



Rule for making Quality concept

ISD-QA-063



RULE

Department

Quality Assurance

DATE: 25.06.2020

Area

New product Development

Issue: 01

Revision: 00

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Purpose:-

The purpose of Making Quality Concept is to extract the changes to be occurred Newly & understand the importance & difficulty in adopting the same to Clarify activities for stable mass production.

Scope:-

A quality concept sheet shall be created if any of the following is applied:

- (1) New parts
- (2) Parts which design or specification is to be changed
- (3) Parts which process is to be changed

Time of Implementation:-

A quality concept should be completed at the timing of evaluating a QCD proposal.

Implementation-Novelty Evaluation:-

1) Quality division shall make a judgement of Novelty (based on novelty criteria) & reason on the mechanism, material, method, machine, and allocation of a target part. (Refer quality concept A ISF-QA-118a)

Consider Input:- Estimated process setting (in-house or outsourcing), New model rollout plan, Change point sheet of new parts, Design FMEA, important items specified by customer and internally, past troubles

2) For items which novelty is 2 or higher, Quality division shall prepare a Quality concept B (ISF-QA-118b) to clarify an impact of applicable items, concerns, and action from a cross sectional approach.

3) Use an Inspection sheet as a tool of assuring important items to study.

4) Study items included in the Quality Concept sheets A and B and keep a record of results.

Judgement Criteria of Novelty:-

Table 1

Novelty Level	Production Novelty			
	Mechanism (Function)	Material	Method	Machine
4	The world's first	The world's first	The world's first Method development required	The world's first Mass production for parts of this type
3	The company's first	The company's first	The company's first	The country's first MP equipment for parts of this type
2	The company has experience but technology standards and know-how are not shared	First time to apply to parts of this type	First time to apply to parts of this type	The company's first Mass production for parts of this type
1	Other <Specific example> The company has experience and technology standards and know-how are shared.	Other <Specific example> Already applied to parts of this type	Other <Specific example> Already applied to parts of this type but first time to apply to parts of this size or thickness	Other <Specific example> First time to use the equipment of this vendor but the company has know-how

Update of past troubles:-

If any of the control items is changed due to a critical quality problem, the "Check Sheet for Preventing Critical Quality Problems" (Anexture 1.1~1.4) shall be reviewed and revised.

Note : Utilize Relevant QE Stds (Space finder) Whenever problem occurs refer the same for common understanding

01	00	Newly made as per global regulation of APQP	25.06.2020
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CHECK SHEET FOR PREVENTING CRITICAL QUALITY PROBLEMS - TRANSMISSION ASSY

