

## QA MATRIX SHEET

Date		06.12.2018
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**❌PQCS / FMEA Sheet must be attached**

Total	Category	Nos	Cp/Cpk ≥1.33	Cp/Cpk <1.33	Double or More Check	PAC-V OK	PAC-V NG
3	Measurable	--	--	--	--	OK	--
	Non Measurable	3			3	OK	--

Supplier		HMSI	
Quality Head	In charge	Approved by	Checked by
PRASHANTH	SHIVA		

Model	KONA	Part no.	23010-KONA-D020	Part name	SHAFT ASSY MAIN	DCN	KONA -E-103	MAP -BLR
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<p><b>Process Assurance Capability - Verification (PAC-V) will be OK if -</b></p> <p><b>1. Process Assurance (Type a. &amp; b) result are OK</b> for Critical items.</p> <p><b>2. Critical items included in PQCS and Operation Std.</b></p> <p><b>3. Operator aware about Critical item's importance.</b></p> <p><b>Note : For any deviation / change request Supplier must inform Purchase and SQA.</b></p>	<p><b>Type a. Measurable items (Examples)</b></p> <ol style="list-style-type: none"> <li>1) Variable Dimensions</li> <li>2) Torques</li> <li>3) Destructive Hardness tests</li> <li>4) Weld penetration</li> <li>5) Cross Section dimension for which part cut is must</li> <li>6) Breaking torque / load etc.</li> </ol>	<p><b>Process Assurance Method (Measurable)</b></p> <pre> graph LR     A[Measurable] --&gt; B["Cp/Cpk ≥ 1.33"]     A --&gt; C["Cp/Cpk &lt; 1.33"]     B --&gt; D[Sample Inspection]     C --&gt; E[100% Inspection]     </pre>	<p><b>Type b. Non Measurable items (Examples)</b></p> <ol style="list-style-type: none"> <li>1) Assembly (Coupler, Bullet terminal. etc.)</li> <li>2) Visual Inspection</li> <li>3) Grease / Oil /Adhesive applications</li> <li>4) Manufacturing process parameters</li> <li>5) Specification test</li> <li>6) Material</li> <li>7) Salt Spray / CASS tests, Paint adhesion (100/100 etc.) Offline tests</li> <li>8) Specification test (e.g. - Durability/ Endurance tests, Destructive tests etc. )</li> </ol> <p><b>[ above Examples are case by case &amp; may change as per Requirement ]</b></p>	<p><b>Process Assurance Method (Non Measurable)</b></p> <pre> graph LR     A[Non Measurable] --&gt; B["200% Check (Minimum Double check) or Triple Check"]     B --&gt; C[Sample Inspection]     </pre>
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QA MATRIX SHEET

Date28.02.2019

※PQCS / FMEA Sheet must be attached

Total	Category	Nos	Cp/Cpk ≥1.33	Cp/Cpk <1.33	Double of More Check	PAC-V OK	PAC-V NG
27	Measurable	21	21	-	21	0	-
	Non Measurable	6			4	0	-

Supplier		HMSI	
Quality Head	In charge	Approved by	Checked by
PRASANTH	SHIVA		

To process-based, please write if there is a change in the new process (Use V for marking)	PQCS <<Base process flow>> <input type="checkbox"/> Base Model <input type="checkbox"/> Base Plant	RECEIVING INSPECTION	FACING CENTERING	STRAIGHTENING	GUNDRILLING	TURNING	SPLINE DEBURRING	THREAD ROLLING	OIL HOLE DRILLING	JIG SETTING & CONDITION CHECKING	PREWASHING	PRE HEATING	CARBURSING & TEMPERING	POST WASHING	SHOT BLASTING	THREAD ANNEALING	CENTER LAPPING	STRAIGHTENING	OIL HOLE DEBURRING	GRINDING	FINAL INSPECTION	<<Change point note column>> Detail of change point etc.
	PQCS <<New process flow>> <input type="checkbox"/> New Model <input type="checkbox"/> New Plant <input type="checkbox"/> New Supplier	RECEIVING INSPECTION	FACING CENTERING	STRAIGHTENING	GUNDRILLING	TURNING	SPLINE DEBURRING	THREAD ROLLING	OIL HOLE DRILLING	JIG SETTING & CONDITION CHECKING	PREWASHING	PRE HEATING	CARBURSING & TEMPERING	POST WASHING	SHOT BLASTING	THREAD ANNEALING	CENTER LAPPING	STRAIGHTENING	OIL HOLE DEBURRING	GRINDING	FINAL INSPECTION	

Mark in necessary item against above mentioned process ① No change from base - ●  ② There is a change from base - ★	4M situation	Raw materials	★	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	<<Part feature note column>> Specific information about 4M situation
		Die Maintenance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Equipment	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Jig and Fixture	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Mfg. Tools	—	★	—	★	—	—	—	—	—	—	—	—	—	★	—	—	—	—	—	
		Insp. Tool	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Operator training	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		PQCS	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		Work Std.	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		Check sheet	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	

