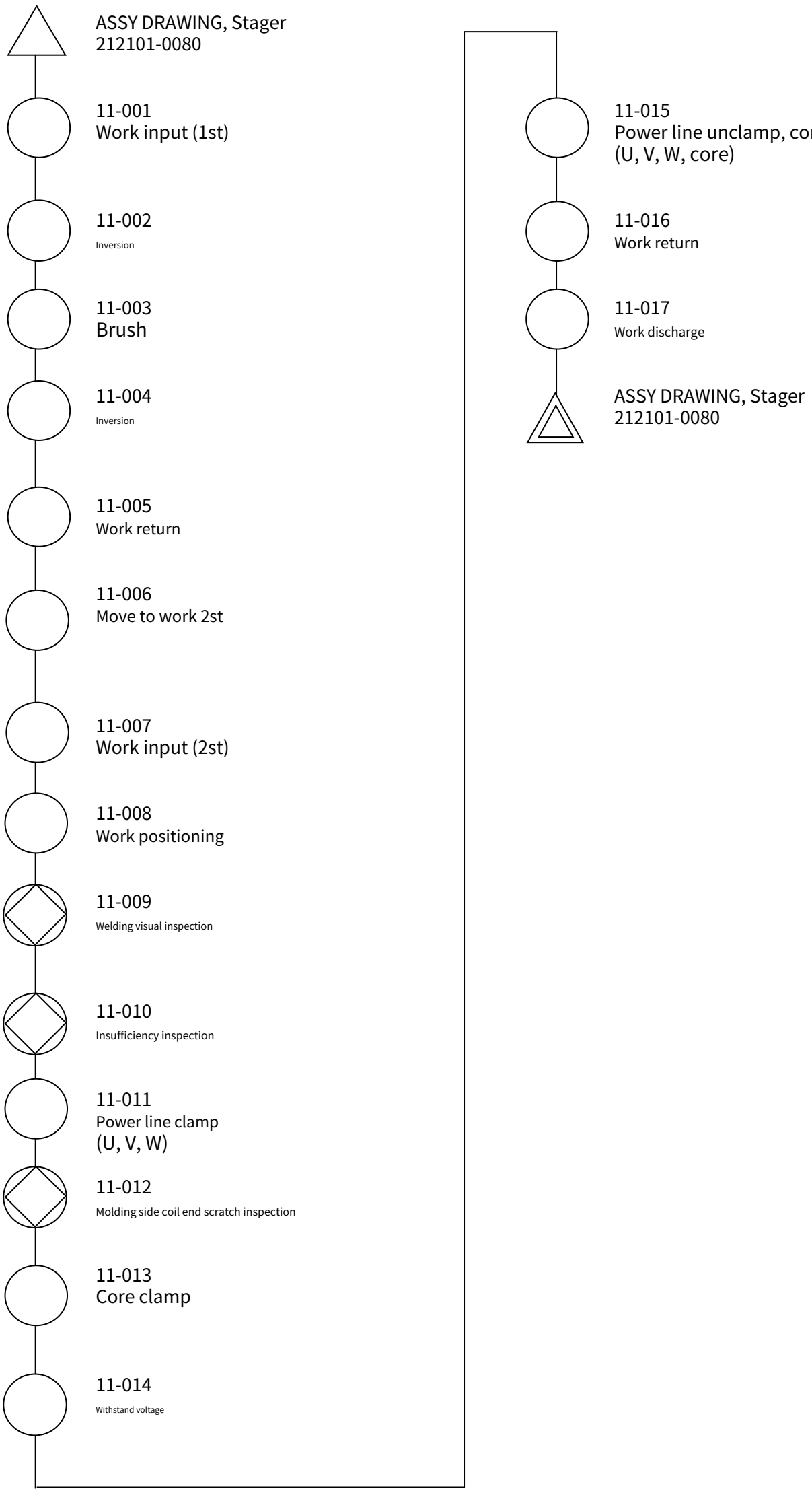
DENSO

Parties outside the secret

１枚がベスト

Structure system diagram	Issuing section: Electric manufacturing department 2 production engineering room 4 date of creation: 2/8/2016	Approval: 吉 6/02/08 田	examination: 小 6/02/08 坂	create: Big 16/01/08 original			Distribution cloth Ahead					

Line name	Assembly part number, part name	name
690A MG Stereoline	212100-0080 Stater S / A, Mo Tar	For initial flow Priority management designation
System No. Systematic name <0/5> 11 11 Welding visual device (general part / neutral point)	Model Product Name 212100-0080 Stater S / A, Mo Tar	Delivery destination, reserved vehicle type Toyota 690A



No.	Revision Date	Revision item	Reason for revision	Revised person
△ 4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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1枚がベスト

Process control statement

Issuing section	Approval	examination	create	Distribution cloth Ahead
Electric manufacturing department 2 production engineering room 4	吉 6/02/08 田	小 6/02/08 坂	Big 16/01/08 original	
date of creation: 2/8/2016				

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name: For initial flow

Priority management designation: S C C C 13 1 2

Process No. / Process name / Station name <1/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

General part (189 points), neutral point (3 points)

Welding ball performance can be judged

Remove soot generated during welding.

