Cms | your technology partner

ADVANCED MATERIALS Business Unit

March 21st2024 / Zogno
Giovanni Croatti - Product Manager

MAIN DRIVER

3 AXES (opt 4° RR) machine available ONLY in n. 2 SIZES

- 3020
- 4020

Z=450 mm

Monoblock basement

- Max planarity and stability

High performance spindles

- Up to 30 kW in S6

Specific vacuum table for nesting with different technologies

Accuracy

- Double Roller guides and encoders (opt)

- **SPECIFIC DESIGN FOR ALUMINIUM PLATES**
- **FLEXIBLITY AND EXELLENT CALMPING SYSTEMS**
- **PRECISION AND HIGH QUALITY FINISHING ALSO FOR HIGH THICKNESS**

Cms
your technology partner

TAO-X APPLICATION FIELDS

MATERIAL

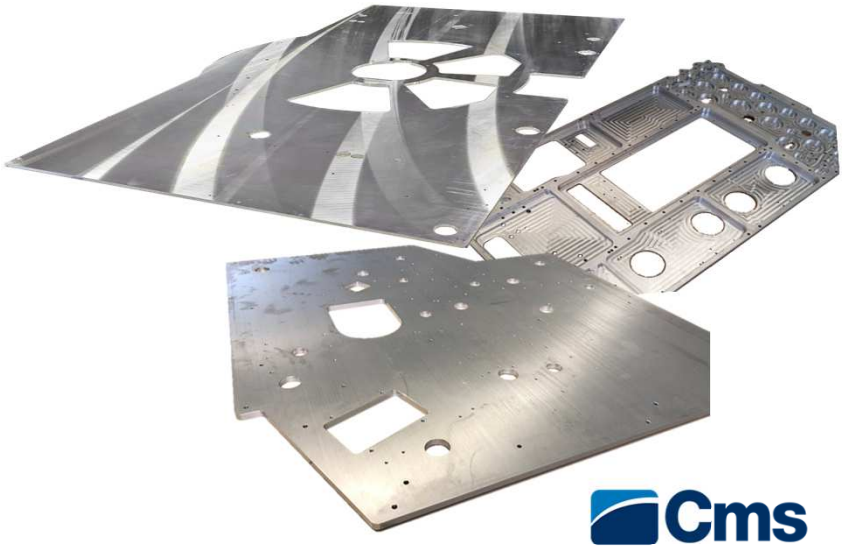
- Aluminium panels
- Light alloys
- Titanium
- Composites & Technical plastic

MAIN APPLICATION FIELD

milling and nesting technology for **large** aluminium plates up to 2.000x4.000 mm

MAIN SECTORS

- **Industrial / Mechanical components**
- **Aerospace**
- Automotive
- **Jigs & Checking Fixtures**
- Military

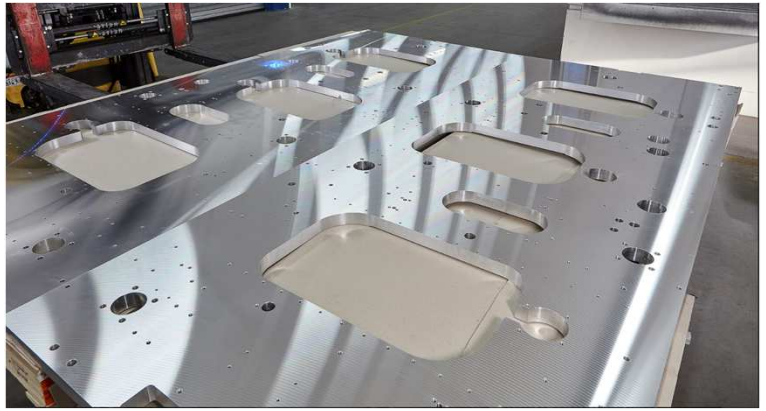


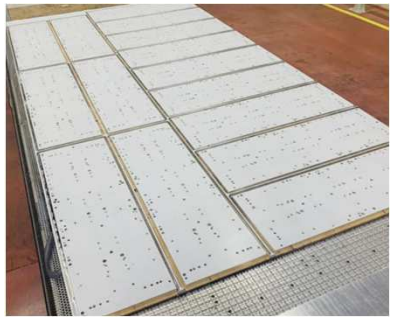
MAIN DRIVER

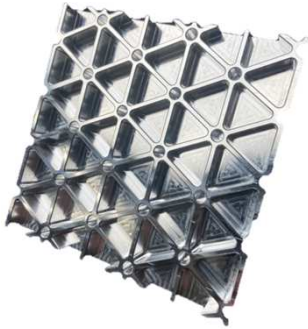
- Excellent Finishing Quality
- Accuracy
- Versatility of clamping solution and efficient nesting table
- Speed top of the class – 80 m/min

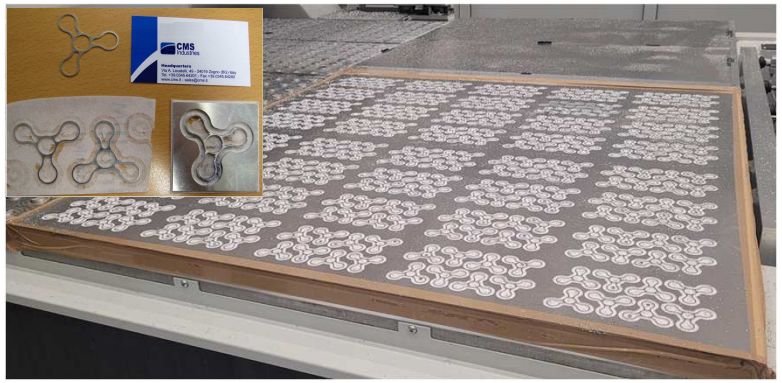
Cms
your technology partner

SOME EXAMPLE









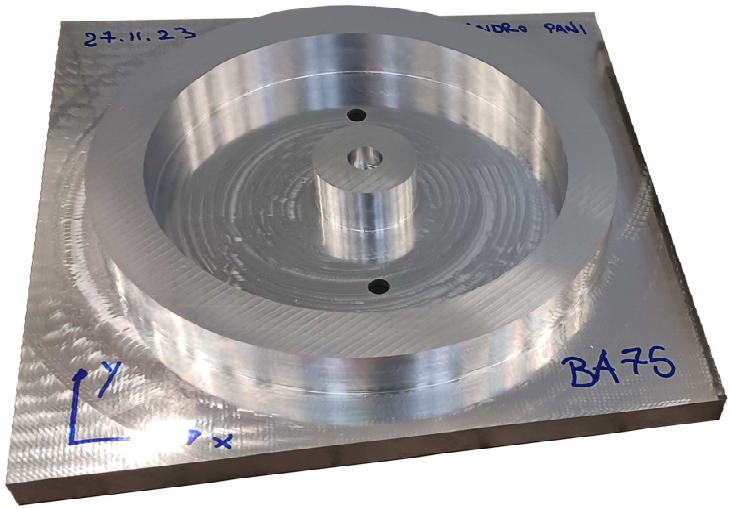
Cms
your technology partner

DOUBLE CYLINDER

TEST DOPPIO CILINDRO
Macchina senza righe ottiche

Ø 60 mm F6000
CIRCOLARITA' **0.014 mm senza righe**

Ø 300 mm F6000
CIRCOLARITA' **0.031 mm senza righe**



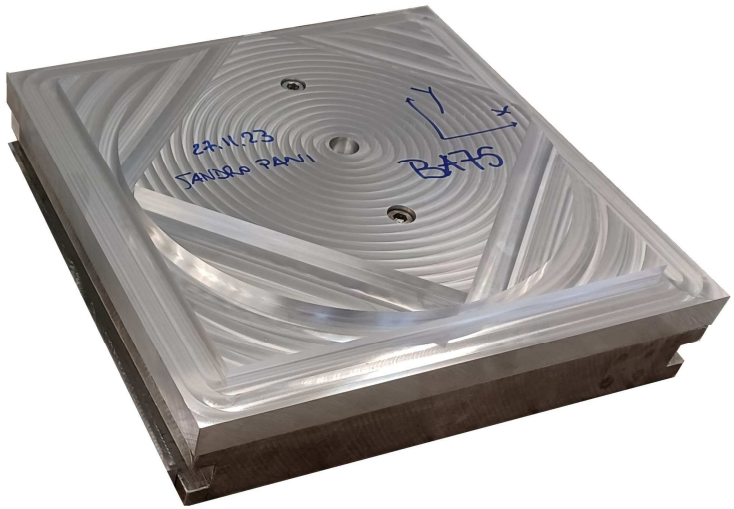
TEST MADE ON TAO-X 4020 HP

Cms
your technology partner

CMS-NAS TEST

CMS-NAS TEST

Name	Measured value	Nominal value	Toll+	Toll-	Deviazione	+/-
Cerchio C_Diametro	19,9722 mm	20,0000			-0,0278	
Cerchio C_Rotondità	0,0055 mm	0,0000	0,0500	0,0000	0,0055	
Distanza #2_Y	301,9514 mm	302,0000	0,1000	-0,1000	-0,0486	
Distanza #4_Y	301,9484 mm	302,0000	0,1000	-0,1000	-0,0516	
Distanza #6_X	301,9376 mm	302,0000	0,1000	-0,1000	-0,0624	
Distanza #8_X	301,9403 mm	302,0000	0,1000	-0,1000	-0,0597	
Parallelismo #20	0,0049 mm	0,0000	0,1000	0,0000	0,0049	
Perpendicolarità #21	0,0076 mm	0,0000	0,1000	0,0000	0,0076	
Distanza 212,3 #10	212,2316 mm	212,3000	0,1000	-0,1000	-0,0684	
Distanza 212,3 #12	212,2690 mm	212,3000	0,1000	-0,1000	-0,0310	
Parallelismo #14	0,0217 mm	0,0000	0,1000	0,0000	0,0217	
Perpendicolarità #15	0,0478 mm	0,0000	0,1000	0,0000	0,0478	
Angolo tra elementi #17	45° 0' 16"	45° 0' 0"	0° 3' 0"	-0° 3' 0"	0° 0' 16"	
Diametro_Cerchio 301	300,9382 mm	301,0000	0,1000	-0,1000	-0,0618	
Rotondità_Cerchio 301 #24	0,0306 mm	0,0000	0,1000	0,0000	0,0306	
Cerchio 301_Val. X	0,0114 mm	0,0000			0,0114	
Cerchio 301_Val. Y	-0,0039 mm	0,0000			-0,0039	
Conc. Cerchio Ø301 vs Cerchio C #23	0,0241 mm	0,0000	0,1000	0,0000	0,0241	