Annexure- 1-1



PROCESS	DEFECT	CONTROL ITEM	HOW TO ASSURE	STANDARDIZE	RESULT
ASSY	Circlip installation NG	Circlip missing	<ul style="list-style-type: none"> Add pokayoke in the process to detect it (Ensure circlip installed to areas not checked with images) Assure with an ASSY imaging tester Quantity control (Make sure 0.01 g is measurable if weight is measured) 	<ul style="list-style-type: none"> Process design Imaging tester 	
		Circlip not installed in groove	<ul style="list-style-type: none"> Add pokayoke in the process to detect Detect by rotation check (Make sure certified members are in charge of checking) Assure installation with an ASSY imaging tester 	<ul style="list-style-type: none"> Process design Work instruction Imaging tester 	
		Groove machining dimension accuracy	<ul style="list-style-type: none"> Assure groove width, groove bottom diameter, chamfering as indicated in drawing No machining on the outer diameter of spline (material as finished) Measure OD of gears with odd teeth (Take into an account of tolerance if converted) 	<ul style="list-style-type: none"> Work standard 	
		Installed on wrong side	<ul style="list-style-type: none"> Make sure to install a circlip inside of the 1D radius (gear stop side) 	<ul style="list-style-type: none"> Work standard 	
		Circlip installation jig (Prevention of plastic deformation)	<ul style="list-style-type: none"> Design jig in accordance with No of spline teeth based on Jig diameter = Spline OD x 1.01 Jig OD tolerance should be +0.05/0 Use the following drawing (2 parts) for a jig used for circlip installation Add a stopper to keep pliers motion in the expansion diameter Check plastic deformation before/after installation to ensure meeting drawing specs 	<ul style="list-style-type: none"> Jig drawing Work instruction Start-up check (Pliers motion) Plastic deformation check 	
		Circlip rotation	<ul style="list-style-type: none"> Make sure a circlip rotates by pulling/pushing with a dedicated jig Check rotation (loose, heavy) (Make sure certified members are in charge of checking) 	<ul style="list-style-type: none"> Work instruction 	
ASSY	Washer fitting NG	Washer missing	<ul style="list-style-type: none"> Add pokayoke in the process to detect it (Ensure washer fitting on areas not checked with images) Assure fitting with an ASSY imaging tester Quantity control (Make sure 0.01 g is measurable if weight is measured) 	<ul style="list-style-type: none"> Process design Imaging tester 	
		Double fitting	<ul style="list-style-type: none"> Add pokayoke in the process to detect it Detect double fitting by circlip rotation (Make sure certified members are in charge of checking) Assure fitting with an ASSY imaging tester 	<ul style="list-style-type: none"> Process design Work instruction Imaging tester 	
		Washer insufficient press-fit	<ul style="list-style-type: none"> Washer not fit to the end of ASSY should be detectable with an imaging tester Make sure washers do not come off during packaging Set packaging to prevent washers from looseness and come-off 	<ul style="list-style-type: none"> Imaging tester Work standard Packaging setting 	
		Control of similar washers	<ul style="list-style-type: none"> Add pokayoke to detect wrong washers (wrong thickness) Assure washers with an ASSY imaging tester 	<ul style="list-style-type: none"> Process design Imaging tester 	
COMP	Press-fit load /slip torque	Press-fit load setting	<ul style="list-style-type: none"> Make parts with max, mid, and min tightening margin to identify 	<ul style="list-style-type: none"> Work standard 	
		Slip torque setting	<ul style="list-style-type: none"> Set alternative control values Take into an account of product conditions (dry, wet, oil, etc.) to identify it 		
		Load control value	<ul style="list-style-type: none"> Set load cell to control press-fit load 	<ul style="list-style-type: none"> Process design Work standard Start-up check 	
		Slip torque control value	<ul style="list-style-type: none"> Set torque measurement unit for torque control 		
		Defect control	<ul style="list-style-type: none"> Load or slip torque NG should be treated as defects (to prevent operators from handling) 	<ul style="list-style-type: none"> Work instruction 	
		Data control	<ul style="list-style-type: none"> Press-fit data and slip torque data should be saved in the unit 	<ul style="list-style-type: none"> Quality record 	
		Control of slip torque inspected parts	<ul style="list-style-type: none"> Slip torque measured parts for inspection must be disposed 	<ul style="list-style-type: none"> Work procedure 	

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CHECK SHEET FOR PREVENTING CRITICAL QUALITY PROBLEMS - TRANSMISSION GEAR