[Inspection St.] 1st Brush hanging

<Equipment>

NO.1 equipment

Equipment machine number	IMB-1817
Equipment name	Welding vision device
Model	—
capacity	7.2kW, 2t
Manufacturer name	Machinery Department

<Material>

Brush

Material name	Connected ϕ0.2
Material Grade	Nylon resin
Manufacturer name	Kowa Co., Ltd.
Size	ϕ100 horizontal winding brush Hair length 20mm
Replacement frequency	Every 30,000 units

Filter

Material name	Nylon mesh filter
Material Grade	Nylon (NBC Meshtec)
Manufacturer name	Kowa Co., Ltd.
Size	ϕ85
Replacement frequency	Every 10,000 units

<Processing (inspection) conditions>

Brush pressing depth	3mm
Brush hair length	20mm ± 1mm
Brush rotation speed	2500 ± 100 rpm (Guyhead reduction ratio 1/15)
Work insertion height	93.0 ± 0.2mm (Based on the core edge on the molding side)
Suction pressure (negative pressure)	--0.5kPa or less
Cycle time	50s

<Working method>

※full automatic

1. Carrying in to 1st.

2. Invert the work with an inversion machine

(Top surface: powder side → top surface: molding side)

3. 3. Rotate the brush (rotate & revolve) with a brush hooker

Remove soot on the surface of the molten ball

(Foreign matter removed is back Suction with

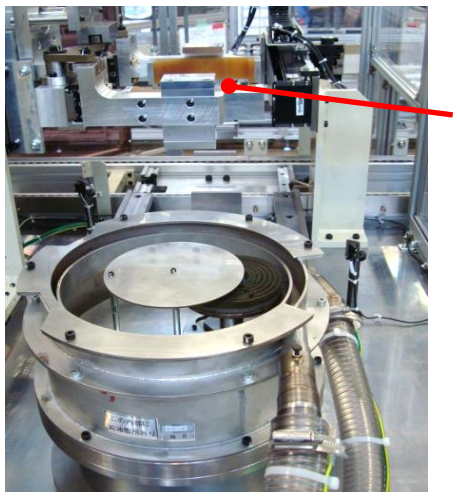
Four. Invert the work with a reversing machine

(Top surface: molding side → top surface: powder side)

5. Carry out 1st, go to 2st

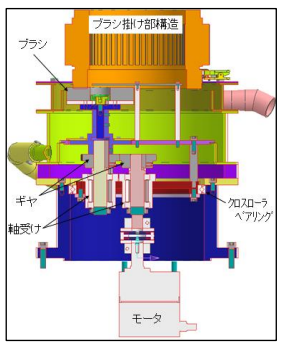
<Processing drawing>

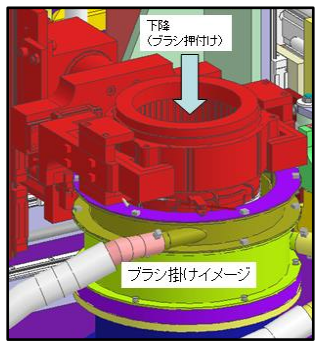
[Overview of the entire facility]

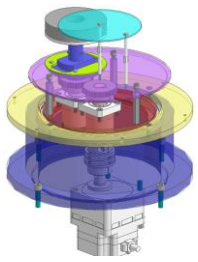


Reversing machine

[Overview of the unit]

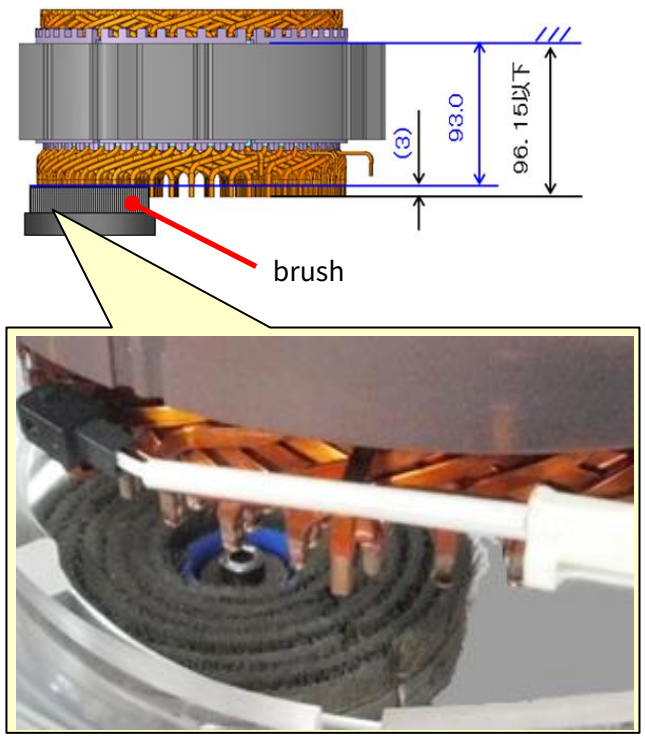






<Processing drawing>

[Processing standards]



<Master check>

Perform a master check at the time of in-process (1 / straight).

Pay out from the welding visual inspection machine.