TEST MADE ON TAO-X 4020 HP

Cms
your technology partner

WAVE TEST CMS

TEST MADE ON TAO-X 4020 HP

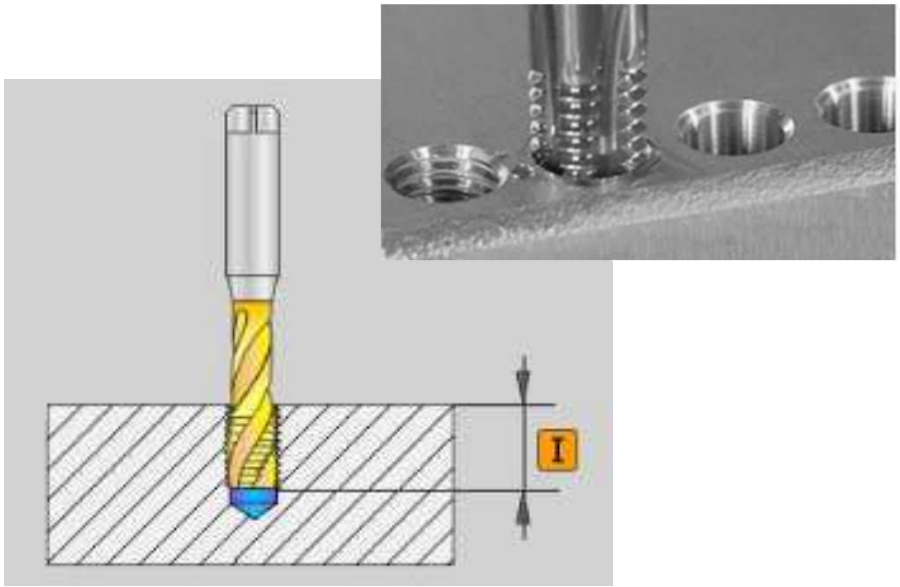
Cms
your technology partner

TAPPING

Rigid Tapping (filettatura rigida)

Spindle 20 kW Syncronous

Test made on M12 M16 ✓

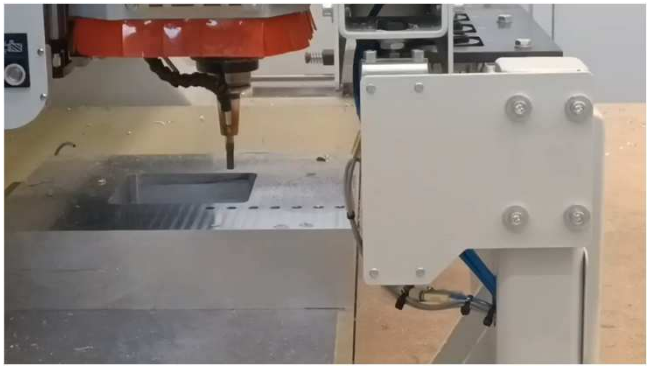


TEST MADE ON TAO-X 4020 HP

Comb Thread (filettatua a pettine)

Spindle 20 kW Syncronous

Test made M12 e M16 ✓



Cms
your technology partner

FLATTENING & DRILLING

FLATTENING

Tool D40-Z3 Ap 4mm; Ae 30 mm

Spindle load: 60%

...

DRILLING

Tool D40-Z3

D 40 mm

H90 mm

...

TEST MADE ON TAO-X 4020 HP

Cms
your technology partner

VDI

VERIFICA PRECISIONI TRAMITE LASER NORMATIVE VDI
Es. di valori che trovate nelle offerte EBS

JD.90.23	TAO-X 4020 HP ACCURACY	N. 1	

CMS will assess axes alignment, Accuracy (P) and Unidirectional Repeatability (Ps) on the basis of the **VDI/DGQ 3441** regulations, by laser measuring systems.

Mechanical Specification, ref. VDI/DGQ 3441 regulation						
Accuracy and Repeatability						
machine/ Axis	**Axis type (Lin/Rot) – (Rack/Screw)**	**Gantry axis (Master/ Slave)**	**Reference stroke**	**Positioning accuracy (P)**	**repeatability (Ps)**	**Actual axis stroke**
			[mm]	***[mm]***	***[mm]***	***[mm]***
X	Rack	Gantry Dual Drive	4080	0,048	0,025	5040
Y	Rack	Dual Drive	2050	0,036	0,019	2200
Z	Screw		450	0,024	0,013	450
Note: testing position in the axis centre line, at the maximum stiffness.						
Note: accuracies are guaranteed with machine operating at a maximum temperature of 20° C ± 1°. The temperature difference between two points of the machine must not exceed 0.1°C/m with a maximum of 0.5°C between two points.						
The tests are performed with axes compensation activated.						
VDI-DGQ 3441 test assessment results on paper available on request.						

JD.90.27	TAO-X 4020 HP **LINEAR SCALES**	N. 1	

Machine equipped with linear scales on **X, Y and Z axes.**

This system further enhances machine accuracy and repeatability.

CMS will assess axes alignment, Accuracy (P) and Unidirectional Repeatability (Ps) on the basis of the **VDI/DGQ 3441** regulations, by laser measuring systems.

Mechanical Specification, ref. VDI/DGQ 3441 regulation						
Accuracy and Repeatability						
machine/ Axis	**Axis type (Lin/Rot) – (Rack/Screw)**	**Gantry axis (Master/ Slave)**	**Reference stroke**	**Positioning accuracy (P)**	**repeatability (Ps)**	**Actual axis stroke**
			[mm]	***[mm]***	***[mm]***	***[mm]***
X	Rack	Gantry Dual Drive	4080	0,034	0,018	5040
Y	Rack	Gantry	2050	0,026	0,014	2200
Z	Screw		450	0,018	0,010	450
Note: testing position in the axis centre line, at the maximum stiffness.						
Note: accuracies are guaranteed with machine operating at a maximum temperature of 20° C ± 1°. The temperature difference between two points of the machine must not exceed 0.1°C/m with a maximum of 0.5°C between two points.						
The tests are performed with axes compensation activated.						
VDI-DGQ 3441 test assessment results on paper available on request.						

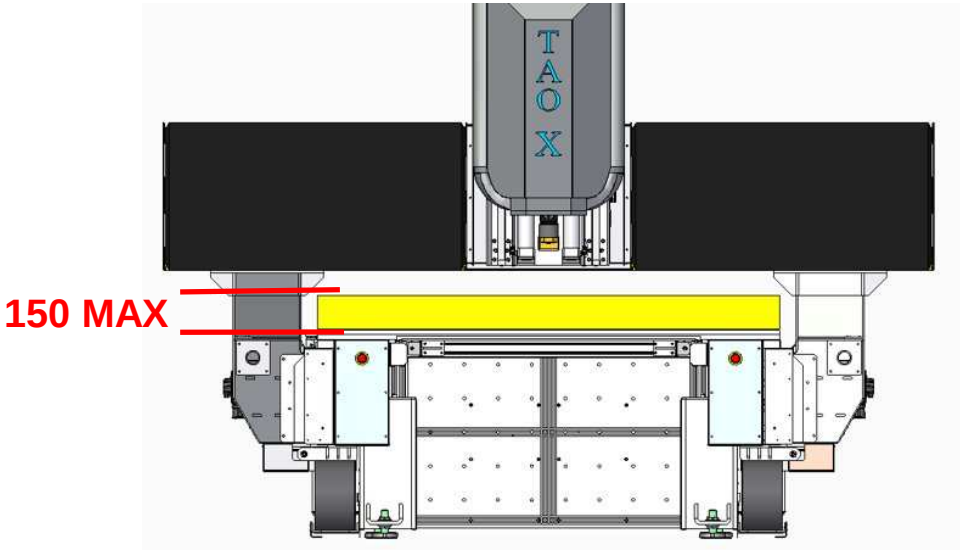
Cms
your technology partner

TAO-X SIZES

TAO-X 3020

STROKES

- X=4040 mm *including tool-changer*
- Y =2200 mm
- Z 450 mm
- Table: 3060x2050 mm



