## **QA MATRIX SHEET** Cp/Cpk Cp/Cpk Double or More | PAC-V | PAC-V | 06.12.2018 **XPQCS / FMEA Sheet must be attached** Supplier HMSI Date Total Category ≥1.33 <1.33 Check ОК NG OK Quality Head In charge Approved by Checked by Supplier name Measurable 3 ОК Part Non Measurable Part Model KONA 23010-K0NA-D020 SHAFT ASSY MAIN DCN KONA -E-103 MAP -BLR PRASHANTH SHIVA no. name ≪Change point note column≫ LING & GO PASS CHECKING Detail of change point etc. RECEIVING INSPECTIO CHILD PARTS PQCS ≪Base process flow≫ ☐Base Model ☐Base Plant To process-based, please write if there is a change in the new process (Use √ for marking) LING & GO PASS CHECKING PQCS «New process flow» ☐ New Model ☐ New Plant ■ New Supplier Raw materials ≪Part feature note column≫ Die Maintenance Specific information about 4M situation Mark in necessary item against above Equipment mentioned process Jig and Fixture ①No change from base - ● Mfg. Tools \* \* Insp. Tool ②There is a change from base - ★ \* \* Operator training PQCS \* \* \* $\star$ Work Std. Check sheet \* Process Assurance Capability - Verification Type a. Measurable items (Examples) Type b. Non Measurable items (Examples) Process Assurance Method (Non Measurable) Process Assurance Method (Measurable) 1) Assembly (Coupler, Bullet terminal, etc.) (PAC-V) will be OK if -1) Variable Dimensions 200% Check Measurable Cp/Cpk ≥ 1.33 Sample Inspection . Process Assurance (Type a, & b) result are OK for Critical items. 2) Torques 2) Visual Inspection Sample (Minimum Double check) Non Measurable 3) Grease / Oil /Adhesive applications Inspection 2. Critical items included in PQCS and Operation Std. 3) Destructive Hardness tests or Triple Check Cp/Cpk < 1.33 100% Inspection 4) Manufacturing process parameters 3. Operator aware about Critical item's importance. 4) Weld penetration 5) Specification test Note: For any deviation / change request Supplier must inform Purchase and 5) Cross Section dimension for which part cut is must SQA. 6) Breaking toque / load etc. 7) Salt Spray / CASS tests, Paint adhesion (100/100 etc.) Offline tests 8) Specification test (e.g. - Durability/ Endurance tests, Destructive tests etc. ) above Examples are case by case & may change as per Requirement ] Measurable/ Non-Operator Inspection process : Critical item Control value Insp. Tool Cp/Cpk PAC-V Remarks Measurable PQCS Ope. Std. Awareness nspection Install circlip to grooves completely,Round faces of inner dia of 0 OK Direction of setring installed VISUAL Non- measurable circlip shall be installed in dirction 5/LOT 100% 100% Freq shown in the figure. Circlip Circlip should not be missed. VISUAL Non- measurable 0 0 0 OK Freq 100% 100% 5/LOT • washer No washer should miss VISUAL Non- measurable 0 0 OK Freq 100% 100% 5/LOT

07010-FKHO

Cp/Cpk PAC-V PAC-V QA MATRIX SHEET Cp/Cpk 28.02.2019 More Check HMSI Date **※**PQCS / FMEA Sheet must be attached Total Category Nos Supplier ≥1.33 <1.33 OK NG PRASHANTH SHIVA 23211-K0NA-D010 Model K0NA SHAFT MAIN DCN KONA-E-103 MAP -BLR «Change point note column» Detail of change point etc. PQCS «Base process flow» □Base Model
□Base Plant To process-based, please write if there is a change in the new process (Use V for marking) CARBURISING & TEMPERING PQCS «New process flow» New Model
New Plant
New Supplier «Part feature note column»

Specific information about 4M situation Raw materials
Die Maintenance
Equipment
Jig and Fixture
Mfg. Tools
Insp. Tool
Operator trainir
PQCS
Work Std.
Check sheet 2)There is a change from base - ★ Process Assurance Capability - Verification (PACA') will be OK If 1. Process Assurance (Cirpos a, & b) result are OK. For Critical Items.
2. Critical Items included in POCS and Operation 3rd.
3. Operation wave about Critical Items in propratuce.
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) Cross Section dimension for which p ssurance Method (Non Measuration)