<Defective product treatment>

Work that is judged to be NG (defective product) by inspection should be reintroduced.

<Regular cleaning>

For the following items, perform regular 1 / direct cleaning using a fence or the like.

・ Brush cleaning once / directly (at the time of work in process)

* Cleaning is vacuum cleaner suction.

・ Filter replacement once / 2W Four

・ Brush exchange once / 6M Four

<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
		1	Main air pressure 0.4 ± 0.05MPa Visual indicator	1 / Direct (at the time of work in process)	Condition management Check sheet	worker		Common to 1st and 2st	
		2							
		3							
		Four							
		Five							
		6							
		7							
		8							

No.	Revision Date	Revision item	Reason for revision	Revised person
△ 4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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1枚がベスト

Process control statement

Issuing section	Approval	examination	create	Distribution
Electric manufacturing department 2 production engineering room 4	吉 6/02/08 田	小 6/02/08 坂	Big 16/01/08 original	cloth Ahead
date of creation 2/8/2016				

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name For initial flow

Priority management designation SCCC 13 1 2 17 17

Process No. Process name Station name <2/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

General part (189 points), neutral point (3 points)

An image of the welding ball is taken to judge the quality of the welding ball, and a quality judgment is made by an image processing inspection.

[Inspection St.] 2st Welding visual inspection

<Equipment>

NO.1 equipment

Equipment machine number IMB-1817

Equipment name Welding vision device

Model —

capacity 7.2kW, 2t

Manufacturer name Machinery Department

<Equipment>

① Camera: IS5604-11 (Ki (Made by Ens) x 2

② Lens : SV-5018MP (Ki (Made by Ens) x 2

③ Control La: OPPF-30MP (Ki (Made by Ens) x 1

④ Lighting (dome): OPCX-50W (Ki (Made by Ens) x 2

⑤ Lighting (coaxial): OPPF-30SP (Ki (Made by Ens) x 2

<Master>

Master name: NG master

Work information: No.20

Welding visual judgment image check

Welding ball parting, top surface unmelted NG check /

Welding ball small / ball large / Gap NG check

<Processing (inspection) conditions> (Welding vision)

・ Shatter speed : 85 μs / 1 line

・ Line trigger cycle : 1: 1

-Number of pixels: 1024 x 8192

・ Cycle time 50s

Wind threshold

◇ Wind4-1 set value	Min 600	Max 1200
◇ Wind4-2 Set value	Min 650	Max 1200
◇ Wind4-3 setting value	Min 650	Max 1200
◇ Wind4-4 set value	Min 700 700	Max 1200
◇ Wind4 (neutral point)	Min 650	Max 1200

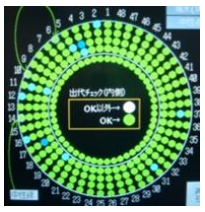
* See the attached sheet for details of other Wind thresholds.

<Working method>

※full automatic

1. Carry the work into the equipment 2st and take a picture vertically to the weld.
2. Perform a visual inspection of the weld ball (2 images).
3. Find the binarization process, Wind edge, and center of the image.
4. Detect the weld area based on the obtained center.
5. Visual test pass / fail judgment is carried out.
6. To insulation measurement. (In the case of NG, the discharge lens is automatically discharged)

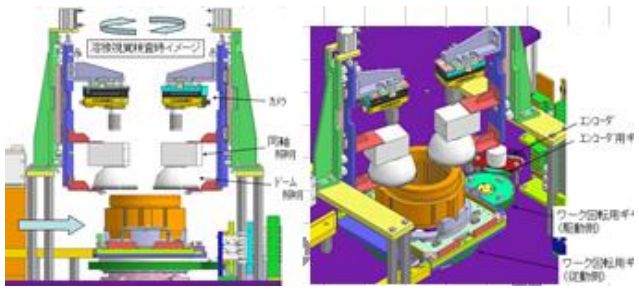
◇ Judgment result display



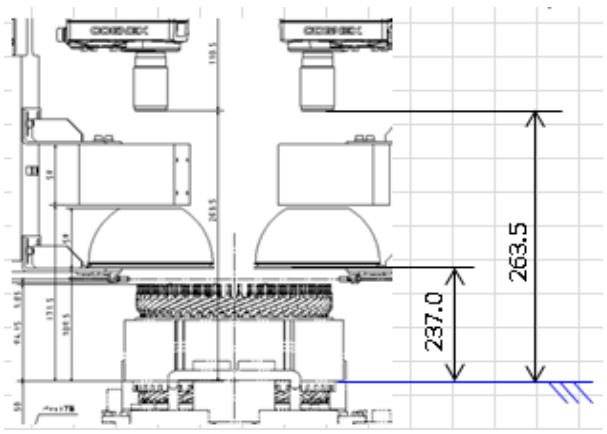
◇ Visual check area

<Processing drawing>

[Overview of the entire facility]



[Camera / lighting position setting]



[Inspection algorithm]

1. 1. Connected-component in wind1

Calculate the pitch in the X and Y directions from the weld balls for 3 slots r.>

2. Position wind2 from the detected reference position

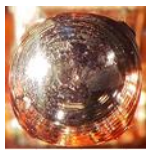
Two weld balls are detected on the inner and outer peripheral sides of the model search. * 2 Wind position is corrected for each slot.