TAO-X 4020

STROKES

- X=5040 mm *including tool-changer* strokes
- Y 2200 mm
- Z 450 mm
- Table 4080x2050 mm

Cms
your technology partner

TaO-X perimeter protections

PROTECTIONS

Front side (along the X axis)

JD9092	Front protections not supplied
JD9093	Frontal protection with telescopic door (3020)
JD9094	Frontal protection with right corner door (3020)
JD9096	Frontal protection with telescopic door (4020)
JD9098	Frontal protection with right corner door (4020)

Rear side (along the X axis)

JD9099	Rear-side protection not supplied
JD9100	Rear protection panelling (3020)
JD9101	Back protection with telescopic door (3020)
JD9102	Rear protection panelling (4020)
JD9103	Back protection with telescopic door (4020)

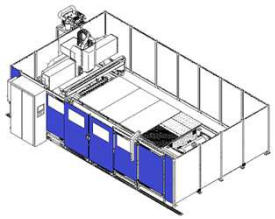
Left side

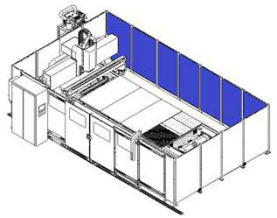
JD9104	Left-side protection not supplied
JD9105	Left-side protection panelling

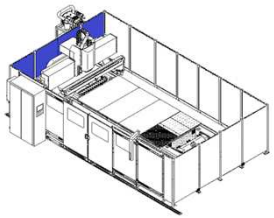
Right side

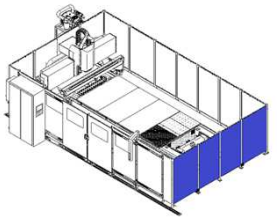
JD9107	Right-side protection not supplied
JD9108	Right-side protection panelling

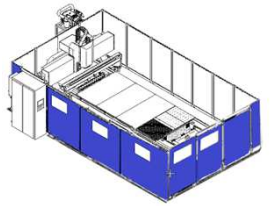
ALUMINIUM PLATE THICKNESS: NO LIMITATION OF 10 mm you have with bumpers + flaps solution





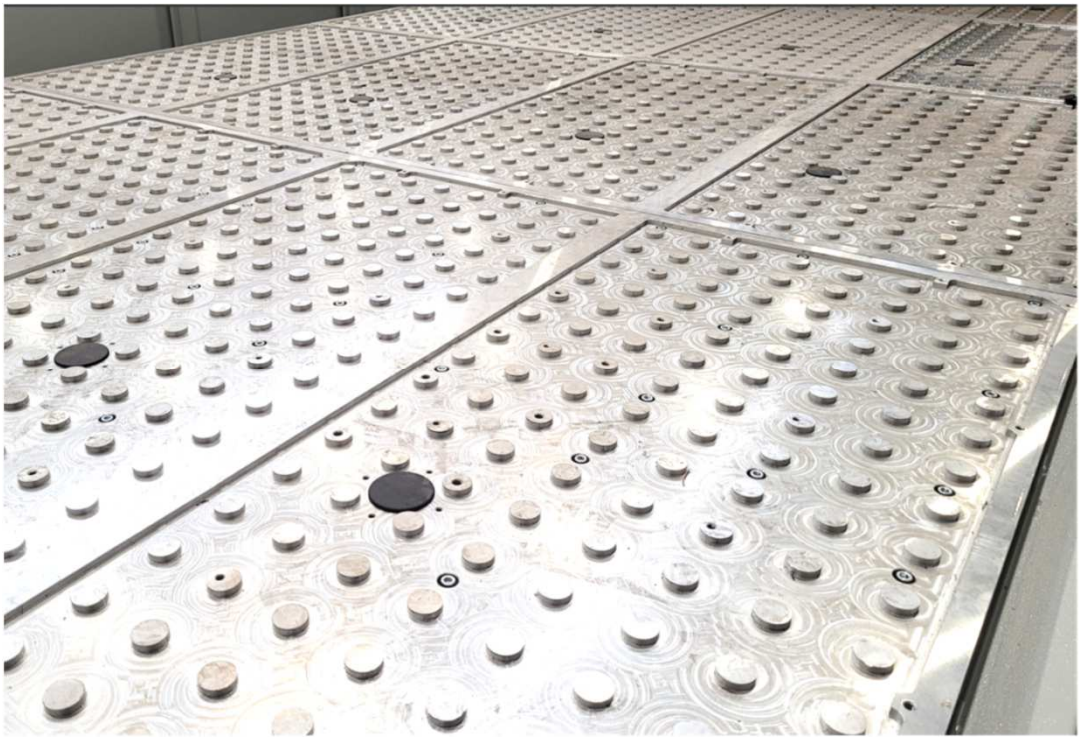






Cms
your technology partner

TAO-X VACUUM TABLE



NEW VACUUM TABLE

THE VACUUM CHAMBER IS CREATED DIRECTLY BETWEEN THE ALUMINIUM PLATE AND THE SPECIFIC CLAMPING MODULE.

Cms
your technology partner

TAO-X NESTING VACUUM PLANT

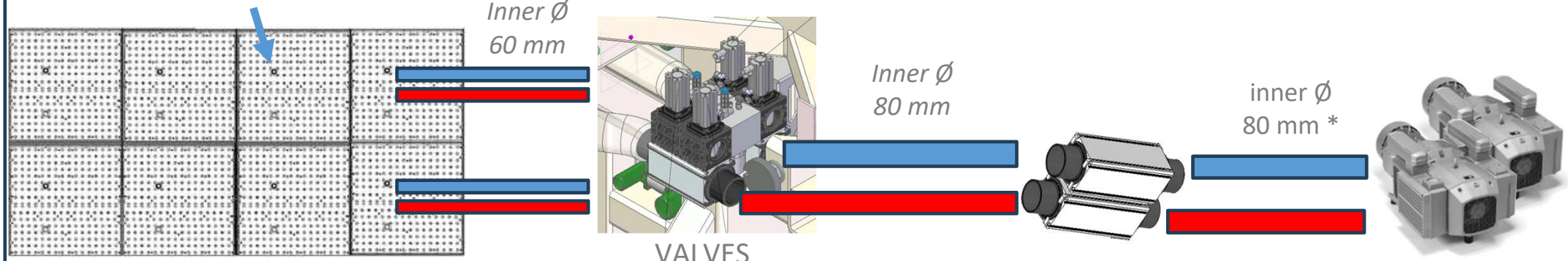
VACUUM PLANT

MODULAR VACUUM PLANT – from 6 up to 16 VACUUM ZONES

UP TO 8 VACUUM ZONE DYNAMIC MODE

DYNAMIC VACUUM SYSTEM

For each single vacuum area 1020x512 mm
inner Ø 50 mm table holes



PLANE

VALVES
+
COLLECTOR

COLLECTOR

PUMPS

* For MBB inner Ø 50/60 mm

Cms
your technology partner

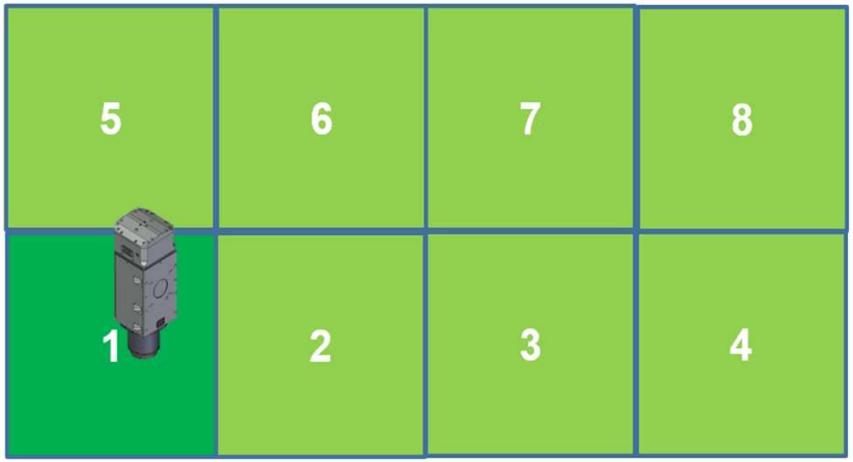
VACUUM SYSTEM – DYNAMIC VACUUM MANAGEMENT

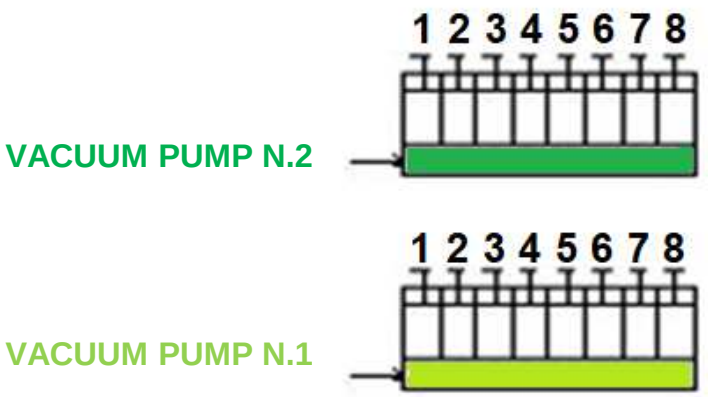
The vacuum plant is specifically design to get the **maximum level of vacuum clamping force!**