2005 Check
(Minimum Double check)

Sample Inspection Cp/Cpk Material S SCr420HV-SG SPECTRO atisfying SPEC 0092Z-GHA-C400 Freq 1/LOT 2 Inside of OIL hole No burrs allowed VISUAL /PLUG GAUGE Freq BRG Press-fit area outer diameter ф14 -0.011/-0.022 MICROMETER /ARG Measurable 2.36 2 1/SETUP &TC 100% 5/LOT Frea . BRG NEEDLE Press-fit area surface roughness Rz 3.2 MAX ROUGHNESS TESTER 2.49 Freq 1/SETUP &TC 1/LOT INV.S. 17X15X1.0 OD MICROMETER & PIN ø 1.80 1.75 ОК Overpin diameter of spline. 5/SETUF &TC 18.598 -0.036/-0.081 Freq 5/LOT -5/SETUP Surface Rz 8 MAX ROUGHNESS TESTER Measurable 1.73 2 Freq 1/LOT -M4 GEAR BUSH φ17 f7 -0.016/-0.034 1.78 MICROMETER /ARG 1/SETUP &TC 100% Freq 5/LOT Alteady given in point no 8 既にポイント8で与えられている M4 GEAR BUSH OD surface roughness ROUGHNESS TESTER Measurable 2.458 2 0 1/SETUP &TC 1/LOT φ17 f7 -0.016/-0.034 MICROMETER /ARG 1.89 BRG Press-fit area outer diameter Measurable 1/SETUP &TC 100% Freq 5/LOT . 10 BRG Press-fit area surface roughness Rz 6.3 MAX ROUGHNESS TESTER 2.458 1/SETUP &TC Freq 1/LOT 11 Dimension of circlip groove 26.5 +0.1/0 HEIGHT GUAGE Measurable 2.34 2 Freq 5/SETU P &TC 5/LOT • 12 61.3 0/-0.1 1.739 Dimension of circlip groove 5/SETU P &TC Freq 5/LOT \_ INV.S. 17X22X0.75 13 OD MICROMETER & PIN ø 1.50 1.708 Overpin diameter of spline. 18.658 -0.011/-0.077 Freq 5/LOT . Rz 25 MAX ROUGHNESS TESTER 2.265 5/SETUP &TC Freq 1/LOT • Base tangent length over k teeth 1.804 15 ( k = 3) < Measurement of all teeth up to stabilization of 14.118 -0.038/-0.075 SPAN MIC Measurable Freq quality, 4 measurements in x, y direction after stabilization> 2.652 16 Total profile error cp only 18 µm MAX GEAR TESTER Freq 5/LOT 17 2.284 2 Measurable cp only Total alignment error 18 μm MAX GEAR TESTER 5/LOT Radial run-out of teeth 18 0.056 MAX PCD TESTER 1.793 2 5/SETUP &TC 1/50 (Gear single item) Freq 5/LOT . 19 Spline circumferential run out 0.1 MAX (Datum D-E) BENCH CENTER & DIAL GAUGE 1/LOT Freq &TC 1/50 \_ Standard: Prohibition of run-out correction

When it is inevitable to carry out straightening, determine the stroke upper limit value by the following method <a href="Reference example">Reference example</a> In mass production preparation stage, carry out the volume check, and calculate the average and standard deviation(g) of stroke occurrence of cracks on the outermost surface. Upper limit of the stroke = average — 4a After correcting, no cracking on the outermost surface. Stroke feed of run-out correcting raigtening report to b attached from bawal Freq