PROCESS	DEFECT	CONTROL ITEM	HOW TO ASSURE	STANDARDIZE	RESULT
Acceptance of steel	Damage	Damage	Install device to detect damages Define allowed damage depth	Steel spec	
		Internal defect	Set control standard of inclusion (Condition setting with proof)	Steel spec Condition control	
		Defect	Return defect parts	Work instruction	
		Packing style	Packing style setting that prevent damages Coil material shall be stored with buffer made from rubber or wood.	Packing style setting	
		Condition control	Data record	By storage standard	
Cutting / Slug	Wrong material	Steel acceptance	Stock area of Product with same diameter and wrong material must be isolated and clearly identified	Work instruction	
		Material	Check the material sheet and storage it.	Work instruction Control Plan	
		Steel identification	Paint different color on bar of material NG.	Work instruction	
		Fall product	Dispose all	Work instruction	
		Package style setting	Use a bucket that does not spill cutting material Place a lid on the top of the bucket to prevent wrong materials from mixing.	Packing style setting	
Heating	Wrong material	Billet material	Display model and times for returned material.	Work instruction	
		Material	Returned materials are displayed on buckets and stored in the designated location.	Work instruction	
		Heating times	Identify structure (decarburizing), underfill, surface defect	Work instruction	
		Fall product	Dispose all	Work instruction	
		Package style setting	Use a bucket that does not spill cutting material Place a lid on the top of the bucket to prevent wrong materials from mixing.	Packing style setting	
Forging and molding	Flow cut / Buckling	Condition setting	Check of product accuracy	Work standard	
		Flow	Verify overlap Check of product	Die design Initial product control	
		Internal crack	Chevron crack check Verification of shrinking (a cross section reduction rate)	Die design	
		Inspection frequency	Check at die exchanges and condition change	Work standard	
Forging and molding	Dwell R shape NG/ Division NG	Bottom R/Division	Measure considering die life Record the status of shape (shape measurement data, image data etc.)	Initial product control Work standard	
		Division accuracy	Measurement of product accuracy at die change.	Work instruction	
		Die control	Division measurement (Based on SPC)	Die control standard	
			Die accuracy check before using new one and when repairing.	Work standard	
Forging and molding	Dwell underfill	Dwell gear shape	Implement profile measurement of gear When lathing dwell end surface, dimension shall be set considering forging droop.	Die control standard Die drawing	
		Appearance	No dent on gear contact area.	Work standard	
		Dwell pierce breaking surface	Die life setting Measure breaking surface at die changes	Work instruction	
		Control of die/electrode	Die accuracy check when repairing and before using new die.	Work standard	
Heat treatment (Forging)	Heat treatment NG	Condition setting	Set condition (temperature, time) considering hardness, structure, crystal grain, and decarburizing. Set billet temperature (Affect to crystal grain and decarburizing)	Die data record Work standard	
		Identification	Verification of 9 point method (batch furnace)	Heat treatment data sheet	
		Measurement point	Setting of sampling point of inspection Described on drawing or setting by agreement with customer	Work standard	
		Surface hardness measurement sample	Decide inspection method to avoid difference of inspection result by shape of measurement area. Measurement marks that do not affect the finished product can flow if they can be eliminated in following processes. If there is any agreement with the customer, follow the customer requirement.	Heat treatment data sheet Work standard	
Lathe	Sliding surface roughness NG	Condition setting	Start-up check by standard hardness master	Work instruction	
		Roughness measurement	Prove setting of cutting tool life Understand the limit of roughness and set it.	Work standard	
