



# LYNX DUO PROCESS + LYNXFRAMER + LYNX F.E.S PROCESS

# YOUR solutions arise from OUR know-how

As a creator of industrial solutions, GROUPE LEDOUX uses the expertise of its different companies in order to design, manufacture and retrofit the machines dedicated to your particular activity.

**STUDY, DESIGN AND** MANUFACTURING OF AUTOMATED **ROBOTIC SPECIAL MACHINES** 

CYBERMÉCA is specialized in the design of special From the production of small and large-scale single machines for different industry sectors. We use the parts to small and medium production runs. HERMÈS performance of our design offices to meet the needs TECHNOLOGIES can offer you its expertise in mechaof your industrial process: consulting; machine vision; nical precision machining. Thanks to HERMÈS TECH-R&D; mechanical, robotic, hydraulic and electrical en-NOLOGIES, GROUPE LEDOUX is self-reliant as to the gineering; assembly; electrical wiring; programming machining of parts and can count on the quality nein our own workshops; adjustment; onsite installacessary to mechanical part of special machines. tion and training; after-sales service; maintenance.





## LYNX DUO PROCESS **ELECTRO PNEUMATIC SYSTEM**

- ► Cycle time (clamping/unclamping): 4.5s
- ► Maximum drilling speed: 18,000 RPM
- ▶ 4 position carriage
- ► Clamping force: 50 to 2,000 daN
- ▶ Bucking force: 500to 15,000 daN
- Thickness measurement
- ► Flushness measurement
- ► Drilling control and automatic repositioning camera
- Robot option for: Automatic tool change Automatic coupon





S.R.M.O. works for the automotive, aeronautics, aerospace and railway industries to renovate, upgrade and modernize machine tools and other complex systems of production. S.R.M.O.'s areas of expertise include automation, numerical control replacement, geometry adjustment and certified mechanical retrofitting. This company also ensures programming and commissionina.



## LYNX F.E.S PROCESS FULL ELECTRIC SYSTEM

- ► Cycle time (clamping/unclamping): 3.4s
- ► Maximum drilling speed: 20,000 RPM
- Multi position carriage
- ► Option with 2nd Electrospindle
- ► Clamping force: 50 to 2,000 daN
- ▶ Bucking force: 500 to 15,000 daN
- ► Thickness measurement
- ► Flushness measurement (mechanical or by 2D laser)
- ► Drilling control and automatic repositioning camera
- ▶ Robot option for:
- Automatic tool change
- Automatic coupon



## FRAMER PROCESS LYNX FRAMER PROCESS

- ► Cycle time (clamping/unclamping): 5.5s
- Riveting on frame/assembly or floor/panel
- ▶ Max rivet capacity: Ø 6.35 Aluminum
- ► Controlled with robot arm version or specific positioner
- Clamping force: 50 to 500 daN
- ▶ Bucking force: 500 to 7,000 daN
- Thickness measurement
- Flushness measurement
- ► Drilling control and automatic repositioning camer

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# **C-TYPE MANUAL VERSION ELECTRO PNEUMATIC SYSTEM**

Description: Semi-automatic riveting machine for aero structure panels. Study and manufacturing of panel support jig on request. Study and manufacturing of suspension crane for manual handling of jig.



5,3 m



PRODUCTS

Bucked up to Ø6.35

**Rivet type:** 





## CYCLE TIME

Standard reference cycle for bucked riveting: Clamping / Drilling / Sealant application / Rivet insertion / Rivet bucking / Unclamping 4.5 seconds



Machine weight: 10 tons Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250mm

# (01) DUO RIVETNG HEAD

- **01.** Upper clamping plate
- 02. Drilling
- . With drill bit breakage detection (Standard)
- **03.** Sealant application
- **04.** Rivet injection into upper tool . Single injector version (Standard)
- Multi injector version (Option)
- **05.** Rivet insertion
- **06**. Rivet ejection (recovery)
- 07. Chip vacuuming
- 08. Drill bit lubrication
- **09**. Relocating view (Option)
- **10**. Cycle view
- **11**. Altitude measurement (Option)
- **12**. Normality measurement (Option)
- **13**. Tool change (Option)
- **14**. Tool storage (Option) 15. Mechanical flushness measurement
- ► Two main axes in head:
- « U » axis (Electrical):
- → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0,005
- $\rightarrow$  Repeatability: +/- 0,001
- « V axis » (Pneumatic with 4 positions): → Forward / backward movement of head carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# (02) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate. Fast fitting / removal. Manual or automatic clamping (Option).

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50l container mounted on wheels. Dust filter.





# (05) LOWER RAM

Subassembly for panel clamping and rivet bucking Two main axes:

- « R » axis
- Upward/Downward Range: 400, 600 ou 800mm Speed: 110mm/s Accuracy: +/- 0,01
- Repeatability: +/- 0,005 « C » axis
- Lower tool rotation Clamping force: 50 to 500daN Bucking force: 500 to 7 000daN Crimping force: (LGP ring) up to 1 000daN.

Real time monitoring:

- → Bucking force
- → Hole measurement
- → Sheet metal measurement

# (06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal.

Possible automatic clamping (Option).