DYNAMIC VACUUM up to 8 ZONES

The vacuum of the 2nd pump is activated automatically on the vacuum zone where the operating unit is working.
The vacuum of the 1st pump is activated automatically on the other selected zones

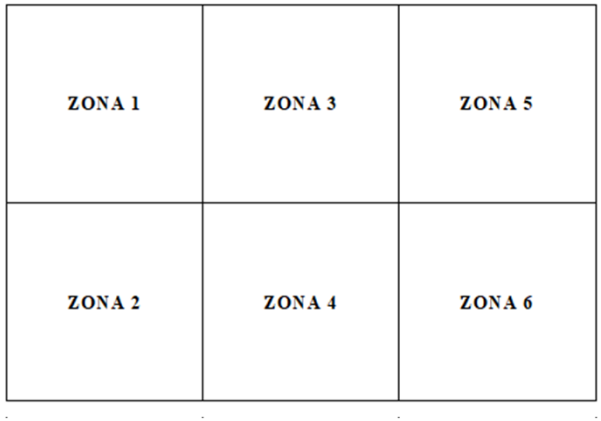
- *This modality is **suitable** only to maximize the vacuum **effect if 3 or more vacuum area are activated!!***
- ***Maximize the vacuum** effect **when** we have **large areas of vacuum loss** due to nesting operations*
- ***With 1 or 2 vacuum zones** the dynamic mode has **not to be used** because only the vacuum effect of 1 pump is activated on the single zone.*



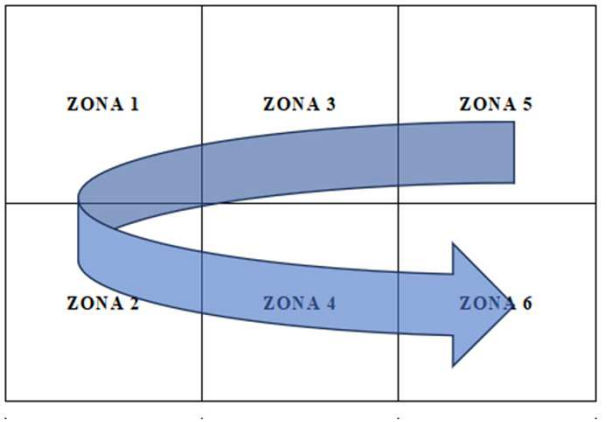


Cms
your technology partner

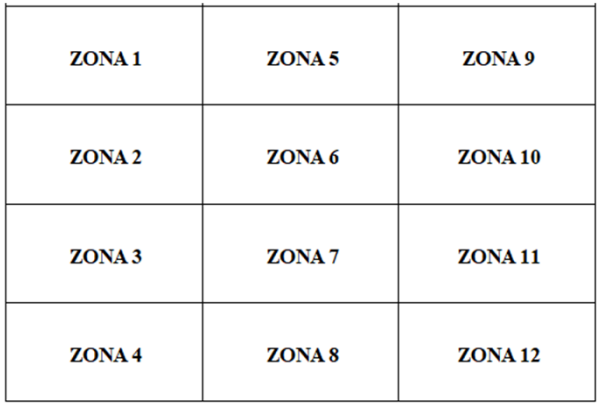
TAO-X NESTING VACUUM TABLE 30-20 option available



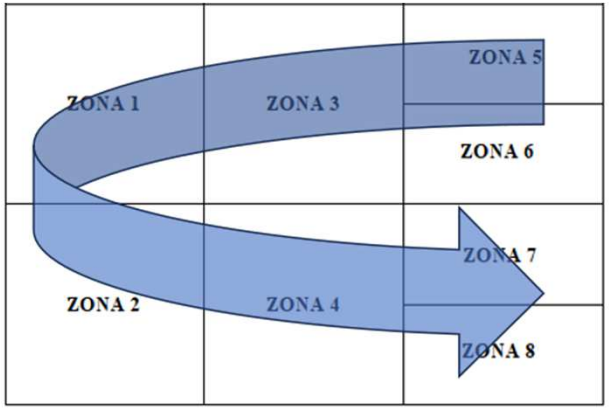
6 STD VACUUM ZONES



6 DYNAMIC VACUUM ZONES



12 STD VACUUM ZONES



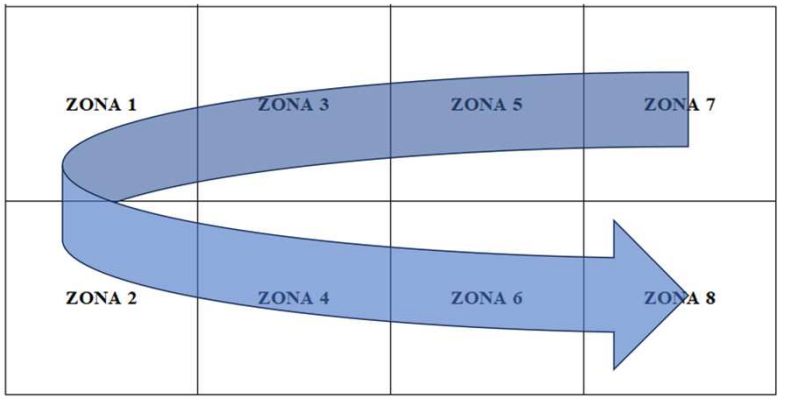
8 DYNAMIC VACUUM ZONES

Cms
your technology partner

TAO-X NESTING VACUUM TABLE 40-20 option available

ZONA 1	ZONA 3	ZONA 5	ZONA 7
ZONA 2	ZONA 4	ZONA 6	ZONA 8

8 STD VACUUM ZONES



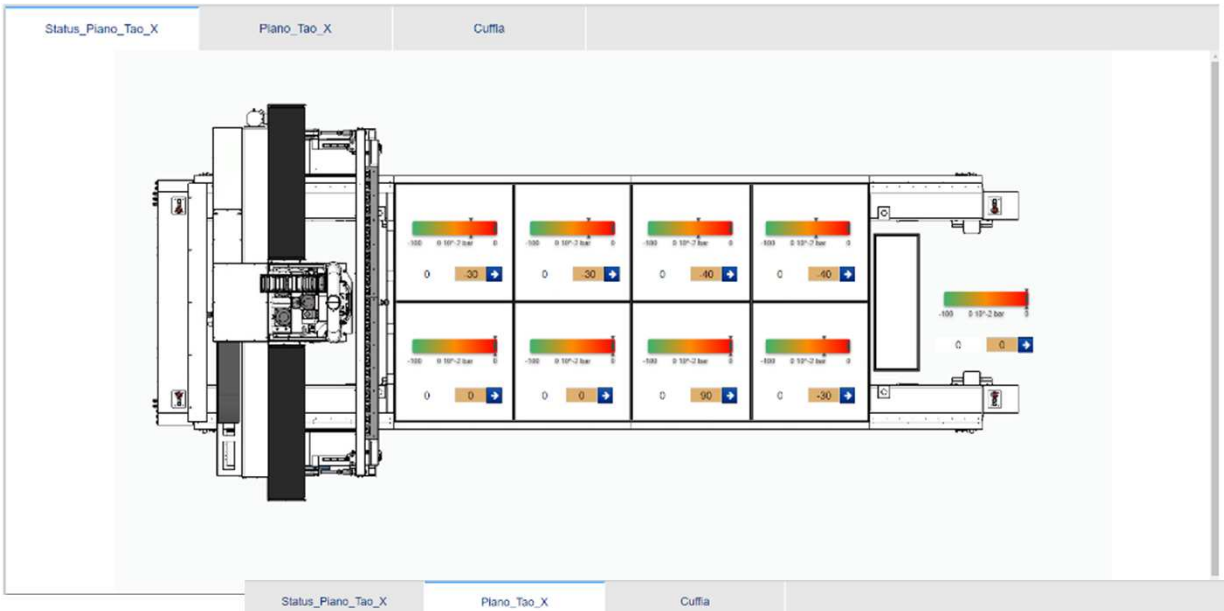
8 DYNAMIC VACUUM ZONES

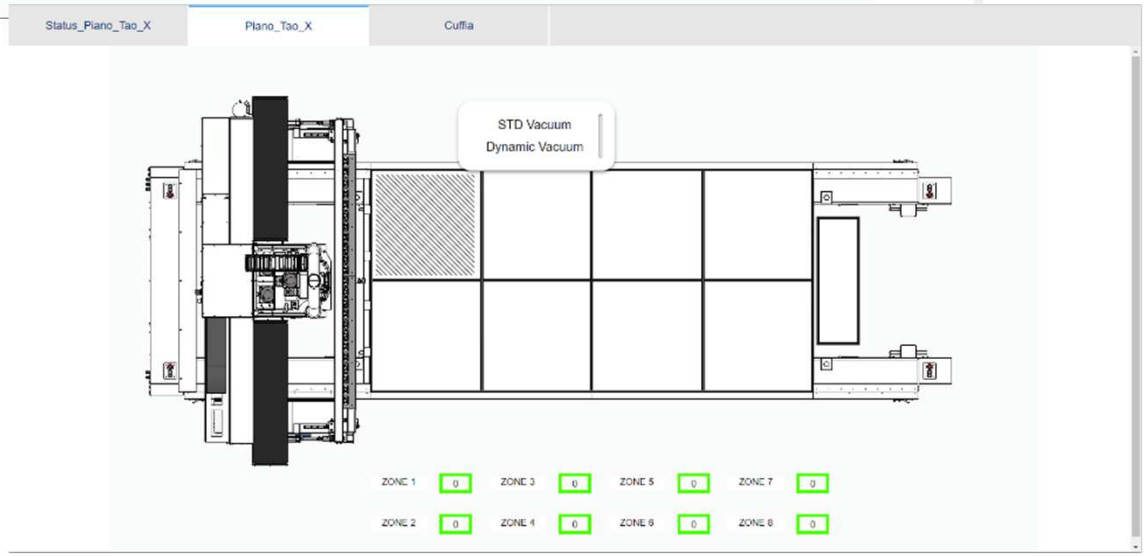
ZONA 1	ZONA 5	ZONA 9	ZONA 13
ZONA 2	ZONA 6	ZONA 10	ZONA 14
ZONA 3	ZONA 7	ZONA 11	ZONA 15
ZONA 4	ZONA 8	ZONA 12	ZONA 16