Process Assurance Capability - Verification (PAC-V) will be OK if:- 1. Process Assurance (Type a. & b.) result are OK, for Critical items. 2. Critical items included in PQCS and Operation Std. 3. Operator aware about Critical item's importance. Note : For any deviation / change request Supplier must inform Purchase and SQA.		Type a. Measurable Items (Examples) 1) Variable Dimensions 2) Torques 3) Destructive Hardness tests 4) Weld penetration 5) Gross Section dimension for which part cut is must 6) Breaking torque / load etc.		Process Assurance Method (Measurable) Measurable → 100% I & B → Sample Inspection → 100% Inspection		Type b. Non Measurable Items (Examples) 1) Assembly (Coupler, Bullet terminal, etc.) 2) Visual inspection 3) Grease / Oil Adhesive applications 4) Manufacturing process parameters 5) Specification test 6) Material 7) Salt Spray / CAS tests, Point adhesion (100/300 etc.) Offline tests 8) Specific test (e.g., Dye penetrant, Leak test)		Process Assurance Method (Non Measurable) Non Measurable → With Check (Minimum Double check) or Take Check → Sample Inspection	
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No.	Critical item	Control value	Insp. Tool	Inspection process : ■																		Measurable/ Non-Measurable	Cp/Cpk	No of inspection	Includ ed in PQCS	Include d in Ope.	Operator Awareness	PAC-V	Remarks
1	Material Satisfying SPEC	SCr420HV—SG 0092Z-GHA-C400	SPECTRO	—	■																	Non -measurable	-	1	o	o	o	OK	DESTRUCTIVE ITEM
2	Inside of OIL hole	No burrs allowed	VISUAL / PLUG GAUGE	—																	100%	Non -measurable	-	2	o	o	o	OK	
3	BRG Press-fit area outer diameter	φ14 -0.011/-0.022	MICROMETER /ARG	—																	1/SETUP &TC 100%	Measurable	2.36	2	o	o	o	OK	
4	BRG NEEDLE Press-fit area surface roughness	Rz 3.2 MAX	ROUGHNESS TESTER	—																	1/SETUP &TC	Measurable	2.49	2	o	o	o	OK	
5	Overpin diameter of spline.	INV.S. 17X15X1.0 18.598 -0.036/-0.081	OD MICROMETER & PIN ø 1.80	—	■																5/LOT	Measurable	1.75	2	o	o	o	OK	
6	Surface	Rz 8 MAX	ROUGHNESS TESTER	—	■																1/LOT	Measurable	1.73	2	o	o	o	OK	
7	M 4 GEAR BUSH	φ17 f7 -0.016/-0.034	MICROMETER /ARG	—																	1/SETUP &TC 100%	Measurable	1.78	2	o	o	o	OK	
8	M4 GEAR BUSH OD surface roughness	Already given in point no 8 既にポイントで与えられている	ROUGHNESS TESTER																		1/SETUP &TC	Measurable	2.458	2	o	o	o	OK	
9	BRG Press-fit area outer diameter	φ17 f7 -0.016/-0.034	MICROMETER /ARG	—																	1/SETUP &TC 100%	Measurable	1.89	2	o	o	o	OK	
10	BRG Press-fit area surface roughness	Rz 6.3 MAX	ROUGHNESS TESTER	—																	1/SETUP &TC 100%	Measurable	2.458	2	o	o	o	OK	
11	Dimension of circlip groove	26.5 +0.1/0	HEIGHT GUAGE	—																	5/SETU P &TC	Measurable	2.34	2	o	o	o	OK	
12	Dimension of circlip groove	61.3 0/-0.1	HEIGHT GUAGE	—																	5/SETU P &TC	Measurable	1.739	2	o	o	o	OK	
13	Overpin diameter of spline.	INV.S. 17X22X0.75 18.658 -0.011/-0.077	OD MICROMETER & PIN ø 1.50	—	■																5/LOT	Measurable	1.708	2	o	o	o	OK	
14	Surface	Rz 25 MAX	ROUGHNESS TESTER	—	■																1/LOT	Measurable	2.265	2	o	o	o	OK	
15	Base tangent length over k teeth ( k =3) <Measurement of all teeth up to stabilization of quality, 4 measurements in x, y direction after stabilization>	14.118 -0.038/-0.075	SPAN MIC	—	■																5/LOT	Measurable	1.804	2	o	o	o	OK	
16	Total profile error	18 μm MAX	GEAR TESTER	—	■																5/LOT	Measurable	2.652	2	-	-	-	-	cp only
17	Total alignment error	18 μm MAX	GEAR TESTER	—	■																5/LOT	Measurable	2.284	2	-	-	-	-	cp only
18	Radial run-out of teeth (Gear single item)	0.056 MAX	PCD TESTER	—																	5/LOT	Measurable	1.793	2	o	o	o	OK	
19	Spline circumferential run out	0.1 MAX (Datum D-E)	BENCH CENTER & DIAL GAUGE	—	■																1/LOT	Measurable	2.696	2	o	o	o	OK	
20	Stroke feed of run-out correcting	Standard: Prohibition of run-out correction When it is inevitable to carry out straightening, determine the stroke upper limit value by the following method <Reference example> In mass production preparation stage, carry out the volume check, and calculate the average and standard deviation(σ) of stroke occurrence of cracks on the outermost surface. Upper limit of the stroke = average — 4σ After correcting, no cracking on the outermost surface.		—																		Non -measurable	—						straightening report to be attached from bawal
21	Confirmation gear appearance	No dent and scratch , on chip and tooth side	VISUAL	—																	100%	Non -measurable	—	2					