		Tool life setting	Check before and after cutting tool change Verify cutting tool life with 3 cycles and set it.	Work standard	
		Machining standard of following process	Not allowed to use for clamping of following process and standards.	Condition setting	
		Appearance	Not allowed dent or damage on sliding surface	Process design Jig control	
Lathe	Burr/Remained chip	Idea of machining method	Removing burr Setting of machining program (Prevent rolled cutting chip)	Process design	
		Cutting tool control	Setting of cutting tool life considering burr	Machining program	
		Jig control	Jig design that not occur biting cutting chip (Removing chip)	Work standard	
Drilling	Burr/Remained chip	Idea of machining method	Removing burr Setting of machining program (Prevent rolled cutting chip)	Cutting tool control	
		Cutting tool control	Setting of cutting tool life considering burr	Jig design	
		Jig control	Jig design that not occur biting cutting chip (Removing chip)	Process design	
		Burr	Removing burr after drilling process	Work standard	
		Burr after pierce machining	Setting of pierce cutting tool life Pierce chip	Cutting tool control	
Drilling	Unprocessed / Non-through hole	Tool contro (Drill, Pierce)	Install detection of tool breakage Tool life control (Implement verification both of new tool and grinded tool.)	Process design	
		Tool exchange (Drill, Pierce)	Tool setting method (Tool allowance)	Pokayoke check list	
		Outflow prevention	Countermeasure for outflow of unprocessed and non-through hole parts (Clarify the grounds for prevention such as penetration check of the final hole and penetration check with file image, etc.)	Tool control sheet	
		Burr (coming-off burr)	Remove coming-off burr	Work procedure	
		Contamination	Check cleanliness after washing Remaining chip inside of part	Pokayoke check list	
Gear cutting	Tooth profile / Roughness NG	Condition setting	Identify roughness and tooth profile and set conditions	Work standard	
		Roughness measurement	Measure before and after cutter change	Work standard	
		Tooth profile shape	Shape evaluation of tooth profile	Work instruction	
SV	Tooth profile / Roughness NG	Condition setting	Identify roughness and tooth profile and set conditions	Tooth profile judgement standard	
		Roughness measurement	Measure before and after cutter change	Work standard	
		Tooth profile measurement	Shape evaluation of tooth profile	Work instruction	
		Tooth bottom diameter	Control tooth bottom diameter at tooth cutting	Tooth profile judgement standard	
		SV allowance	Setting allowance of SV machining	Work standard	
		Gear rotation inspection	Dimension setting that not occur trochoid interference Design standard of gear inspection master	Cutter drawing	
GH/GG	Tooth profile / Roughness NG	Condition setting	Identify roughness and tooth profile and set conditions	Work standard	
		Roughness measurement	Measure before and after grinding stone changes	Work instruction	
		Tooth profile measurement	Shape evaluation of tooth profile	Tooth profile judgement standard	
		Tooth bottom diameter	Control tooth bottom diameter at tooth cutting	Work standard	
		GH/GG allowance	Set allowance of GH/GG machining	Work standard	
		Gear rotation inspection	Dimension setting that not occur trochoid interference Design standard of gear inspection master	Cutter drawing	
Heat treatment	Heat treatment NG	Condition setting	Setting condition based on hardness, structure, and depth. CO2 control	Work standard	
		Identification	9 points verification Setting of sampling point of inspection	Heat treatment data sheet	
		Measurement point	Add points in drawing or decide them based on agreement with customer	Work standard	
		Surface hardness measurement sample	Measurement marks that do not affect the finished product can flow if they do not affect following process. Follow customer's requirement if any Start-up check with standard hardness master	Heat treatment data sheet Work instruction	