100%

100%

21

Confirmation gear appearance

No dent and scratch , on chip and tooth side

Frea

					Date	28.	02.2019	*	PQCS / FN	MEA Sheet	must be	attache	<u>d</u>					Total		Catego	ory	Nos	Cp/Cpk ≥1.	3 Cp/Cpk <1.33	B Dou More	uble or e Check PAC	-V OK PAC	:-V G		Supplie	ır		нм
													Supplie	er name			[	27		Measura	able	21	21	· .	_		0 -		Qua	ality Head	In charge	App	proved by
Model KONA Part no.	23211-K0	NA-D010	Part name		SHAFT MAIN				OCN KON	NA-E-103				M	MAP -BLR				N	on Meas	urable	6				4	0 -						
																														==			==
To process-based, please write		PQCS «Base process flow»  Base Model  Base Plant				RECEIVING INSPE CTION	FACING CENTERING		TURNING	SPLINE DEBURRING	THREAD ROLLING	JE I	JIG SETTING & CONDITION CHECKING	PREWASHING PRE HEATING	CARBURISING & TEMPERING	POST WASHING	SHOT BLASTING	THREAD ANNEALING	CENTER LAPPING	STRAIGHTENING	OIL HOLE DEBURRING	GRINDING	FINAL INSPECTION	«Change poin Detail of chang									
if there is a change in the new process (Use V for marking)		PQCS «New process flow»  New Model  New Plant  New Supplier				RECEIVING INSPE CTION	FACING CENTERING	GUNDRILLING	TURNING	SPLINE DEBURRING	THREAD ROLLING	OIL HOLE DRILLING	JIG SETTING & CONDITION CHECKING	PREWASHING PRE HEATING	CARBURISING & TEMPERING	POST WASHING	SHOT BLASTING	THREAD ANNEALING	CENTER LAPPING	STRAIGHTENING	OIL HOLE DEBURRING	GRINDING	FINAL INSPECTION										
		Raw materials				*		-   -	Τ-		-	-		-   -	T	-	-		-					«Part feature n	note colum	nn»							
		Die Maintenance				T - 1		-   -	-	-	-	-	-	-   -	-	-		-	-		-	-	-	Specific informat	ation abou	ut 4M situation							
1		Equipment				T - 1		-	-		-			-   -	-						-	-											
Mark in necessary item against above mentioned process		Jig and Fixture				-	-   -	-   -	-	-	-	-		-   -	-	-	-	-	-	-	-	-	-										
①No change from base - •		Mfg. Tools				-	* -	- *	-		-	*		-   -		-	-	*	-			-											
②There is a change from base - ★		Insp. Tool					-   -	_	-		-	-		-   -	-	-	-	-			-												
		Operator training					* *	_	_	*	*	*		* *	*	*	*	*		*	*	*	*										
		PQCS					* *	_	_	*	*	*		* *	*	*	*	*		*	*	*	*										
		Work Std.					* *		_	+		*		* *	*	*	*	*		*	*	*	*										
December Assumed Complith, Varification		Check sheet	1.	Torre a Manuschia Province		*	* *	* *	*	*	*	*	*	* *	*	*	*	*	*	*	*	*	*	(From ale:)					Process Account	ce Method (Non Mear	aoirahio)		
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) Cross Section dimension for which part 6) Breaking toque / load etc.	cut is must								Measurable		Ca/Cpk×			Sample Impector				Assembly (C     Visual Inspe     Grease / Oil	/Adhesive appl ing process para	rminal. etc.)			No.	ion Measurable			200% Check linimum Double check or Triple Check	k)	Sample
No. Critical item		Control value		Insp. Tool										Inspection p	orocess : ■							7) Salt Spray /	CASS tocts: Pain	Measurable/ Measurab		Cp/Cpk	No of Inspection	ed i	clud Includ d in d in QCS Ope.	Operat		-v	Remar
					_										•										T			Fuc	сз Оре.			1	
22 Case depth		0.3 ~ 0.5 mm		MICROVICKERS	Freq										1/LOT								1/LO1	Measurab	ble	2.56	2	0	0 0	0	ОК	:   "	ESTRU( ITEN
23 Effective hardening layer	Vickers hard	hardness distribution with dness tester and check the our prace of the hardened layer	istance	MICROVICKERS	_										•								•	Non - measurab	- 1		2	С	0 0	0	ОК	( D'	ESTRUC ITEM