16 STD VACUUM ZONES

Cms
your technology partner

VACUUM SYSTEM – HMI to manage the vacuum



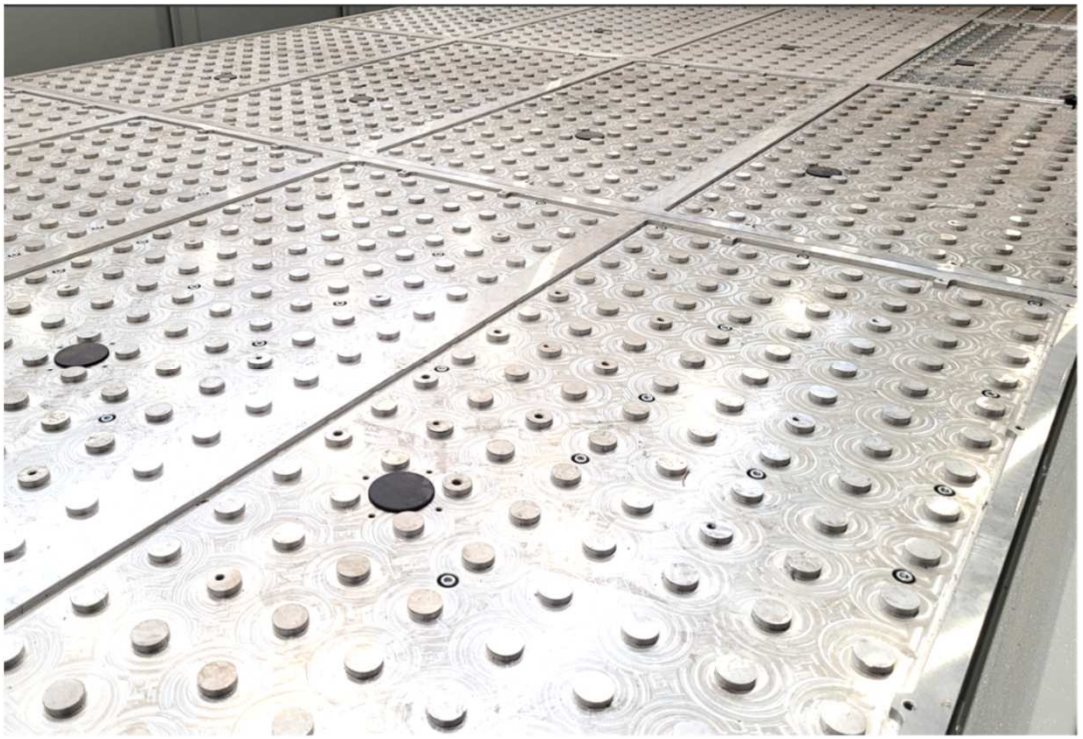


SPECIFIC HMI

Possibility to control and manage the vacuum level of each zone.

Cms
your technology partner

TAO-X VACUUM TABLE



NEW VACUUM TABLE

THE VACUUM CHAMBER IS CREATED DIRECTLY BETWEEN THE ALUMINIUM PLATE AND THE SPECIFIC CLAMPING MODULE.

Cms
your technology partner

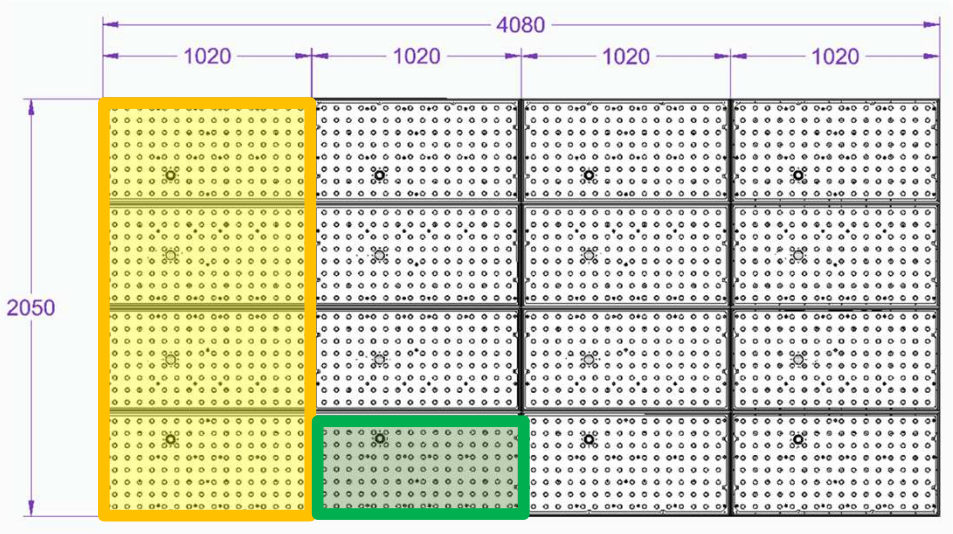
CONFIGURABLE WORK TABLE

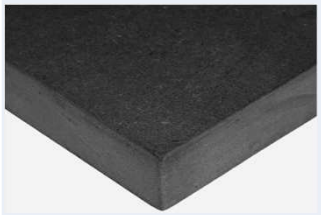
The table is divided into **MACRO SECTION – 1020x2050 mm**

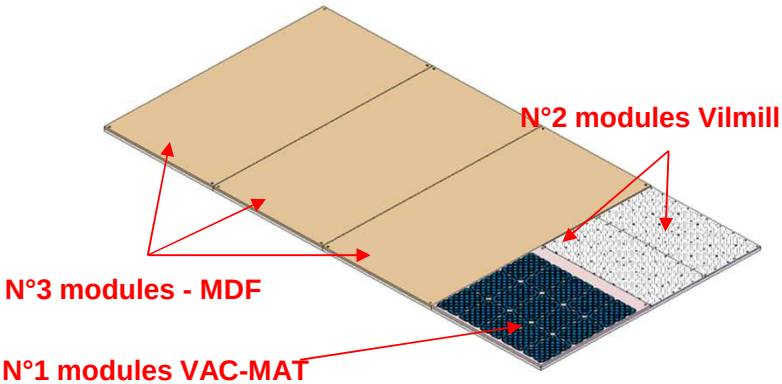
(n. 3 for TAO-X3020 and n. 4 for TAO-X4020)

The MACRO SECTION is divided in **4 SECTION 1020x512 mm**

This section identify the relative vacuum zone.



MDF *(water repellent type)*	Vilmill	CMS aluminum vacuum table	Vac-mat
Module 1020x2050 mm	Module 1020x512.5 mm	Module 1020x2050 mm	Module 1020x1025 mm
			