3. 3. Detects radial pitch and circumferential axis deviation from the search model position 4. Calculate the axis center of each of the inner circumference side and the outer circumference side

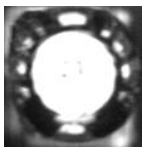
Position wind4-1 and wind4-2,

It is detected by the blob area and judged as good or bad.

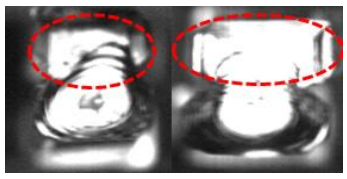
[Good product]



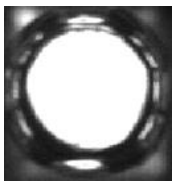
→ Image taken



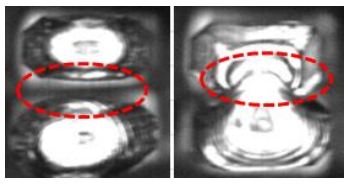
[Defective product-NG corner remaining]



[Defective product-Tamadai NG]



[Defective product-ball farewell NG]



[Defective product-small ball NG]

Welded area is binarized, and welded and unwelded parts

By making a distinction, the ball breaks up and the corner residue is detected.

<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
		1	OK / NG judgment This machine	1 / Direct (at the time of work in process)	Check sheet	worker			
		2	Must check OK / NG Judgment 4 This machine	1 / Direct (at the time of work in process)	Recording paper	Team leader			
		3	Illuminance check OK judgment This machine	1 / Direct (at the time of work in process)	Equipment check	worker			
		Four	General weld shape This machine	100%	Equipment check	Team leader			
		Five	Neutral spot weld shape This machine	100%	Equipment check	Team leader			
		6	Welding ball check NG (48 slots each, 1 to 4 layers) This machine	100%	P control chart	Team leader			
		7							
		8							

No.	Revision Date	Revision item	Reason for revision	Revised person
△ 4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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Process control statement

Issuing section	Approval	examination	create
Electric manufacturing department 2 production engineering room 4	吉田 16/02/08	小坂 16/02/08	Big 16/01/08 original
date of creation 2/8/2016			

Distribution cloth Ahead

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name For initial flow

Priority management designation SCCC 13 1 2 17 17

Process No. Process name Station name <2/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

General part (189 points), neutral point (3 points)

An image of the welding ball is taken to judge the quality of the welding ball, and a quality judgment is made by an image processing inspection.

[Inspection St.] 2st Welding visual inspection

<Equipment> <Equipment> conforms to the previous specifications.

NO.1 equipment

Equipment machine number	IMB-1817
Equipment name	Welding vision device
Model	—
capacity	7.2kW, 2t
Manufacturer name	Machinery Department

<Master>

Master name: NG master

Work information: No.20

Welding visual judgment image check

Welding ball parting, top surface unmelted NG check /

Welding ball small / ball large / Gap NG check

<Processing (inspection) conditions> (Welding vision)

- Shatter speed : 85 μs / 1 line
- Line trigger cycle : 1: 1

-Number of pixels: 1024 x 8192

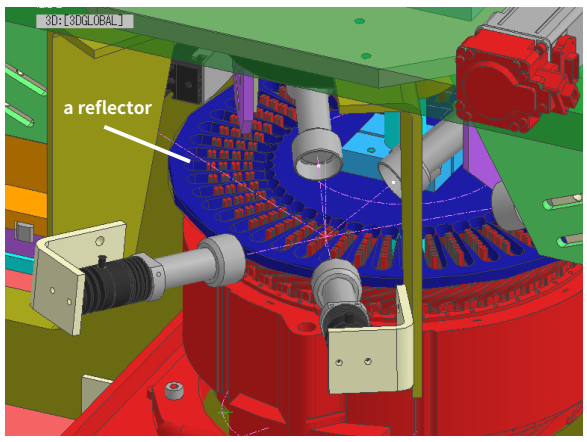
- Cycle time 50s

<Additional specification conditions> (Welding vision)

◆ Added NG detection for gap between slots

Purpose: Avoiding visual unit interference trouble due to abnormal welding shape

◇ Measures to prevent interference between the reflector (blue, disk-shaped) and the work



Schematic diagram of general welding visual inspection machine No. 2

<Working method>

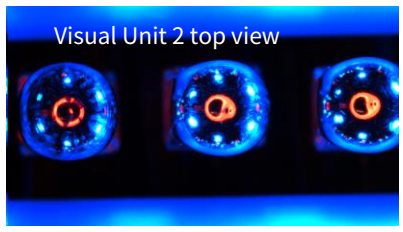
※full automatic

1. Carry the work into the equipment 2st and take a picture vertically to the weld.
2. Perform a visual inspection of the weld ball (2 images).
3. Find the binarization process, Wind edge, and center of the image.
4. Detect the weld area based on the obtained center.
5. Detect the circumferential weld area in the Wind to be added.
6. Replaced with the current coil interlayer Gap NG detection item. Slot-to-slot gap NG detection, welding abnormality inspection quality
7. In case of NG, discharge lane is automatically discharged (defective product)

* It is judged as NG abolition once.