		oint of hardness HV 513.			Freq										1/LOT								5/LO1		_		<u> </u>	_	4	_	_	_	
24 Carburized area hardness		HRA 78∼83	RO	OCKWELL HARDNESS TESTER	Freq										■ 10/LOT								1/LO1	Measurab	ble	2.29	2	o	0 0	0	ОК	( DI	ESTRUC ITEM
25 Hardness inside		HRC 30∼45	PO	OCKWELL HARDNESS TESTER	_										-								•	Measurab	hle	2.04	2		0 0	0	ОК	, D	ESTRUC
23 Hardness Histor		TIME 30 '43	NO	SCRWELL HARDNESS TESTER	Freq										1/LOT								1/LO1	1	oic	2.04							ITEN
26 Root of thrad (Depth 0.2)		H v (0.3) 300∼392		MICROVICKERS	_													■ 1/SETUP					•	Measurab	ble	1.78	2	ر ا			ОК	, D	ESTRU
, , , , , , , , , , , , , , , , , , ,					Freq													&TC /1/LOT					1/L01	1		•	<u> </u>	<u></u>	_	1	4	1	ITEN
27 All surfes	Confirm	that there is not a de-coal	ped	MICROSCOPE	_		No	requiremen 図面の要	t in drawing 件なし	B					•								•	Non - measurab			2	С	0 0		ОК	( D	ESTRU ITEN
					Freq							図面記	載はありませ	ŧ.	1/LOT								1/LO1	casuldi	-		_	$\perp$	$\perp$	$\perp$	$\bot$	_	
					_							に不利! て必要?	脱炭層があ になるので管 です。	理項目とし																			
					Freq			$\perp$				Howeve decarbu disadvar	s no drawing t er, if there is a urized layer, i intageous in s	a it becomes strength, so													_	$\perp$	$\perp$	4	$\perp$	_	
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					Freq																				_			_	4	4	_	_	
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			13.304	13.985	0.002	0.001	13.989	13.978	13.98	13.98	13.99	13.98	13.99	13.98	13.99	13.98	13.99	13.99	13.99	13.98	13.99	13.98	13.99	13.98	13.99	13.98	13.99	13.99	13.98	13.99	13.99	13.98	13.98	13.99	13.98	13.99	13.98	13.99
1.75 2	2.01	2.450	1.450	1.695	1.000	0.201	3.200	0.000	1.280	1.620	1.680	1.730	1.580	1.540	1.660	1.450	1.910	1.630	1.580	1.570	1.680	1.580	1.630	1.590	1.990	2.450	1.690	1.580	1.630	1.890	1.680	1.740	1.890	1.650	1.660	1.720	1.880	1.680
	2.01	18.543	18.529	18.537	0.014	0.004	18.562	18.517	18.536	18.534	18.539	18.543	18.540	18.536	18.535	18.542	18.539	18.537	18.542	18.539	18.542	18.539	18.529	18.536	18.530	18.532	18.534	18.531	18.536	18.534	18.536	18.532	18.538	18.538	18.536	18.534	18.540 1	18.541
1.73 1.	1.89	5.470	3.150	4.333	2.320	0.705	8.000	0.000	4.560	4.100	4.830	4.560	3.820	5.470	4.820	5.290	4.590	5.240	4.820	5.240	5.120	5.260	4.280	4.260	4.850	3.540	3.260	3.330	4.820	3.290	4.220	4.360	3.150	4.150	3.280	3.730	3.590	4.150
1.78 2	2.28	16.979	16.974	16.977	0.005	0.001	16.984	16.966	16.976	16.979	16.976	16.978	16.977	16.978	16.976	16.978	16.978	16.976	16.978	16.978	16.979	16.979	16.977	16.976	16.978	16.976	16.975	16.978	16.978	16.976	16.976	16.976	16.975	16.974	16.976	16.977	16.978 1	16.978
2.46 2	2.73	4.180	2.840	3.469	1.340	0.384	6.300	0.000	3.280	2.900	3.340	2.850	2.960	4.120	3.240	3.850	3.240	3.390	4.120	2.840	3.360	2.980	3.450	3.520	3.580	4.180	3.920	2.980	3.360	3.570	3.290	3.540	3.820	3.390	3.750	3.590	3.890	3.760
1.89 1	1.94	16.978	16.972	16.975	0.006	0.002	16.984	16.966	16.974	16.976	16.975	16.975	16.973	16.973	16.973	16.974	16.973	16.973	16.975	16.974	16.975	16.976	16.976	16.975	16.976	16.976	16.976	16.975	16.975	16.978	16.972	16.976	16.976	16.978	16.975	16.973	16.975 1	16.972
.458 2.	2.734	4.180	2.840	3.469	1.340	0.384	6.300	0.000	3.280	2.900	3.340	2.850	2.960	4.120	3.240	3.850	3.240	3.390	4.120	2.840	3.360	2.980	3.450	3.520	3.580	4.180	3.920	2.980	3.360	3.570	3.290	3.540	3.820	3.390	3.750	3.590	3.890	3.760