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CHECK SHEET FOR PREVENTING CRITICAL QUALITY PROBLEMS - TRANSMISSION SHAFT

Annexure- 1-4



PROCESS	DEFECT	CONTROL ITEM	HOW TO ASSURE	STANDARDIZE	RESULT
Steel acceptance	Damage	Damage	• Install device to detect damage • Define allowable damage depth.	• Steel specs	
		Internal defects	• Set control standard of inclusions. (Condition setting with proof)	• Steel specs • Condition control	
		Defect parts	• Return defect products	• Work instruction	
		Packing style	• Packing style setting that avoid damage • Coil material shall be storage with cushioning material made of rubber and wood.	• Packing style setting	
		Condition control	• Data records	• By storage standard	
Cutting / Slug	Wrong material	Steel acceptance	• Products which have same diameter and wrong material shall be isolated and clearly identified.	• Work instruction	
		Material	• Check mil sheet and storage it.	• Work standard • Control Plan	
		Steel identification	• Use identification color paint for bar material of material defect	• Work instruction	
		Fall product	• Dispose all	• Work instruction	
		Packing style setting	• Use a bucket that does not spill cutting material • Place a lid on the top of the bucket to prevent wrong materials from mixing.	• Packing style setting	
Heating	Wrong material	Billet material	• Returned material shall be displayed the model and the times.	• Work instruction	
		Material	• Returned materials are displayed on buckets and stored in the designated location.	• Work instruction	
		Heating times	• Identify structure (decarburizing), underfill, and surface defect.	• Work instruction	
		Fall product	• Dispose all	• Work instruction	
		Packing style setting	• Use a bucket that does not spill cutting material • Place a lid on the top of the bucket to prevent wrong materials from mixing.	• Package style setting	
Forging & molding	Flow cut / Buckling	Condition setting	• Product accuracy check	• Work standard	
		Flow	• Verify blushing and overlapping • Check of whole product	• Die design • Initial parts control	
		Internal crack	• Chevron crack check • Verify shrinking (a cross section reduction rate)	• Die design	
		Inspection frequency	• Check at die change and condition change.	• Work standard • Initial product control	
Correction (After forging)	Crack	Condition setting	• Setting of maximum of push amount (By SPEC or setting procedure) • Limit value setting of initial runout	• SPEC • Procedures	
		Detect crack	• Installation of AE sensor • NG detected products by crack are automatically discharged to the NG BOX, and operators cannot handle it.	• Process design • Work standard	
		Jig control	• Check of product receiving area and wear states of pusher jig	• Work standard • Work instruction	
		Correction record	• Storage of the data in correction equipment	• Quality record	
		Manual correction	• Detection of downward end (not too push) • Stopper setting by jig	• Changeover procedure • Design jig	
Lathe	Shape NG	Condition setting	• Cutting tool life control (Implement identification of new one and re-grinding one)	• Process design • Cutting tool control sheet	
		Program control of groove machining	• No machining of outer diameter of circlip groove (reduce circlip overlap allowance)	• Machining program • Work standard	
		Groove shape	• Evaluated by shape measurement at cutting tool change, program change and change points.	• Work standard	
		Spline OD machining	• No machining not instructed in drawing	• Machining program • Work standard	
Oil hole drilling	Unprocessed / Unpenetrated	Cutting tool control	• Install device to detect cutting tool breakage • Cutting tool life control (Identify new cutting tool and re-grinded cutting tool.)	• Process design • Pokayoke check sheet • Cutting tool control	
		Cutting tool change	• Cutting tool setting method (Cutting tool allowance)	• Work instruction	
		Prevent outflow	• Outflow prevention measures of unprocessed and unpenetrated products (Clarify the reason for outflow prevention such as confirming penetration of final hole and confirming penetration in the image)	• Pokayoke check sheet • Work standard	
		Coming-off burr	• Remove coming-off burr	• Work standard	
		Contamination	• Cleanliness check by washing • Remained chip on oil hole	• Process design • Work standard	
Drilling	Burr / Remained chip	Idea of machining method	• Removing burr • Machining program setting (Prevent rolling cutting chip)	• Process design • Machining program	
		Cutting tool control	• Cutting tool life setting considering burr	• Work standard • Cutting tool control	
		Jig control	• Jig design that does not bite chip (Removing chip)	• Jig design	
		Coming-off burr	• Removing coming-off burr after drilling	• Process design • Work standard	
		Pierce machining burr	• Setting of pierce cutting tool life • Pierced chip	• Work standard • Cutting tool control	
Heat treatment	Heat treatment NG	Condition setting	• Set condition considering hardness, structure, and depth. • CO2 control	• Work standard • Heat treatment data sheet	
		Identification	• 9 points verification • Setting of sampling points of inspection	• Work standard • Heat treatment data sheet	
		Measurement point	• Enter in drawing or set by agreement with customer	• Work standard	
		Surface hardness measurement sample	• Measurement marks that do not affect finished products can outflow if they do not affect the following process • If there is any agreement with the customer, follow the customer requirement.	• Work instruction	
		Measurement device start-up check	• Start-up check by standard hardness master	• Start-up check sheet	
Correction	Crack	Condition setting	• Set the maximum of pushing amount (By SPEC or setting procedure) • Limit value setting of initial runout	• SPEC • Procedures	
		Crack detection	• AE sensor installation • NG detected products by crack are automatically discharged to the NG BOX, and operators cannot handle it.	• Process design • Work standard	
		Jig control	• Check of wear status of product receiving area and pusher jig	• Work standard • Work instruction	
		Correction record	• Storage of the data in correction equipment	• Quality record	
High frequency tempering	High frequency tempering NG	Condition setting	• Set condition considering hardness, structure, and depth.	• Work standard • Heat treatment data sheet	
		Identification	• Identified by all points in case picked out a few products • Understand the standard of each point and prevent the variation	• Work standard • Condition sheet	
		Measurement point	• Described in drawing or set by agreement with customer • Check by every lot	• Work standard	
		Coil touch	• Install device to detect abnormal coil touch	• Pokayoke control sheet	
		Jig control	• Implement wear control	• Jig control sheet	
Grinding	Seal area roughness NG	Condition setting	• Setting of dress interval • 3 cycle verification (Change amount investigation of roughness and diameter)	• Work standard	
		Roughness measurement	• Check before and after dress • Chatter check	• Work standard	
		Appearance	• No dent and scratch on seal	• Process design • Jig control	
		Following process	• Not used for clamp or standard of following process.	• Process design • Jig design	
		Setting of grinding stone life	• Set verifying grinding stone life	• Condition setting sheet	

