED FROM THE FORD MOTOR COMPANY ENGINEERING MATERIAL APPROVED SOURCE LIST

MATERIAL: NYLON 6/6 (WSS-M4D706-B1), COLOR:BLACK 5

HellermannTyton

REFERENCE	T50ROSFTOVALR		
PART MUST COMPLY WITH RESTRICTED SUBSTANCE MANAGEMENT STANDARD WSS-M99P9999-A1 TO SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT 4			
DRAFTED IN ACCORDANCE WITH FORD MOTOR COMPANY ENGINEERING CAD AND DRAFTING STANDARDS VERSION 28.1		3RD ANGLE PROJ DIMENSIONS ARE IN MILLIMETERS	
CAD TYPE K-CATIA5	CAD LOC. TCe	CAD FILE GU5T-14E047-D-DWG-01	DTMC IS MASTER
OPER. NO. ---	UNIT mm	DRAWING GU5T-14E047-DA	
DESIGN EHAFTAR	DETAIL TPUSILO	TITLE RET WIR HRNS TIE STRAP	SHT 1 OF 1
CHECKED TPUSILO	SAFETY ---		
SCALE 1:1	DATE 20151110	DIVISION	
		PLANT	

FORD MOTOR COMPANY