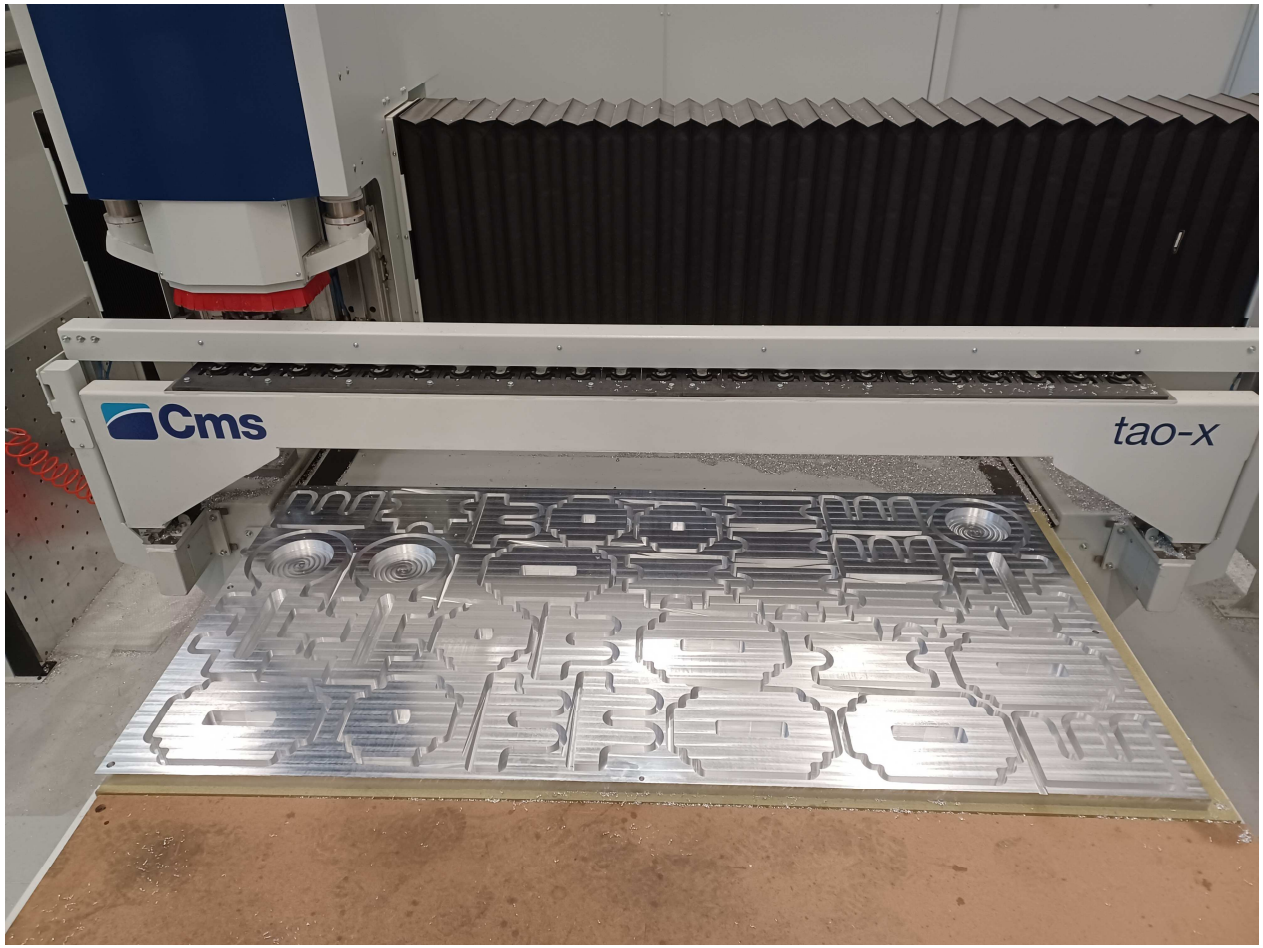
Example of composition

Cms
your technology partner

MDF – module 1020x2050 mm

NESTING OF ALUMINIUM PLATE with different thickness

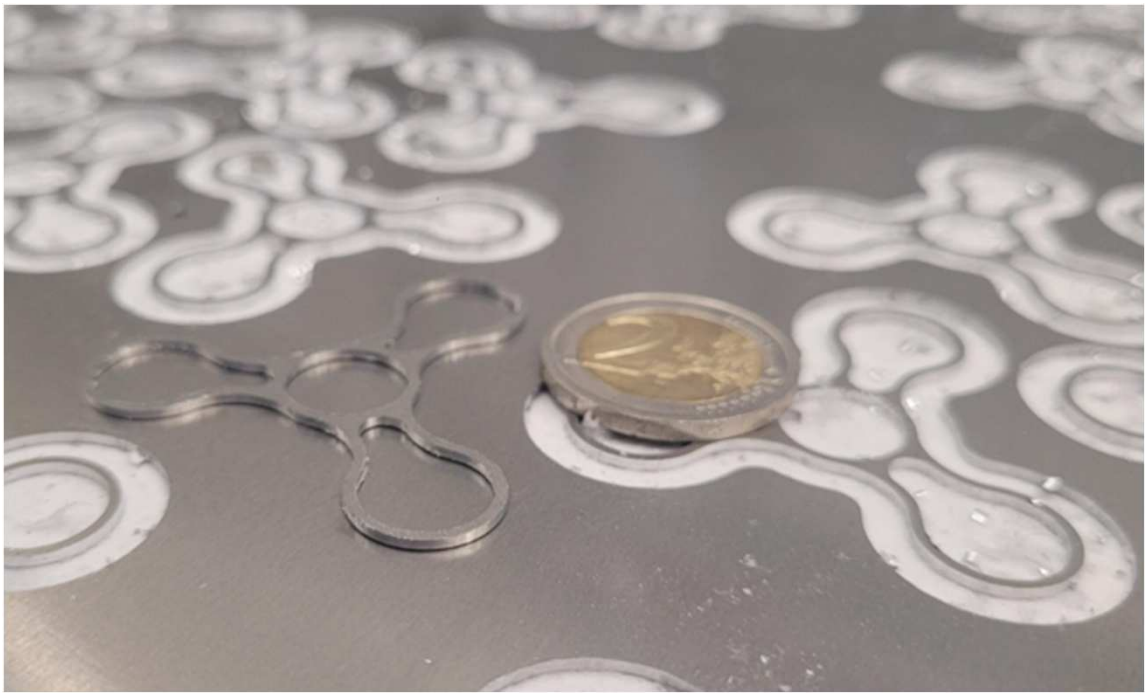
Test made on an aluminum 5754 plate 1000x2000x30 mm

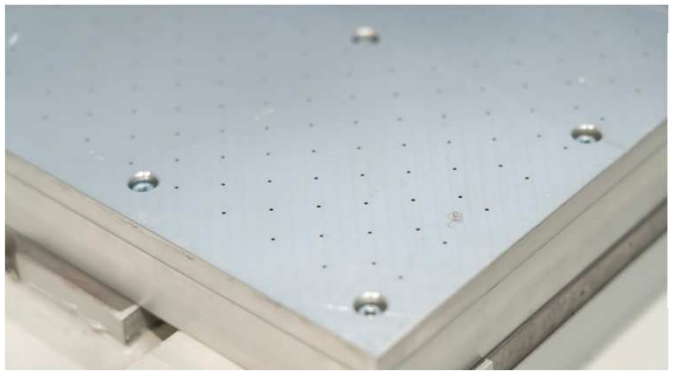


Cms
your technology partner

VILMILL – module 1020x512 mm

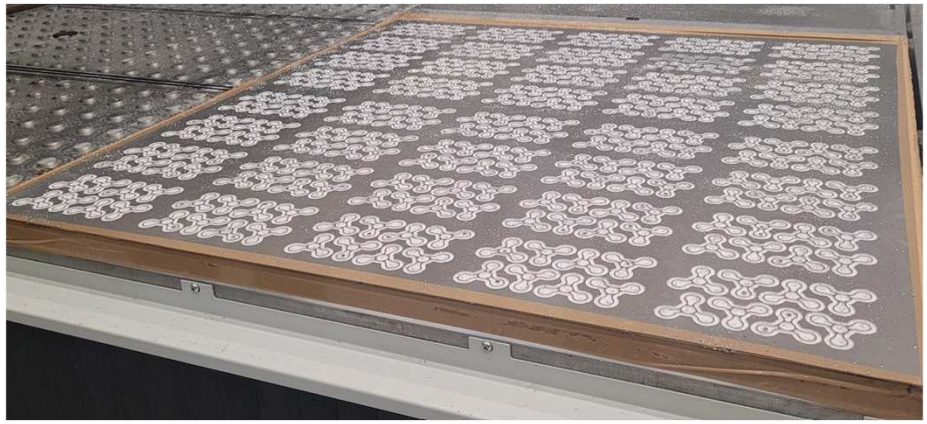
NESTING OF **SMALL** ALUMINIUM **COMPONENTS** from single sheet with Vilmill technology





Planarità modulo 1020x512 mm inferior a +/- 0.025 mm

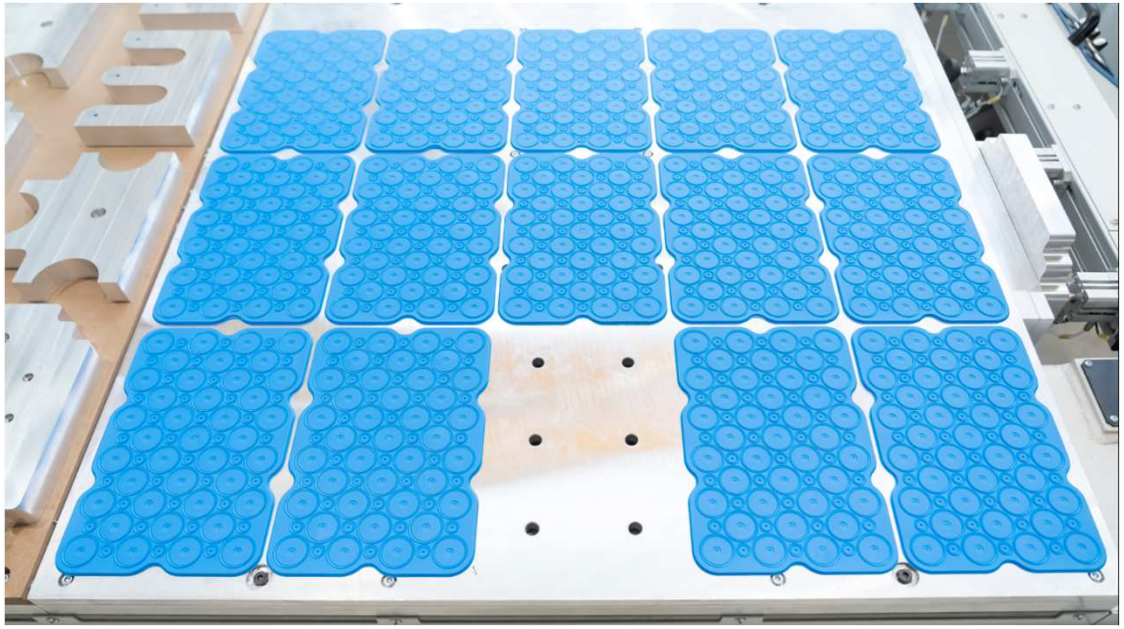
Test made on an aluminum plate 1000 x 1000 x 1 mm
Aluminum 5754 H111