(08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

## (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7Kw
- ► Speed: 18,000 or 20,000RPM
- ▶ Torque: 3,8 ou 5Nm
- ► Chuck: HSKA32 or HSKA40
- Concentricity: 2µm
- Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time.

(22) PLATFORM

Adjustable platform in order to raise / lower the operator to suitable height.

(23) SIGHT

Camera and reticule generator on monitor + laser pointer in order to aim at riveting points

Options (detail p. 22) :

28 Flushness measurement



# LYNX DUO C-TYPE SMALL CAPACITY **ELECTRO PNEUMATIC SYSTEM**

Description: Automatic riveting machine for 5 positioning axis aero structure panels. Use: Ideal for stringer, cleat and window panel assemblies

## **PRODUCTS**

Simple panels: Length: 5,900mm max Width: 1,950mm max Radius: 2,000max Weight: 200Kg max

Rivet type: Bucked up to Ø6.35  $\rightarrow$  Countersunk or round head

LGP & HL insertion up to Ø6.35  $\rightarrow$  Countersunk or round head





3,7 m





# CYCLE TIME

Standard reference cycle for bucked riveting: Clamping/ Drilling / Sealant application / Rivet insertion / Rivet bucking / Unclamping 4,5 seconds

Work cycle: Standard cycle/ Shift 25mm 5.7 seconds

Machine weight: 22tons Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250mm

## **AXIS POSITIONING**

- $\cdot X$  axis
- ▶ Range: 5,975mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ▶ Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>

**.** 

## $\cdot$ Y axis

- ▶ Range: 2,700mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ▶ Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- Z axis
- ▶ Range: 1,220mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- A axis
- Range: 200°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max Speed: 200°/min
- ► Max Acceleration: 4°.s<sup>2</sup>
- C axis
- ▶ Range: 450°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max Speed: 3 600°/min
- ► Max Acceleration: 10°.s<sup>2</sup>

# (01) DUO RIVETNG HEAD

- **01.** Upper clamping plate
- 02. Drilling
- . With drill bit breakage detection (Standard)
- **03.** Sealant application
- **04.** Rivet injection into upper tool . Single injector version (Standard)
- Multi injector version (Option)
- **05.** Rivet insertion
- **06**. Rivet ejection (recovery)
- 07. Chip vacuuming
- 08. Drill bit lubrication
- **09**. Relocating view (Option)
- **10**. Cycle view
- **11**. Altitude measurement (Option)
- **12**. Normality measurement (Option)
- 13. Tool change (Option)
- **14**. Tool storage (Option)
- 15. Mechanical flushness measurement
- ▶ Two main axes in head: « U » axis (Electrical):
- → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0,005
- $\rightarrow$  Repeatability: +/- 0,001
- « V axis » (Pneumatic with 4 positions): → Forward / backward movement of head carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# **02**) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate Fast fitting / removal. Manual or automatic clamping (Option).

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.



# (05) LOWER RAM

Subassembly for panel clamping and rivet bucking Two main axes:

- « R » axis
- Upward/Downward Range: 400, 600 ou 800mm Speed: 110mm/s Accuracy: +/-0.01
- Repeatability: +/- 0,005
- « C » axis Lower tool rotation Clamping force: 50 to 500daN Bucking force: 500 to 7 000daN

Crimping force: (LGP ring) up to 1 000daN. Real time monitoring:

- → Bucking force
- → Hole measurement
- → Sheet metal measurement

# (06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal.

Possible automatic clamping (Option).

(07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm

# (08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

# (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7Kw
- ► Speed: 18,000 or 20,000RPM
- ▶ Torque: 3,8 ou 5Nm
- ► Chuck: HSKA32 or HSKA40
- ► Concentricity: 2µm
- ▶ Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time.

# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/- 0.1 mm



# (18) MULTI REFERENCE FRAME /JIG

Frame / Jig defined with customer in order to ensure different lengths and references are accepted. Manual setting.

Options (detail p. 22) :

**17** Normality compensation **20** Tool changing robot

21 Toll Storage 28 Flushness measurement



# LYNX DUO C-TYPE HIGH CAPACITY **ELECTRO PNEUMATIC SYSTEM**

Description: Automatic riveting machine for 5 positioning axis aero structure panels.

6th axis option for double curved panel ( $B + / - 12^{\circ}$  axis).

Use: Ideal for stringer, cleat and window panel assemblies. Seam for 2 or 3 upper shell or bottom section panels.