→ Visual Unit 2 Prevention of interference with the reflector

[Good product]



[Defective product-circumferential direction, ball flow NG]

↑ Welding ball and reflector interference state

[Inspection algorithm]

1. 1. Connected-component in wind1

Calculate the pitch in the X and Y directions from the welding balls for 3 slots. Position wind2 from the detected reference position

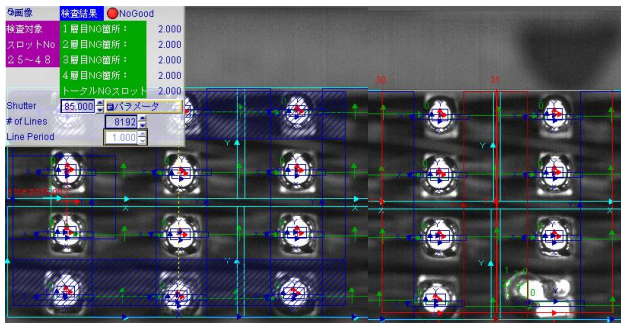
Two weld balls are detected on the inner and outer peripheral sides of the model search. * 2 Wind position is corrected for each slot.

3. 3. Detects radial pitch and circumferential axis deviation from the search model position 4. Calculate the axis center of each of the inner circumference side and the outer circumference side

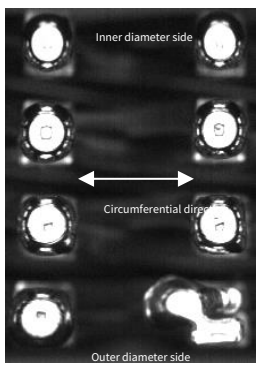
Size Position wind4-1 and wind4-2,

It is detected by the blob area and judged as good or bad.

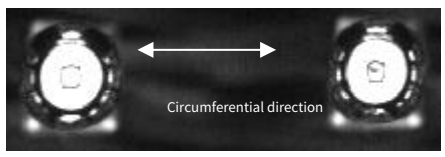
◇ Inspection result image



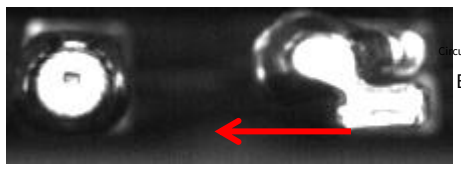
[Visual No. 1, captured image]



[Good product]



[Defective product-circumferential direction, ball flow NG]



Circumferential direction

Ball flow state

<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
		1	OK / NG judgment This machine	1 / Direct (at the time of work in process)	Check sheet	worker			
		2	Must check OK / NG Judgment 4 This machine	1 / Direct (at the time of work in process)	Recording paper	Team leader			
		3	Illuminance check OK judgment This machine	1 / Direct (at the time of work in process)	Equipment check	worker			
		Four	General weld shape This machine	100%	Equipment check	Team leader			
		Five	Neutral spot weld shape This machine	100%	Equipment check	Team leader			
		6	Welding ball check NG (48 slots each, 1 to 4 layers) This machine	100%	P control chart	Team leader			
		7							
		8							

No.	Revision Date	Revision item	Reason for revision	Revised person
△ 4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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Process control statement

Issuing section	Approval	examination	create	Distribution cloth Ahead
Electric manufacturing department 2 production engineering room 4	吉 16/02/08 田	小 16/02/08 坂	Big 16/01/08 original	
date of creation 2/8/2016				

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name For initial flow

Priority management designation SCCC 13 1 2 17.17

Process No. Process name Station name <3/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

Take a picture of the slot paper from the end face of the core that all the slot paper fits between the coil and the core.

The quality is judged by image processing inspection.

[Inspection St.] 2st Insufficiency inspection

<Equipment>

NO.1 equipment

Equipment machine number IMB-1817

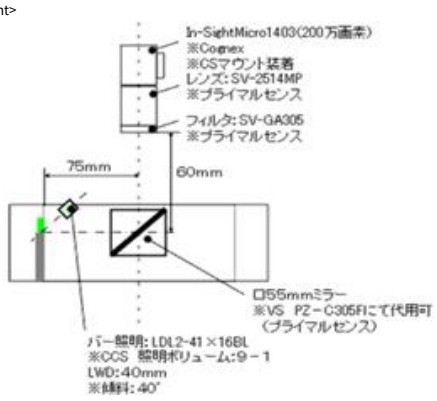
Equipment name Welding visual device (Insyu visual perception)

Model —

capacity 7.2kW, 2t

Manufacturer name Machinery Department

<Equipment>



<Master>

NO.1 Master

Work information No. 20

Master name Accuracy master <NG judgment master>

(Welding vision, Ionic NG master Including)

<Processing (inspection) conditions> * Formal judgment is made based on the initial flow.