Date28.02.2019

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27	Measurable	21	21	-	21	0	-
	Non Measurable	6			4	0	-

Supplier		HMSI	
Quality Head	In charge	Approved by	Checked by

Model	KONA	Part no.	23211-KONA-D010
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Part name	SHAFT MAIN
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DCN	KONA-E-103
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Supplier name	MAP-BLR
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To process-based, please write if there is a change in the new process (Use V for marking)	PQCS <<Base process flow>> <input type="checkbox"/> Base Model <input type="checkbox"/> Base Plant	RECEIVING INSPECTION	FACING CENTERING	STRAIGHTENING	GUNDRILLING	TURNING	SPLINE DEBURRING	THREAD ROLLING	OIL HOLE DRILLING	JIG SETTING & CONDITION CHECKING	PREWASHING	PRE HEATING	CARBURSING & TEMPERING	POST WASHING	SHOT BLASTING	THREAD ANNEALING	CENTER LAPPING	STRAIGHTENING	OIL HOLE DEBURRING	GRINDING	FINAL INSPECTION	<<Change point note column>> Detail of change point etc.
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Mark in necessary item against above mentioned process ① No change from base - ● ② There is a change from base - ★	4M situation	Raw materials	★	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<<Part feature note column>> Specific information about 4M situation
		Die Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Jig and Fixture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Mfg. Tools	-	★	-	★	-	-	★	-	-	-	-	-	-	★	-	-	-	-	-	
		Insp. Tool	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Operator training	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		PQCS	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		Work Std.	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	
		Check sheet	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	

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No.	Critical item	Control value	Insp. Tool	Inspection process : ■																				Measurable/ Non-Measurable	Cp/Cpk	No of Inspection	Includ ed in PQCS	Includ ed in Ope.	Operator Awareness	PAC-V	Remarks
22	Case depth	0.3 ~ 0.5 mm	MICROVICKERS	—											■							■	Measurable	2.56	2	o	o	o	OK	DESTRUCTIVE ITEM	
				Freq										1/LOT							1/LOT										
23	Effective hardening layer	Measure the hardness distribution with a micro Vickers hardness tester and check the distance from the surface of the hardened layer to the point of hardness HV 513.	MICROVICKERS	—											■							■	Non - measurable	--	2	o	o	o	OK	DESTRUCTIVE ITEM	
				Freq										1/LOT							5/LOT										
24	Carburized area hardness	HRA 78～83	ROCKWELL HARDNESS TESTER	—											■							■	Measurable	2.29	2	o	o	o	OK	DESTRUCTIVE ITEM	
				Freq										10/LOT							1/LOT										
25	Hardness inside	HRC 30～45	ROCKWELL HARDNESS TESTER	—											■							■	Measurable	2.04	2	o	o	o	OK	DESTRUCTIVE ITEM	
				Freq										1/LOT							1/LOT										
26	Root of thrad (Depth 0.2)	H v (0.3) 300～392	MICROVICKERS	—													■					■	Measurable	1.78	2	o	o	o	OK	DESTRUCTIVE ITEM	
				Freq												1/SETUP & TC /1/L OT					1/LOT										
27	All surfes	Confirm that there is not a de-coal bed	MICROSCOPE	—	No requirement in drawing 図面の要件なし							図面記載はありません 図面の要件なし					■						■	Non - measurable	--	2	o	o	o	OK	DESTRUCTIVE ITEM
				Freq														1/LOT													
				—								図面記載はありません 図面記載はありません																			

No requirement in drawing  
図面の要件なし

図面記載はありません  
しかし、脱炭層があると強度的に不利になるので管理項目として必要です。  
There is no drawing to describe  
However, if there is a decarburized layer, it becomes disadvantageous in strength, so it is necessary as a management item.