## **PRODUCTS:**

## Simple panel :

- Length: 5,900mm max
- ▶ Width: 3.800mm max
- ▶ Radius: 2,000mm max
- ▶ Weight: 500Kg max

Rivet type: Bucked up to Ø6.35 → Countersunk or round head

LGP with ring crimping up to Ø6.35  $\rightarrow$  Countersunk or round head

HL insertion up to Ø6.35 → Countersunk or round head



**AXIS POSITIONING** 

## $\cdot$ X Axis

- ▶ Range: 5,975mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ► Max speed: 10m/min
- ► Max acceleration: 400mm.s<sup>2</sup>

## $\cdot$ Y Axis

- ▶ Range: 4,200mm
- ► Accuracy: +/- 0,1
- ► Repeatability: +/-0,05
- ► Max speed:10 m/min
- ► Max acceleration: 400mm.s<sup>2</sup>
- Z Axis
- ▶ Range: 2,700mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ► Max speed: 10 m/min
- ► Max acceleration: 400mm.s<sup>2</sup>
- A Axis
- Range: 200°
- Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max speed: 200°/min
- ► Max acceleration: 4°.s<sup>2</sup>
- C Axis
- ▶ Range: 450°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max speed: 3 600°/min
- ► Max acceleration: 10°.s<sup>2</sup>

## CYCLE TIME:

Standard reference cycle for bucked riveting: Clamping / Drilling / Sealant Application / Rivet insertion / Rivet bucking / Unclamping 4.5 seconds Work cycle: Standard cycle/ Shift 25mm.

Machine weight: 35 tons Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250 mm

# (01) DUO RIVETNG HEAD

- **01.** Upper clamping plate
- 02. Drilling
- . With drill bit breakage detection (Standard) 03. Sealant application
- **04.** Rivet injection into upper tool
- Single injector version (Standard)
- Multi injector version (Option) 05. Rivet insertion
- **06**. Rivet ejection (recovery)
- 07. Chip vacuuming 08. Drill bit lubrication
- **09**. Relocating view (Option)
- **10**. Cycle view
- **11**. Altitude measurement (Option)
- **12**. Normality measurement (Option)
- 13. Tool change (Option)
- **14**. Tool storage (Option)
- 15. Mechanical flushness measurement
- Two main axes in head: « U » axis (Electrical):
  - → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0,005
- → Repeatability: +/- 0,001
- « V axis » (Pneumatic with 4 positions):
- → Forward / backward movement of head carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# 02) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate. Fast fitting / removal. Manual or automatic clamping (Option).

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# **04**) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.









5.7 seconds

(05)	LOWER	RAM

Subassembly for panel clamping and rivet bucking Two main axes:

- « R » axis
  - Upward/Downward Range: 400, 600 ou 800mm Speed: 110 mm/s Accuracy: +/- 0,01
  - Repeatability: +/- 0,005 ▶ « C » axis
  - Lower tool rotation Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN Crimping force: (LGP ring) up to 1 000 daN.
  - Real time monitoring:
  - → Bucking force
  - → Hole measurement
  - → Sheet metal measurement

# (06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal.

Possible automatic clamping (Option).

## (07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm

## (08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

# (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7Kw
- ► Speed: 18,000 or 20,000RPM
- ▶ Torque: 3,8 ou 5Nm
- Chuck: HSKA32 or HSKA40
- ► Concentricity: 2µm
- Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).



Jig station for placing and removing jig. For loading and unloading jig by using your crane without putting any constraint on the machine frame.

(**13**)JIG

Jig on standard frame studied to accept your panels. Can be used for preparation or finishing station.

# (14) PERSONNEL ELEVATOR

Personnel elevator to access riveting head.

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time

# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/- 0.1mm

## Options (detail p. 22) :

**17** Normality compensation **20** Tool changing robot

21 Toll Storage 28 Flushness measurement



# **C-TYPE DOOR**

# **ELECTRO PNEUMATIC SYSTEM**

Description: Automatic riveting machine for 7 positioning axis aero structure panels. Solution for offset clamping before drilling.

- Allows for a maximum of drillings on door or panel.
- Use: Ideal for door or small panel. Simple or double curved panels.

## PRODUCTS

### Door or panel: Length: max 2,300mm Width: max 1,260mm Radius: max 2,000mm Weight: max 70Kg

**Rivet type:** Bucked up to Ø6.35  $\rightarrow$  Countersunk or round head

LGP & HL insertion up to Ø6.35  $\rightarrow$  Countersunk or round head









## AXIS POSITIONING

## $\cdot X$ axis

- ▶ Range: 2,400mm
- Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ▶ Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>

## • Y axis Lower Ram

- ▶ Range: 2,000mm
- ► Accuracy: +/- 0,1
- ▶ Répétabilité : +/-0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>

## • Y axis Head

- ▶ Range: 1,500mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- Z&W axes
- ▶ Range: 2,700mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/-0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- A axis
- ▶ Range: 200°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max Speed: 200°/min
- ► Max Acceleration: 4°.s<sup>2</sup>
- C axis
- ▶ Range: 450°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ▶ Max Speed: 3 600°/min
- ► Max Acceleration: 10°.s<sup>2</sup>

Standard reference cycle for bucked riveting: Clamping / Drilling / PR Application / Rivet

4,5 seconds

Work cycle: Standard cycle/ Shift 25mm. 5,7 seconds

Machine weight: 25 tons Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250mm Civil engineering work is necessary (Axis X and Y Ram are buried).