Processing conditions (visual perception of insufficiency)

- Shatter speed : 8μs / 1 line
- Line trigger cycle : none
- Number of pixels: 1600 x 1200 pixels (continuous capture)
- Cycle time 50s

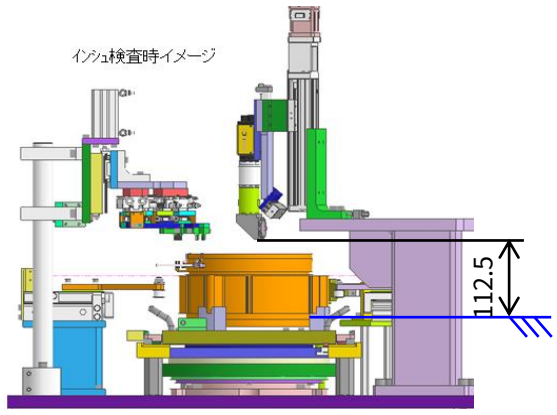
<Working method>

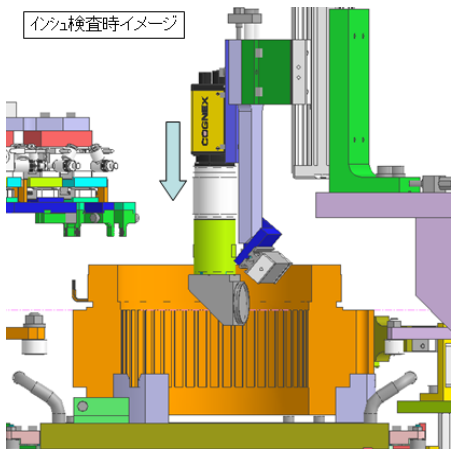
※full automatic

1. Ishinshu inspection camera Insert it on the inner diameter side.
2. Index imaging and inspection of the work. (3slot x 16 images)
3. Find the binarization process, wind edge, and height of the shot.
4. The allowance is 1.6 mm or more and 3.9 mm or less: OK judgment
   Other than that, NG judgment is made.
   * Resolution: 0.025 mm / pixel
6. To the molding side ionic inspection. (In case of NG, discharge lens is automatic Execution

<Processing drawing>

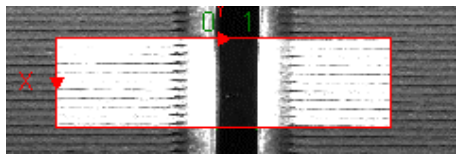
[Camera position setting]





[Measurement algorithm]

1. 1. The inside of Wind0 is stretched to emphasize the center of the slot.



2. Detects uninterrupted black edge position (slot position) in Wind0 3. Above 2. Positioning wind1-1 from the result of

3. Emphasize the core end face position ① by stretching the area. Top ⇒ bottom black ⇒ white edge detection in Wind1-1

Measure the core end face position ①

Five. Above 4. Positioning wind2-1 from the result of

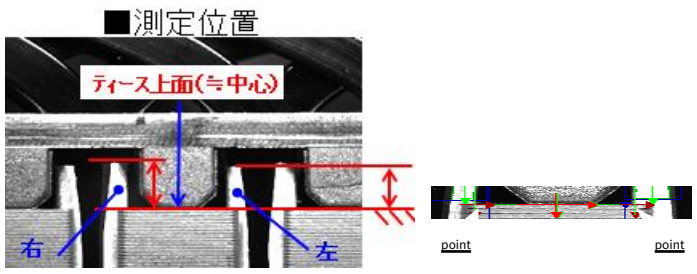
Detect points A and B within the standard from the left ⇒ right edge position 6. Above 5. Position wind3-1 to Wind5-1 from point A

Detect the circumscribed rectangle (XYWH) of the white blob in the area 7. Above 2. Position wind1-2 from the result of

8. Emphasize the core end face position ② by stretching the area. Top ⇒ bottom black ⇒ white edge detection in Wind1-2

Measure the core end face position ②

9. Judge whether the detected height is within the standard and output OK / NG.



<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
◇		1	OK / NG judgment / This machine	1 / Direct (at the time of work in process)	Check sheet	worker			
○+◇	C	2	Inshu paper shide (creeping distance) 1.6 or above,3.9Less than / This machine (1)	100% 4 / Nao	P control chart xR control chart	Team leader		Manage Max / Min values	
		3							
		Four							
		Five							
		6							
		7							
		8							

No.	Revision Date	Revision item	Reason for revision	Revised person
△4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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Process control statement

Issuing section	Approval	examination	create
Electric manufacturing department 2 production engineering room 4	吉 16/02/08 田	小 16/02/08 坂	Big 16/01/08 original
date of creation 2/8/2016			

Distribution cloth Ahead

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name For initial flow

Priority management designation SCCC 13 1 2 17 17

Process No. Process name Station name <4/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

The presence or absence of coil end scratches on the molding side is detected by the ionic tester.

[Inspection St.] 2st Molding side ionic inspection

<Equipment>

NO.1 equipment

Equipment machine number IMB-1817

Equipment name Welding visual device (molding side ionic inspection)

Model —

capacity 7.2kW, 2t

Manufacturer name Machinery Department

<Equipment>

NO.1 equipment

Device name Pinhole inspector

Model IONIQ

Manufacturer name ATEQ

<Master>

NO.1 Master

Work information No. 20

Master name Accuracy master <NG judgment master>

(Welding vision, Insulation allowance NG master Including)

NO.1 Master

Work information No. 20

Master name Accuracy master <NG judgment master>

(Welding vision, Insulation allowance NG master Including)

<Processing (inspection) conditions> * Formal judgment is made based on the initial flow.