.340 2.4	2.455	26.560	26.540	26.548	0.020	0.007	26.600	26.500	26.540	26.560	26.540	26.540	26.560	26.540	26.560	26.550	26.540	26.560	26.550	26.550	26.550	26.540	26.550	26.540	26.550	26.550	26.550	26.550	26.540	26.550	26.540	26.550	26.550	26.540	26.540	26.550	26.550 1	26.550
.739 2.	2.070	61.280	61.250	61.258	0.030	0.008	61.300	61.200	61.25	61.26	61.28	61.26	61.26	61.25	61.25	61.26	61.26	61.26	61.26	61.25	61.25	61.25	61.25	61.25	61.28	61.26	61.26	61.26	61.27	61.25	61.26	61.25	61.26	61.25	61.26	61.26	51.26	61.26
.708 2.:	2.279	18.618	18.597	18.606	0.021	0.005	18.647	18.581	18.604	18.610	18.603	18.605	18.604	18.609	18.603	18.602	18.610	18.609	18.606	18.609	18.610	18.603	18.610	18.612	18.618	18.610	18.609	18.609	18.601	18.600	18.603	18.598	18.602	18.606	18.599	18.601	18.597 2	18.610
.265 2.	2.548	18.120	10.120	13.890	8.000	1.635	25.000	0.000	11.920	16.820	12.450	13.840	12.920	10.120	12.980	12.880	13.250	14.610	12.950	13.840	12.950	13.860	18.120	13.820	13.860	14.820	13.860	13.820	14.520	15.520	14.520	13.820	13.590	13.570	14.520	17.930	12.100 1	12.920
.804 1.9	1.941	14.066	14.052	14.060	0.014	0.003	14.080	14.043	14.063	14.059	14.061	14.059	14.062	14.058	14.056	14.059	14.056	14.056	14.052	14.056	14.059	14.059	14.064	14.059	14.063	14.066	14.064	14.065	14.062	14.063	14.062	14.063	14.059	14.059	14.059	14.061	14.059 1	14.063
.652 2.3	2.821	12.400	7.600	9.540	4.800	1.063	18.000	0.000	9.700	9.600	8.500	9.800	7.600	8.400	9.400	9.400	9.600	9.400	9.400	8.700	8.700	8.600	8.400	9.500	9.600	9.500	9.400	9.600	8.700	11.400	12.400	12.100	11.400	9.800	9.600	9.500	<b>3.600</b> ∤	8.900
.284 2.3	2.323	11.400	6.500	9.153	4.900	1.291	18.000	0.000	9.600	9.500	8.700	9.600	9.700	8.500	8.400	8.500	9.600	7.500	9.800	8.500	7.800	6.500	7.400	9.800	8.700	8.600	8.500	7.400	6.900	9.800	10.800	10.400	11.400	9.600	11.100	10.500	10.600 1	10.900
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.793 2.:	2.202	0.041	0.024	0.033	0.017	0.004	0.056	0.000	0.038	0.032	0.041	0.039	0.032	0.029	0.031	0.028	0.036	0.035	0.028	0.035	0.037	0.036	0.028	0.033	0.028	0.036	0.024	0.036	0.033	0.032	0.030	0.039	0.035	0.037	0.036	0.028	1.036	0.028
.696 3.4	3.054	0.065	0.045	0.056	0.020	0.005	0.100	0.000	0.052	0.046	0.062	0.048	0.059	0.055	0.048	0.053	0.049	0.058	0.063	0.057	0.048	0.056	0.059	0.061	0.052	0.056	0.058	0.065	0.045	0.062	0.052	0.058	0.056	0.058	0.061	0.058	0.058	0.063
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07010-FRHO-F0-001

	Aut	formula in Ce to calculated	l (Do not distu	rb formula)			Supplier input ar	ea (Sample readin	gs) -																											
Cpk	Ср	Max.	Min.	Aver.	Range	Std. Dev.	USL	LSL	1	2	3	4	5	6	7	8	9	10	11	12	13	14 15	16	17	18	19	20	21	22	23	24	25	26	27	28 2	9 3
0.82	2.56	0.480	0.450	0.468	0.030	0.013	0.500	0.300	0.480	0.470	0.460	0.450	0.480																							
‡DIV/0!	#DIV/0!	0.000	0.000	#DIV/0!	0.000	#DIV/0!																														
2.29	3.12	81.500	81.000	81.164	0.500	0.267	83.000	78.000	80.900	81.500	81.400	81.000	81.020																							
2.04	2.19	40.000	37.300	38.020	2.700	1.143	45.000	30.000	37.300	40.000	37.500	38.000	37.300																							
1.22	1.78	######	354.000	360.400	21.000	8.620	392.000	300.000	354.00	375.00	359.00	360.00	354.00																							
#DIV/0!	#DIV/0!	0.000	0.000	#DIV/0!	0.000	#DIV/0!																														
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