# (01) DUO RIVETNG HEAD

- **01.** Upper clamping plate
- 02. Drilling
- . With drill bit breakage detection (Standard)
- **03.** Sealant application
- **04.** Rivet injection into upper tool . Single injector version (Standard)
- Multi injector version (Option)
- **05.** Rivet insertion
- **06**. Rivet ejection (recovery)
- 07. Chip vacuuming
- 08. Drill bit lubrication
- **09**. Relocating view (Option)
- **10**. Cycle view
- **11**. Altitude measurement (Option)
- **12**. Normality measurement (Option)
- 13. Tool change (Option)
- **14**. Tool storage (Option)
- 15. Mechanical flushness measurement
- ▶ Two main axes in head:
- « U » axis (Electrical): → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0,005
- $\rightarrow$  Repeatability: +/- 0,001
- « V axis » (Pneumatic with 4 positions): → Forward / backward movement of head carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# **02**) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate Fast fitting / removal. Manual or automatic clamping (Option).

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.



CYCLE TIME

insertion / Rivet bucking / Unclamping

# (05) LOWER RAM

Subassembly for panel clamping and rivet bucking Two main axes:

- « R » axis
- Upward/Downward Range: 400, 600 ou 800mm Speed: 110 mm/s Accuracy: +/-0.01
- Repeatability: +/- 0,005
- « C » axis

Lower tool rotation Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN Crimping force: (LGP ring) up to 1 000 daN.

Real time monitoring:

- → Bucking force
- → Hole measurement
- → Sheet metal measurement

# **06**) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal.

Possible automatic clamping (Option).

(07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm

# (08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

# (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7Kw
- ► Speed: 18,000 or 20,000RPM
- ▶ Torque: 3,8 ou 5Nm
- ► Chuck: HSKA32 or HSKA40
- Concentricity: 2µm
- Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time.

(16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/- 0.1 mm

# (17) NORMALITY COMPENSATION

3 point measurement to ensure automatic normality compensation of panel on riveting point.

(18) MULTI REFERENCE FRAME /JIG

Frame / Jig defined with customer in order to ensure different lengths and references are accepted. Manual setting.

## Options (detail p. 22) :



21 Toll Storage 28 Flushness measurement

C-TYPE RK POSITION **FULL ELECTRIC SYSTEM** 

▶ Range: 4,700mm

• X axis

- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0,05

**AXIS POSITIONING** 

- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>

## $\cdot$ Y axis

- ▶ Range: 4,850mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- Z axis
- ▶ Range: 980mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0.05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- A axis
- ▶ Range: 200°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/- 0,01°

- C axis

- ► Accuracy: +/- 0,016°
- ► Max Speed: 200°/min

Clamping / Drilling / Sealant application / Rivet insertion / Rivet bucking / Unclamping 3,4 seconds

Work cycle: Standard cycle/ Shift 25mm. 4,4 seconds

Machine weight: 35 tons Floor resistance: 5t/m<sup>2</sup> Minimum depth (without iron): 250 mm

CYCLE TIME Standard reference cycle for bucked riveting:

(05) LOWER RAM Subassembly for panel clamping and rivet bucking Two main axes: « R » axis

> Upward/Downward Range: 400, 600 ou 800mm Speed: 110 mm/s Accuracy: +/- 0,01 Repeatability: +/- 0,005

**02**)LOWER TOOLS

**03**) RIVET INJECTOR

Specially adapted to rivet standard.

(04) VACUUMING DEVICE

Vacuuming of drilling chips

Dust filter.

Manual or automatic clamping (Option).

Fast fitting / removal.

Reliability rate: 99%.

« C » axis Lower tool rotation Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN Crimping force: (LGP ring) up to 1 000 daN.

Real time monitoring:

- → Bucking force
- → Hole measurement → Sheet metal measurement

# 06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal. Possible automatic clamping (Option).

# 07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm





10











7,1 m

Bucked up to Ø 6,35

→ Countersunk or round head

→ Countersunk or round head

# HL insertion up to Ø6.35

PRODUCTS Panel:

Length: max 3,450mm Width: max 2,800 mm Radius: 2,000mm Weight: max 500Kg

## Rivet type:

→ Countersunk or round head

LGP with ring crimping up to Ø6.35



Description: Automatic riveting machine for 6 positioning axis aero structure panels.

Use: Ideal for flow-line production of simple or double curved panels (B Axis: +/-35°).



- ► Max Speed: 200°/min ► Max Acceleration: 4°.s<sup>2</sup> • B axis ▶ Range: 200°

  - ▶ Repeatability: +/-0,01°

  - ► Max Acceleration: 4°.s<sup>2</sup>

▶ Range: 450°

- ► Accuracy: +/- 0,016°
- ► Repeatability: +/-0,01°
- ► Max Speed: 3600°/min ► Max Acceleration: 10°.s<sup>2</sup>

# (08) CONTROL STATION

NC & Process keyboard and monitors.

(09) RIVET DISTRIBUTION

controlling the machine.

Process & monitoring camera.

Straight or offset lower tool with integrated clamping plate.

From 1 to 6 injectors on head simultaneously.

Retractable 50 I container mounted on wheels.

By bowl or cartridge. 1 rivet/s max distribution.

Regrouping of lengths for same rivet standard for distribution on 1 injector.