■ Measurement environment conditions

Measurement temperature 25 ± 10 °C

Measured humidity 50% RH or less

■ Power line (U, V, W) clamp

Measurement terminal clamp pressure 0.4 ± 0.1MPa

■ Molding side ionic

Applied voltage Molding side: 11kV (Display: 11 ± 1kV)

Inspection time 10s

Terminal position Aim for 2mm (from C / E part)

Good product judgment Insulation rate 80% or more (voltage drop less than 20%)

Number of inspections Molding side: C / E end face

■ Cycle time

50 seconds

<Working method>

※full automatic

1. 1. Clamp the power line (U, V, W)

2. Next, raise (advance) the electrode for ionic inspection on the molding side.

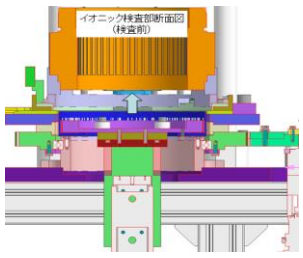
Inspect the insulation (scratch) of the coil end on the molding side.

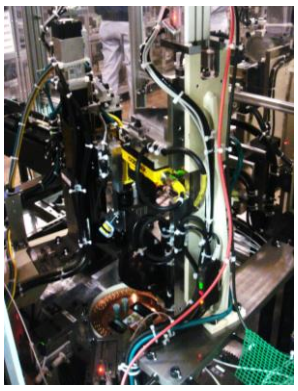
Four. 4. Lower (backward) the electrode for ionic inspection on the molding side.

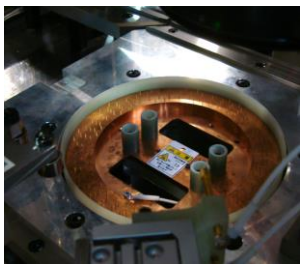
Next, to the dielectric strength inspection at the same st

<Processing drawing>

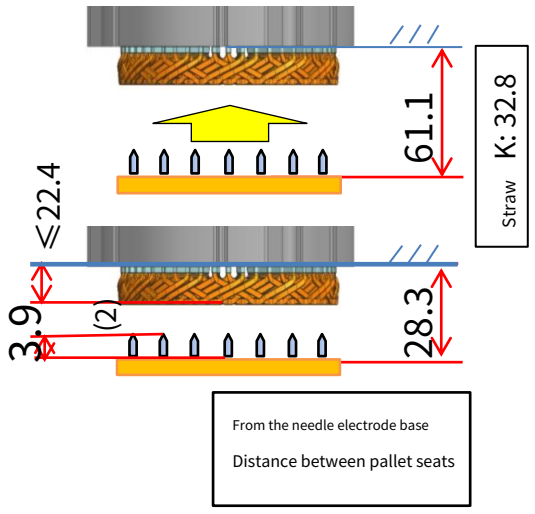
・ Measuring instrument



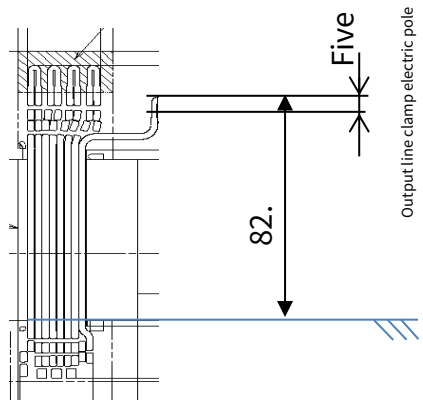




[Electrode position setting]



[Terminal clamp position setting]



<Regular cleaning>

For the following items, perform regular 1 / direct cleaning using a fence or the like.

・ 1st, 2st crush part (1 / w)

・ Measurement probe (1 / w)

・ Clean the area around the electrodes using a fan, etc. (1 / straight)
(Because it leads to misjudgment of Ionic through dust)

・ Dehumidifier tank (1 / straight)

<Daily inspection>

・ Check based on the daily inspection check sheet.

・ Implement based on the refueling instruction sheet.

・ Restart the dehumidifier. (1 / D)

<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
◇		1	OK / NG judgment This machine	1 / Y	Recording paper	Team leader			
◇		2	Must check OK / NG Judgment Four This machine	1 / Direct (at the time of work in process	Check sheet	worker			
⊕		3	Code pinhole (DC11000V applied) Four Insulation rate 80% or more (voltage drop less than 20%)	100%	P control chart	Team leader		(Applied voltage: 11 ± 1kV)	
⊕		Four	Measurement temperature 25 ± 10 °C This machine (0.1)	1 / Direct (at the time of work in process	Condition management check sheet	worker			
⊕		Five	Measured humidity 50% RH or less This machine (0.1)	1 / Direct (at the time of work in process	Condition management check sheet	worker			
◆		6	Handionic inspection (DC12000V applied) No discharge Four Offline Ionic	1 / H	Check sheet	Team leader		(Applied voltage 12 ± 1 kV)	
		7							
		8							