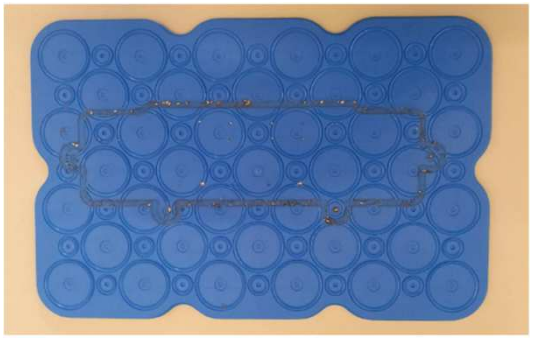
Cms
your technology partner

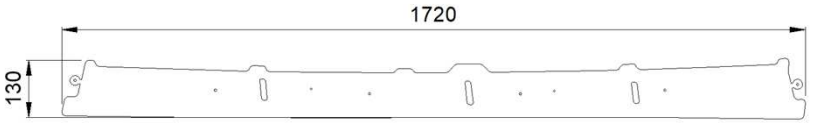
VAC-MAT – module 1020x1025 mm

TITANIUM PLATE from single sheet
Usually from 0.8 mm up to 4/5 mm



Ex of titanium item (1.5 mm) for aeronautical application
Titanium ASTM B265 Gr1



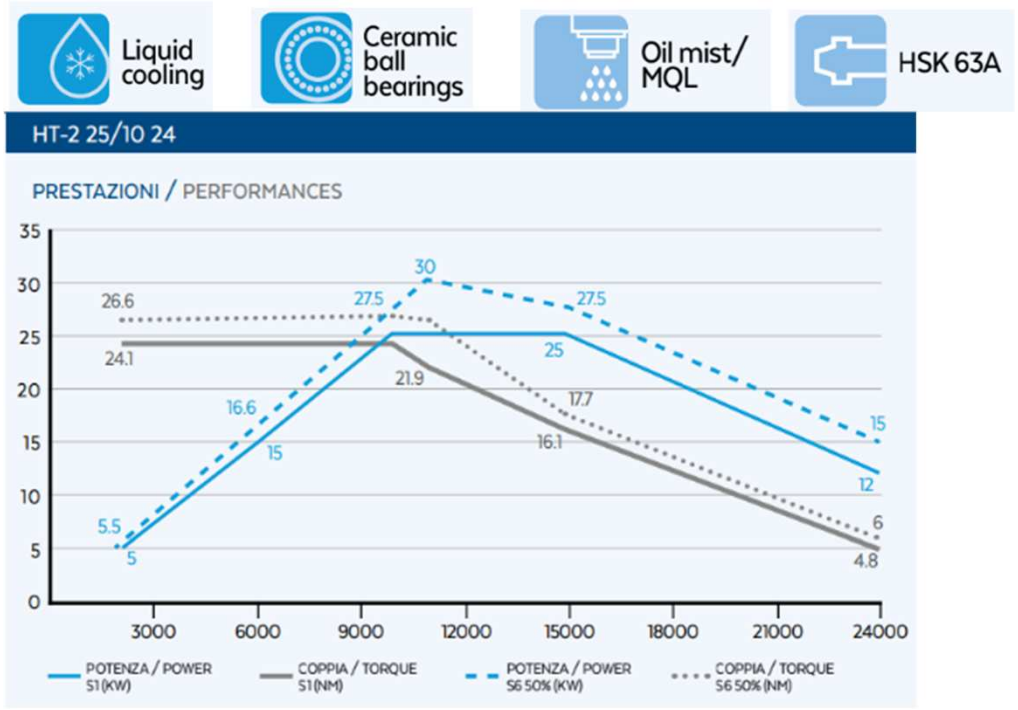


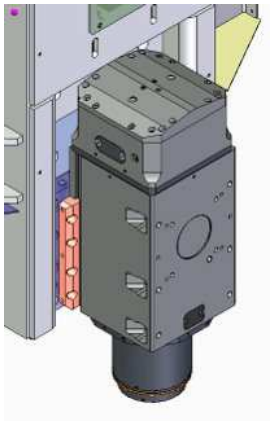
Cms
your technology partner

WORKING UNITS

The **WORKING UNIT** is available **with 3 o 4° axes**

All the spindles have **3 front bearings-> max rigidity**

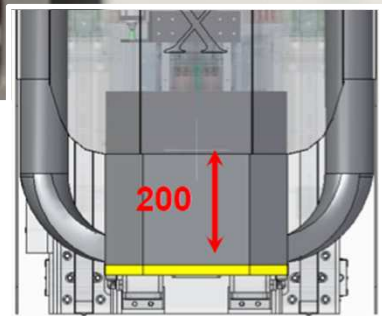




SPINDLE	CONNECTION	POWER S1 (kW)	POWER S6 (kW)	TORQUE Nm	Max rpm
HX-2 12/12 24 63F NL (asincrono)	HSK63F	12	15	12	24000
HX-2 15/12 24 63F NL (asincrono)	HSK63F	15	**19**	13.8	24000
HX-2 20/10 24 63A NL (**sincrono-controllato**)	HSK63A	20	**22.3**	20.1	24000
HT-2 25/10 24 63A NL (**asincrono-controllato**)	HSK63A	25	**30**	26.6	24000

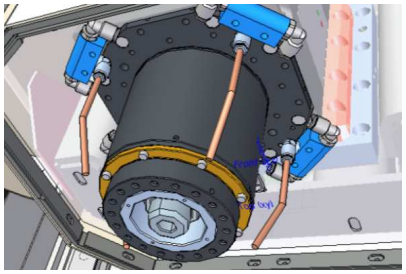
Cms
your technology partner

SUCTION HOOD



SUCTION HOOD SPECIFIC DESIGNED FOR ALLUMINIUM PROCESSING

- Stroke **200 mm**
- NC Controlled - **32 positions**
- **Automatic positioning control (with relative CAM)**
- Telescopic **metal rigid piping**
- **Quick strips-ring replacement**

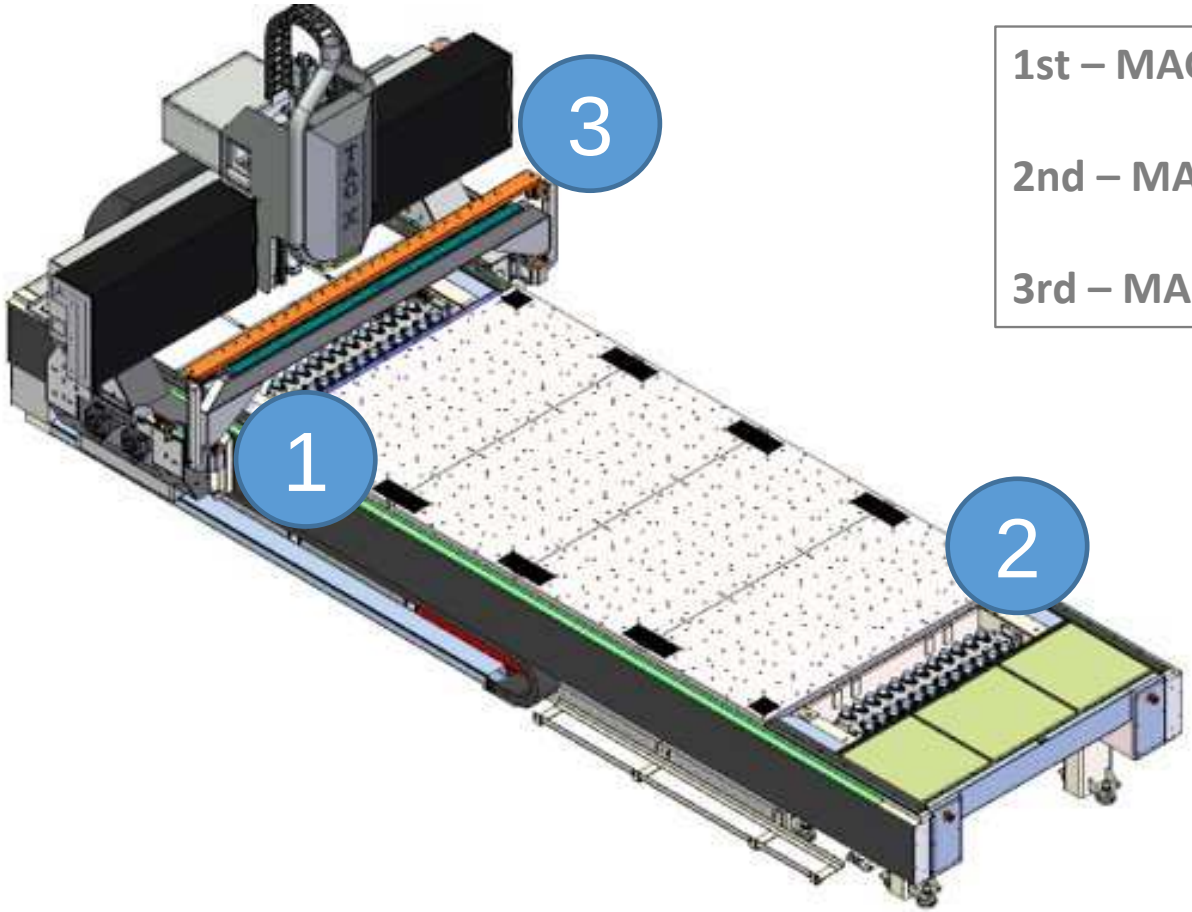


- ✓ **CLEAN design**
- ✓ **Suction efficiency -> reduced wasted time to clean the machine**
- ✓ **NO pipe BREAKS due to hot aluminum chip**
- ✓ **Very short time on replacing suction hood strips**