Combines all the functions necessary for monitoring and

## (10) ELECTROSPINDLE

- Power: 6 ou 7 Kw
- Speed: 18,000 or 20,000 RPM
- ▶ Torque: 3.8 ou 5 Nm
- ► Chuck: HSKA32 or HSKA40
- ► Concentricity: 2 µm

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (13) JIG

Jig on standard frame studied to accept your panels. Can be used for preparation or finishing station.

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time.

# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/- 0.1 mm

## (17) NORMALITY COMPENSATION

## 3 point measurement to ensure automatic normality compensation of panel on riveting point.

# **27**) FES RIVETING HEAD

- **01.** Upper clamping plate
- **02.** Drilling 1
- $\rightarrow$  With drill bit breakage detection
- **03.** Drilling 2 (Option)
- $\rightarrow$  With drill bit breakage detection
- **04.** Sealant application
- **05.** Rivet injection into upper tool → Multi injector version
- **06.** Rivet insertion
- **07.** Rivet ejection (recovery)
- **08.** Chip vacuuming
- **09.** Drill bit lubrication
- **10.** Relocating view(Option)
- **11.** Cycle view
- **12**. Altitude measurement (Option)
- **13**. Normality measurement (Option) **14**. Tool change (Option)
- **15**. Tool storage (Option)
- **16**. Mechanical flushness measurement (Option)
- **17**. Optical flushness measurement (Option)
- **18**. « Push-away » adjustment via HMI

Three main axes in head:

- S axis (Electrical Linear Motor)
- → Upward /downward movement of slider
- → Accuracy: +/- 0.005
- → Repeatability: +/- 0.001
- « U » axis (Electrical)
- $\rightarrow$  Upward /downward movement of drilling spindle
- → Accuracy: +/- 0.005
- $\rightarrow$  Repeatability: +/- 0.001
- « V axis » (Pneumatic with 4 positions)
- → Forward / backward movement of head carriage
- → Accuracy: +/- 0.01
- → Repeatability: +/-0.005

## Options (detail p. 22) :

- **10** 2<sup>nd</sup> electro spindle **20** Tool changing robot
- 21 Toll Storage 28 Flushness measurement



▶ Peck drilling for chip shearing (Option)



# **C-TYPE FLOW LINE FULL ELECTRIC SYSTEM**

Description: Automatic riveting machine for 16 positioning axes on 1 NC and double process with automatic jig feeder for aero structure panels. Use: Ideal for flow-line production of simple or double curved upper shell or bottom sections (B Axis: +/-15°)









39 m

## • Y1 & Y2 axis

- ▶ Range: 3,300 mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0,05
- ► Max Speed: 10 m/min
- ► Max Acceleration: 400 mm.s<sup>2</sup>

## • W1 & W2 axis

- ▶ Range: 3,300 mm
- ► Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0,05
- ► Max Speed: 10 m/min
- ► Max Acceleration: 400 mm.s<sup>2</sup>

## • Z1 & Z2 axis

- ▶ Range: 3,300 mm
- ► Accuracy: +/- 0,1
- ► Repeatability: +/- 0,05
- ► Max Speed: 10 m/min
- ► Max Acceleration: 400 mm.s<sup>2</sup>

## • U1 & U2 axis (jig feeder)

- ▶ Range: 19,950 mm
- ► Accuracy: +/- 0,01°
- ▶ Repeatability: +/- 0,05
- ► Max Speed: 10 m/min
- ► Max Acceleration: 400 mm.s<sup>2</sup>

## • A1 & A2 axis

- ▶ Range: 200°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/-0,01°
- ► Max Speed: 200°/min ► Max Acceleration: 4°.s<sup>2</sup>
- C1 & C2 axis
- Range: 450°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/- 0,01°
- ► Max Speed: 3 600°/min
- ► Max Acceleration: 10°.s<sup>2</sup>

## CYCLE TIME

Standard reference cycle for bucked riveting: Clamping / Drilling / Sealant application / Rivet insertion / Rivet bucking / Unclamping 3,4 seconds Work cycle: Standard cycle/ Shift 25mm. 4,4 seconds



Machine weight: 65 tons Floor resistance: 8t/m<sup>2</sup> Minimum depth (without iron): 250 mm

# 02) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate. Fast fitting / removal. Manual or automatic clamping (Option).

# 03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips Retractable 50 I container mounted on wheels. Dust filter.

# 05)LOWER RAM

Subassembly for panel clamping and rivet bucking Two main axes:

« R » axis Upward/Downward

Range: 400, 600 ou 800 mm Speed: 110 mm/s Accuracy: +/- 0,01 Repeatability: +/- 0,005

« C » axis Lower tool rotation

Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN Crimping force: (LGP ring) up to 1 000 daN.

## Real time monitoring:

- → Bucking force
- → Hole measurement → Sheet metal measurement

# 06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal. Possible automatic clamping (Option).

# (07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm





Ε 4

▶ Repeatability: +/- 0,05

- ► Max Speed: 10 m/min
- ► Max Acceleration: 400 mm.s<sup>2</sup>

# **(08)** CONTROL STATION

controlling the machine.