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△ 4	1/19/2017	Coil end, pin hole, filter periodic cleaning interval, master check	Correction of typographical errors Reflects the examination results during the initial flow period	Kosaka

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Process control statement

Issuing section	Approval	examination	create	Distribution cloth Ahead
Electric manufacturing department 2 production engineering room 4	吉 6/02/08 田	小 6/02/08 坂	Big 16/01/08 original	
date of creation 2/8/2016				

System No. -System diagram number Line name

690A MG Stereoline

Assembly part number, part name

212100-0080

Stater S / A, Mo Tar

name For initial flow

Priority management designation SCCC 13 1 2

Process No. Process name Station name <5/5>

11 11

Welding visual device (general part / neutral point)

Model Product Name

212100-0080

Stater S / A, Mo Tar

Delivery destination, reserved vehicle type

Toyota

690A

<Process specifications>

Measure the withstand voltage between phases and

Make sure there are no pinholes between the coils.

[Inspection St.] 2st Dielectric strength

<Equipment>

NO.1 equipment

Equipment machine number IMB-1817

Equipment name Welding vision device

Model —

capacity 7.2kW, 2t

Manufacturer name Machinery Department

<Equipment>

No. 1 device

Device name Withstanding voltage tester

Model TOS5050A

Manufacturer name KIKUSUI

<Master>

NO.1 Master

Master No. ————

Master name ————

<Processing (inspection) conditions> * Formal judgment is made based on the initial flow.

■ Output line (U, V, W clamp)

Measurement terminal clamp pressure 0.4 ± 0.1MPa

■ Inspection conditions

Specified voltage value AC2400V

Voltage input section U, V, W

Voltage waveform sine wave

Application time 1s

■ Cycle time

50 seconds

<Working method>

※full automatic

1. 1. After the molding side ionic is completed

* The output line (U, V, W) is clamped.

2. Inspect the withstand voltage between phases in this St.

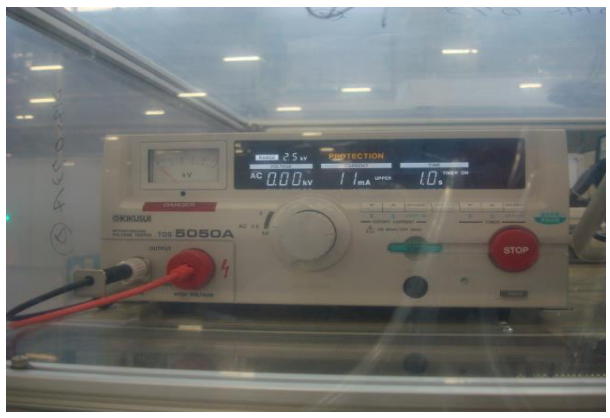
3. 3. Unclamp the output lines (U, V, W)

4. Release pallet positioning

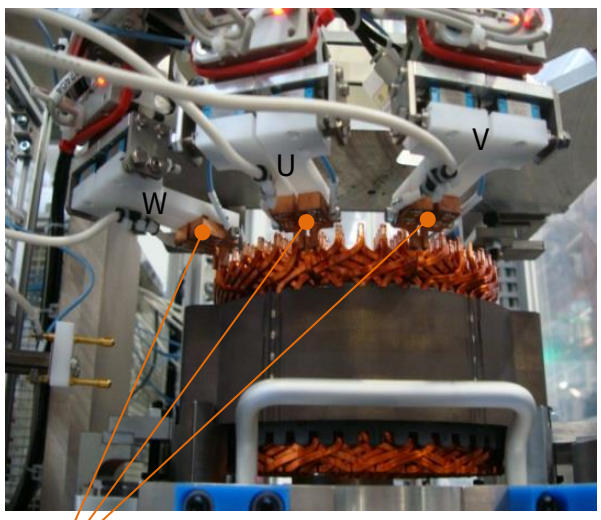
Five. Carry out the pallet

<Processing drawing>

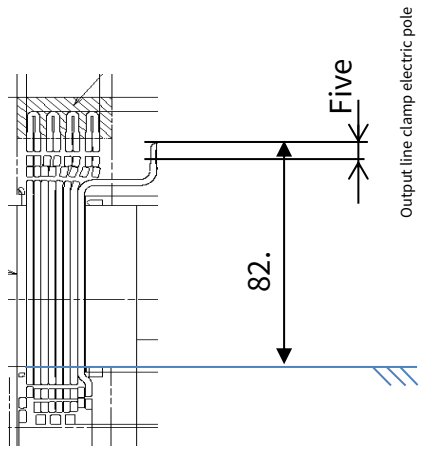
[Overview of the entire facility]



・ The appearance of the unit inside the equipment



[Terminal clamp position setting]



<Quality>

At the time of measurement	Heavy	No.	Characteristic / Measuring instrument	Management method: Management interval	Management method: Management method	Management method: Administrator	Process capability σ, X, Cp, Cpk	remarks	Quality ID Relationship criteria
○ ◇		1	Dielectric strength to ground (BDV to ground) Applied voltage 200V This machine (0.1kV)	1 / direct	Condition management Check sheet	Team leader			
		2							
		3							
		Four							
		Five							
		6							
		7							
		8							

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