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CHECK SHEET FOR PREVENTING CRITICAL QUALITY PROBLEMS - CAM SHAFT

Annexure- 1-4



PROCESS	DEFECT	CONTROL ITEM	HOW TO ASSURE	STANDARDIZE	RESULT
Lathe	Thrust roughness NG	Condition setting	·Cutting tool life control (Implement identification of new one and re-grinded one)	·Process design	
		Roughness measurement	·Check before and after cutting tool change	·Cutting tool control	
		Appearance	·No dent on thrust area	·Work standard	
Oil hole drilling	Unprocessed /Unpenetrated	Tool life setting	·Verify 3 cycles of cutting tool life and set it	·Condition setting	
		Cutting tool control	·Install device to detect cutting tool breakage	·Process design	
			·Cutting tool life control (Implement identification of new one and re-grinded one)	·Pokayoke check sheet	
		Cutting tool change	·Setting method of cutting tool(Cutting tool allowance)	·Cutting tool control	
		Prevent outflow	·Outflow prevention of unprocessed and unpenetrated products ·Outflow prevention measures of unprocessed and unpenetrated products (Clarify the reason for outflow prevention such as confirming penetration of final hole and confirming penetration in the image)	·Work instruction	
Oil hole drilling	Burr / Remaining chip	Burr (Coming-off side)	·Removing burr of coming-off side	·Pokayoke check sheet	
		Contamination	·Cleanliness check by washing	·Work standard	
			·Remained chip inside cam	·Process design	
		Idea of machining method	·Removing burr	·Machining program	
		Cutting tool control	·Setting of machining program (Prevent rolling cutting chip)	·Work standard	
Heat treatment	Heat treatment NG	Jig control	·Setting of cutting tool life considering burr	·Cutting tool control	
		Coming-off burr	·Jig design that not bite cutting chip (Removing chip)	·Jig design	
			·Remove coming-off burr after drilling	·Process design	
		Condition setting (Carburizing cam)	·Condition setting based on hardness, structure, and depth.	·Work standard	
		Identification (Carburized cam)	·CO2 control	·Heat treatment data sheet	
Induction	Induction NG	Hardness depth	·9-points verification	·Work standard	
			·Setting of sampling points of inspection	·Heat treatment data sheet	
			·When heat treatment after rough grinding, verify a balance of the depth after cam grinding finish. (No deviation of open side and close side)	·Work standard	
			·Set condition considering hardness, structure, and depth.	·Heat treatment data sheet	
		Condition setting		·Work standard	
Grinding	Roughness defect of seal area	Identification	·Identify at all points in case picking up some products	·Condition sheet	
		Measurement point	·Prevent variation by understanding the standard of each point.	·Work standard	
		Coil touch	·Described on drawing or set by customer's agreement	·Pokayoke control sheet	
		Jig control	·Check by each lot	·Jig control sheet	
		Hardness depth	·Installation of error detection of coil touch	·Work standard	
Cam grinding	Burn / Crack		·When heat treatment after rough grinding, verify depth balance after cam grinding finish. (No deviation of open side and close side)	·Heat treatment data sheet	
		Condition setting	·Setting of dress interval	·Work standard	
		Roughness measurement	·3 cycle verification (Change amount investigation of roughness and diameter)	·Process design	
		Appearance	·Check before and after dressing	·Jig control	
		Following process	·Chatter check	·Process design	
Cam grinding	Shape / Angle NG		·Not used clamp and standard for following process	·Jig design	
		Grinding stone setting	·Verify grinding stone life and set it	·Condition setting sheet	
		Condition setting	·Prevent remained burn by setting grinding allowance of rough grinding and finish grinding.	·Program control	
		Dress interval	·Prevent clogging by setting dress amount	·Work standard	
		Burn control (Steel carburizing CAM)	·Verify surface burn and crack by nital check when changing grinding stones or conditions.	·Work instruction	
COMP	Press-fit load / Slip torque	Burn control (Others)	·Verify surface burns and cracks by color check and magnetic detection when changing grinding stones or conditions.	·Work standard	
		Burn control (By agreement)	·Set internal stress and control it	·Work instruction	
		Condition setting	·Identification of profile before and after grinding stone changes (Verify shape difference by grinding stone diameter)	·Program control	
		Dress interval	·Prevent clogging by setting dress amount	·Work standard	
		Jig control	·Wear control of machining standard	·Jig design	
COMP	Caulking breakage		No contact with jigs	·Jig control	
		Press-fit load setting	·Manufacture products with interference MAX-MID-MIN and identify them	·Work standard	
		Slip torque setting	·Setting of alternative control value	·Start-up check	
		Load control setting	·Identify considering the product condition (dry, wet, oil etc.)	·Work instruction	
		Control value setting of slip torque	·Control press-fit load by installed load cell	·Quality record	
COMP	Caulking breakage	Defect control	·Set torque measurement device in case performs torque control	·Process design	
		Data control	·Products of load and slip torque NG shall be treated as defective products (specification must not handle #)	·Jig design	
		Caulking load setting	·Storage of press-fit data and slip torque data in the device	·Jig control	
		Caulking jig	·Setting of load cell	·Work standard	
		Operation check	·Shape control of caulking jig (punch)	·Work instruction	
COMP	Caulking breakage		·Consult of jig for determining caulking phase position (backlash of standard area, phase position gap)	·Process design	
		Contamination control	·Check of working condition after caulking (Not allowed hanging or contact)	·Jig design	
			·No biting contamination on operation area	·Jig control	
				·Work standard	
				·Work standard	

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