Process & monitoring camera. (09) RIVET DISTRIBUTION

NC & Process keyboard and monitors.

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

Combines all the functions necessary for monitoring and

## (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7 Kw
- ▶ Speed: 18,000 or 20,000 RPM
- ▶ Torque: 3,8 ou 5 Nm
- ► Chuck: HSKA32 or HSKA40
- ► Concentricity: 2 µm
- ► Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (**13**)JIG

Jig on standard frame studied to accept your panels. Can be used for preparation or finishing station.

# (15) SEALANT APPLICATION

System for applying sealant on countersink Cycle+1 application. Adjustment by pressure and pushing time.

## (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/- 0.1 mm

## (17) NORMALITY COMPENSATION

3 point measurement to ensure automatic normality compensation of panel on riveting point.

# (27) FES RIVETING HEAD

- **01.** Upper clamping plate
- **02.** Drilling 1
- → With drill bit breakage detection
- **03.** Drilling 2 (Option)
- $\rightarrow$  With drill bit breakage detection
- 04. Sealant application
- **05.** Rivet injection into upper tool → Multi injector version
- 06. Rivet insertion
- **07.** Rivet ejection (recovery)
- **08.** Chip vacuuming
- **09.** Drill bit lubrication **10.** Relocating view(Option)
- **11.** Cycle view
- **12**. Altitude measurement (Option)
- **13**. Normality measurement (Option)
- 14. Tool change (Option)
- 15. Tool storage (Option)
- **16**. Mechanical flushness measurement (Option)
- 17. Optical flushness measurement (Option)
- 18. « Push-away » adjustment via HMI

Three main axes in head:

- ► « S» axis (Electrical Linear Motor )
- → Upward /downward movement of slider
- → Accuracy: +/- 0.005
- → Repeatability: +/- 0.001
- « U » axis (Electrical)
- → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0.005
- → Repeatability: +/- 0.001
- « V axis » (Pneumatic with 4 positions)
- $\rightarrow$  Forward / backward movement of head carriage
- → Accuracy: +/- 0.01
- → Repeatability: +/- 0.005

## Options (detail p. 22) :

- **10** 2<sup>nd</sup> electro spindle **20** Tool changing robot
- 21 Toll Storage 28 Flushness measurement





Description: Automatic riveting machine for 5 positioning axis aero structure panels. Use: Ideal for panel seam of upper or lower sections.

## PRODUCTS

Panel: Length: max 5,900mm Width: max 3,500 mm Radius: 1,980mm +/- 10mm Weight: max 500Kg

## Rivet type:

Bucked up to Ø6.35  $\rightarrow$  Countersunk or round head LGP & HL insertion up to Ø6.35  $\rightarrow$  Countersunk or round head



31,9 m



## AXIS POSITIONING

- X1 axis
- ▶ Range: 13,950mm
- ► Accuracy: +/- 0,1
- ► Répétabilité: +/- 0,05
- ► Max Speed: 10 m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- $\cdot$  X2 axis
- ▶ Range: 13,950mm
- Accuracy: +/- 0,1
- ▶ Repeatability: +/- 0,05
- Max Speed: 10 m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- $\cdot Z$  axis
- Range: 30mm
- ► Accuracy: +/- 0.1
- ▶ Repeatability: +/- 0,05
- ► Max Speed: 10m/min
- ► Max Acceleration: 400mm.s<sup>2</sup>
- $\cdot$  A axis
- Range: 200°
- ► Accuracy: +/- 0,016°
- ▶ Repeatability: +/- 0,01
- Max Speed: 200°/min
- ► Max Acceleration: 4°.s<sup>2</sup>
- C axis
- Range: 450°
- ► Accuracy: +/- 0,016° ▶ Repeatability: +/-0,01°
- ► Max Speed: 3 600°/min
- Max Acceleration: 10°.s<sup>2</sup>

## CYCLE TIME

Standard reference cycle for bucked riveting: Clamping / Drilling Sealant application / Rivet insertion / Rivet bucking / Unclamping 3,4 seconds

Work cycle: Standard cycle/ Shift 25mm. 4,4 seconds

Machine weight: 22 tons Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250mm

# (02) LOWER TOOLS

Straight or offset lower tool with integrated clamping plate. Fast fitting / removal. Manual or automatic clamping (Option).

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.

# 05 LOWER RAM

Subassembly for panel clamping and rivet bucking Two main axes:

« R » axis

Upward/Downward Range: 400, 600 ou 800mm Speed: 110 mm/s Accuracy: +/- 0,01

Repeatability: +/- 0,005 ▶ « C » axis

Lower tool rotation Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN

Crimping force: (LGP ring) up to 1 000 daN. Real time monitoring:

- → Bucking force → Hole measurement
- → Sheet metal measurement

# 06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal. Possible automatic clamping (Option).

# (07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm









# (08) CONTROL STATION

Process & monitoring camera.

NC & Process keyboard and monitors.

09) RIVET DISTRIBUTION By bowl or cartridge.

controlling the machine.

1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

Combines all the functions necessary for monitoring and

# (10) ELECTROSPINDLE

- ▶ Power: 6 ou 7 Kw
- ► Speed: 18,000 or 20,000 RPM
- ► Torque: 3,8 ou 5 Nm
- ► Chuck: HSKA32 or HSKA40
- ► Concentricity: 2 µm
- Peck drilling for chip shearing (Option)

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool.

Evacuation into collecting bin (No ejection onto panel).

# (13) JIG

Jig on standard frame studied to accept your panels. Can be used for preparation or finishing station.

# (14) PERSONNEL ELEVATOR

Personnel elevator to access riveting head.

# (15) SEALANT APPLICATION

## System for applying sealant on countersink

Cycle+1 application. Adjustment by pressure and pushing time.

# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/-0.1 mm

# (27) FES RIVETING HEAD

- **01.** Upper clamping plate
- **02.** Drilling 1
- $\rightarrow$  With drill bit breakage detection
- **03.** Drilling 2 (Option)  $\rightarrow$  With drill bit breakage detection
- **04.** Sealant application
- **05.** Rivet injection into upper tool → Multi injector version
- **06.** Rivet insertion
- **07.** Rivet ejection (recovery)
- **08.** Chip vacuuming
- **09.** Drill bit lubrication **10.** Relocating view(Option)
- **11.** Cycle view
- **12**. Altitude measurement (Option) **13**. Normality measurement (Option)
- 14. Tool change (Option)
- **15**. Tool storage (Option)
- **16**. Mechanical flushness measurement (Option)
- **17**. Optical flushness measurement (Option)
- 18. « Push-away » adjustment via HMI

Three main axes in head:

- S axis (Electrical Linear Motor)
- → Upward /downward movement of slider
- → Accuracy: +/- 0.005
- → Repeatability: +/- 0.001
- « U » axis (Electrical)
- → Upward /downward movement of drilling spindle
- → Accuracy: +/- 0.005
- → Repeatability: +/- 0.001
- « V axis » (Pneumatic with 4 positions)
- $\rightarrow$  Forward / backward movement of head carriage
- → Accuracy: +/- 0.01
- → Repeatability: +/- 0.005

## Options (detail p. 22) :

- **10** 2<sup>nd</sup> electro spindle **20** Tool changing robot
- 21 Toll Storage 28 Flushness measurement





Description: Drilling/riveting process for internal panel riveting. Use: Ideal for cleat/frame or door assembly.

## PRODUCTS

Rivet type: Bucked up to Ø5  $\rightarrow$  Countersunk or round head

POSITIONING Positioning by CN Siemens 840D-sl controlled Robot And

Kuka KR600-R2830

- → Max robot range: 2,826mm
- → Repeatability: 0.16mm
- → Robot controller KRC4

0

- Robot Comau NJ-650-2.7
- → Max robot range: 2,702mm
- → Repeatability: 0.15mm
- → Without bay controller







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# CYCLE TIME

Standard reference cycle for bucked riveting: Clamping/ Drilling /Sealant application/ Rivet insertion / Rivet bucking / Unclamping 5,5 seconds

Work cycle: Standard cycle/ Shift 25mm. 7 seconds

Framer weight: 460Kg Robot weight: 2,500Kg Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250mm

# (03) RIVET INJECTOR

Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.

# (06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal. Possible automatic clamping (Option).

# (07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm

# (08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

# (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool. Evacuation into collecting bin (No ejection onto panel).



# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/-0.1 mm

## (17) NORMALITY COMPENSATION

3 point measurement to ensure automatic normality compensation of panel on riveting point.

## (24) UPPER PART

- **01.** Upper clamping plate 02. Drilling → With drill bit breakage detection **03**. Rivet injection into upper tool
- 04. Rivet insertion
- **05**. Rivet ejection (recovery)
- 06. Chip vacuuming
- 07. Drill bit lubrication
- **08**. Relocating view
- Three main axes in upper part:
- « T» axis (Electrical)
- $\rightarrow$  Forward / backward movement of upper tool carriage → Accuracy +/- 0.005
- → Repeatability: +/- 0.001
- « U» axis (Electrical)
- → Upward /downward movement of drilling spindle.
- → Accuracy: +/- 0,005
- → Repeatability: +/- 0,001
- « V axis » (Pneumatic with 2 positions)
- → Forward / backward movement of spindle carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# (25) LOWER PART

- **01.** SLower clamping plate
- **02**. Ram with integrated lower tool
- **03**. Tool rotation

## Two main axes in upper part:

- « R» axis (Electrical)
- → Upward/Downward.
- → Speed: 110 mm/s
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005 « C» axis (Electrical)
- → Lower tool rotation
- → Range: 450°
- → Speed: 10 tr/min
- → Accuracy: +/- 0,016°
- → Repeatability: +/- 0,01

Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN

Real time monitoring:

- → Bucking force
- → Hole measurement
- → Sheet metal measurement

# (26) SPINDLE

Spindle: 15 000 RPM Torque: 2 Nm Holder: Ø6.35 Concentricity: 2 µm Peck drilling for chip shearing (Option)



Description: Drilling/riveting process for internal panel riveting. Space saving version. Use: Ideal for cleat/frame or door assembly.

## PRODUCTS

**Rivet type:** Bucked Ø3.2 or Ø4 Alu → Round head

POSITIONING

Positioning by CN Siemens 840D-sl controlled Robot And

Kuka KR360-FORTEC

- → Max robot range: 2,826mm
- → Repeatability: 0.16mm
- → Robot controller KRC4

0

Robot Comau NJ-370-2.7

- → Max robot range: 2,703mm
- → Repeatability: 0.15mm
- → Without bay controller





Specially adapted to rivet standard. Reliability rate: 99%. From 1 to 6 injectors on head simultaneously.

# (04) VACUUMING DEVICE

Vacuuming of drilling chips. Retractable 50 I container mounted on wheels. Dust filter.

# (06) UPPER TOOLS

Upper tool equipped with gripper for rivet handling. Fast fitting / removal. Possible automatic clamping (Option).

# (07) RELOCATING VIEW

Camera and lighting for automatic relocating (X & Y) on panel reference points. Accuracy: +/- 0.1mm

# (08) CONTROL STATION

Combines all the functions necessary for monitoring and controlling the machine. NC & Process keyboard and monitors. Process & monitoring camera.

# (09) RIVET DISTRIBUTION

By bowl or cartridge. 1 rivet/s max distribution. Regrouping of lengths for same rivet standard for distribution on 1 injector.

# (11) RIVET EJECTOR

Ensures automatic evacuation of a rivet when loaded on grippers of upper tool. Evacuation into collecting bin (No ejection onto panel).





1 m



## CYCLE TIME

Standard reference cycle for bucked riveting: Clamping / Drilling / Sealant application / Rivet insertion / Rivet bucking / Unclamping 5,5 seconds

Work cycle: Standard cycle/ Shift 25mm. 7 seconds

Framer weight: 260 Kg Robot weight: 2,100 Kg Floor resistance: 2t/m<sup>2</sup> Minimum depth (without iron): 250 mm



# (16) ALTITUDE COMPENSATION

Measurement and instantaneous correction of panel position (along Z axis) in relation to the riveting point. Accuracy +/-0.1mm

## (17) NORMALITY COMPENSATION

3 point measurement to ensure automatic normality compensation of panel on riveting point.

## (24) UPPER PART

- **01.** Upper clamping plate **02.** Drilling → With drill bit breakage detection
- **03**. Rivet injection into upper tool
- **04**. Rivet insertion
- **05**. Rivet ejection (recovery) 06. Chip vacuuming
- 07. Drill bit lubrication
- **08**. Relocating view
- Three main axes in upper part:
- « T» axis (Electrical)
- $\rightarrow$  Forward / backward movement of upper tool carriage → Accuracy +/- 0.005
- → Repeatability: +/- 0.001
- « U» axis (Electrical)
- → Upward /downward movement of drilling spindle.
- → Accuracy: +/- 0,005
- → Repeatability: +/- 0,001
- « V axis » (Pneumatic with 2 positions)
- → Forward / backward movement of spindle carriage
- → Accuracy: +/- 0,01
- → Repeatability: +/- 0,005

# (25) LOWER PART

- **01.** SLower clamping plate
- **02**. Ram with integrated lower tool
- **03**. Tool rotation

## Two main axes in upper part:

- « R» axis (Electrical)
- → Upward/Downward.
- → Speed: 110 mm/s
- → Accuracy: +/- 0,01 → Repeatability: +/- 0,005
- « C» axis (Electrical)
- → Lower tool rotation
- → Range: 450°
- → Speed: 10 tr/min
- → Accuracy: +/- 0,016°
- → Repeatability: +/- 0,01

Clamping force: 50 to 500 daN Bucking force: 500 to 7 000 daN

Real time monitoring:

- → Bucking force
- → Hole measurement
- → Sheet metal measurement

# (26) SPINDLE

Spindle: 15 000 RPM Torque: 2 Nm Holder: Ø6.35 Concentricity: 2 µm Peck drilling for chip shearing (Option)





Loading arm with suspension crane to ensure loading and unloading of panel or door on machine frame.

Tool changing robot (drilling tools and upper tools) on

19

riveting head.

19 LOADING ARM

**20** TOOL CHANGING ROBOT

Robot can process coupons automatically.



28)





# **10** ELECTROSPINDLE

Power: 6 ou 7 Kw Speed: 18,000 or 20,000 RPM Torque: 3,8 ou 5 Nm Chuck: HSKA32 or HSKA40 Concentricity: 2 µm Peck drilling for chip shearing (Option)

# **17** NORMALITY COMPENSATION

3 point measurement to ensure automatic normality compensation of panel on riveting point.

# LOWER TOOLS EXAMPLE





(20)









# 21 TOOL STORAGE

Tool changing robot (drilling tools and upper tools) on riveting head. Robot can process coupons automatically.



**28** FLUSHNESS MEASUREMENT

Automatic measurement of distance between rivet and panel after riveting. 2 possible versions: mechanical or optical.









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