- ✓ **Suction hood brush available for different materials (ex carbonfiber, plastics…)**

Cms
your technology partner

TOOL CHANGERS



1st – MAGAZINE **24-PLACE** *(integrated in machine bed)*

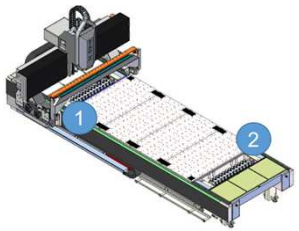
2nd – MAGAZINE **24-PLACE** *(integrated in machine bed)*

3rd – MAGAZINE **23-PLACE** *(on board)*

UP TO 71-PLACE

Cms
your technology partner

TOOL CHANGERS integrated in the machine bed



1

2

1st – MAGAZINE **24**-PLACE *(integrated in machine bed)*

2nd – MAGAZINE **24**-PLACE *(integrated in machine bed)*

**2nd not available with vertical table option.*

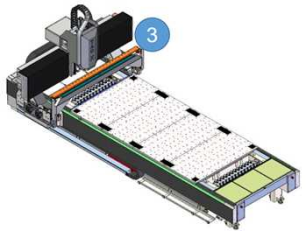
Chip to chip 14 sec

**Chip to chip, T1 – T2 18.000 rpm.*

Cms
your technology partner

TOOL CHANGER – on board of the bridge

Pressurized protection cups



3

3rd – MAGAZINE **23**-PLACE *(on board)*

Chip to chip 10 sec

**Chip to chip, T1 – T2 18.000 rpm.*

Cms
your technology partner

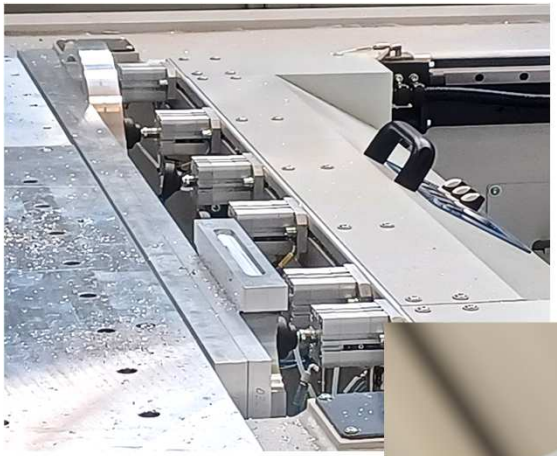
VERTICAL TABLE

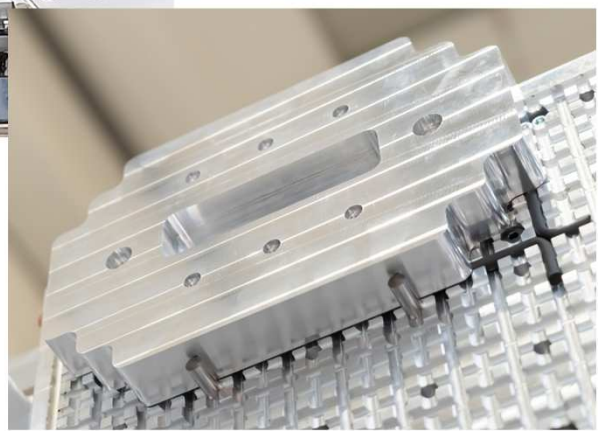
- Vertical Surface with CMS Vacuum table
- Dimension: **1.350 x 850 mm**
- Holes with a pattern **60x60** mm **for the positioning of the reference pins**

THE **VERTICAL TABLE** GIVES THE POSSIBILITY TO

CLAMPS AN ITEM IN VERTICAL POSITION to do machining on the side

The Clamping of the piece is carried out by the VACUUM and PRESSURE CYLINDERS

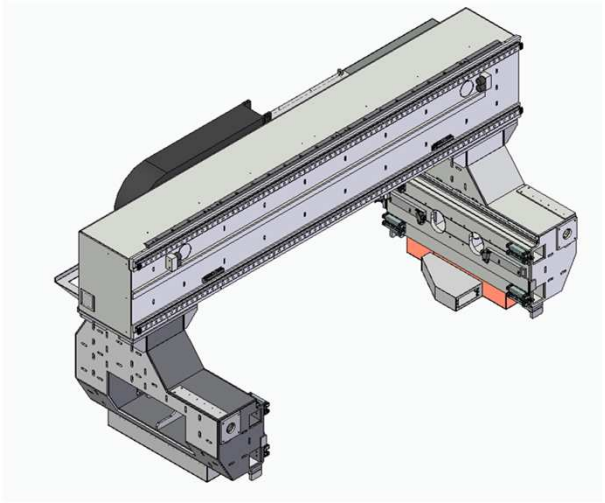




Cms
your technology partner

TAO- X main features – STRUCTURE

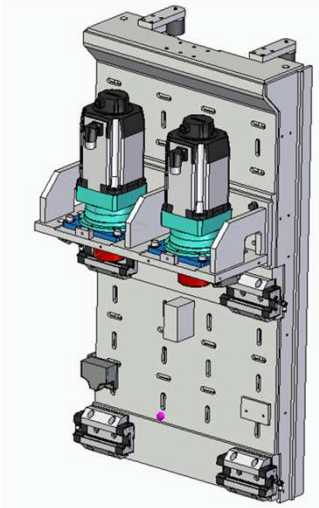
Massive MONOBLOC STRUCTURE
(4000 kg)
stiffness and stability



GUIDES – size 35 mm

DOUBLE GUIDE for X Stroke
size 35 mm

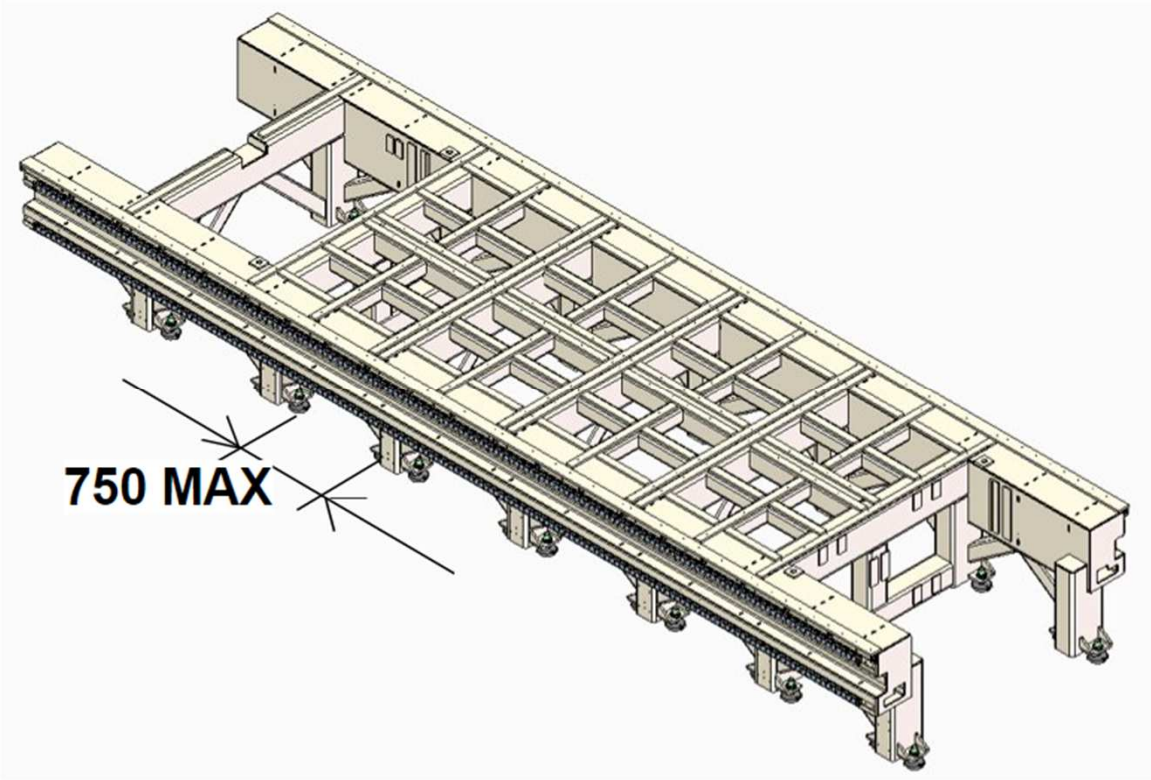
X Gantry Dual drive *opt*



Y Dual drive *opt*

Cms
your technology partner

TAO- X main features – TABLE STRUCTURE

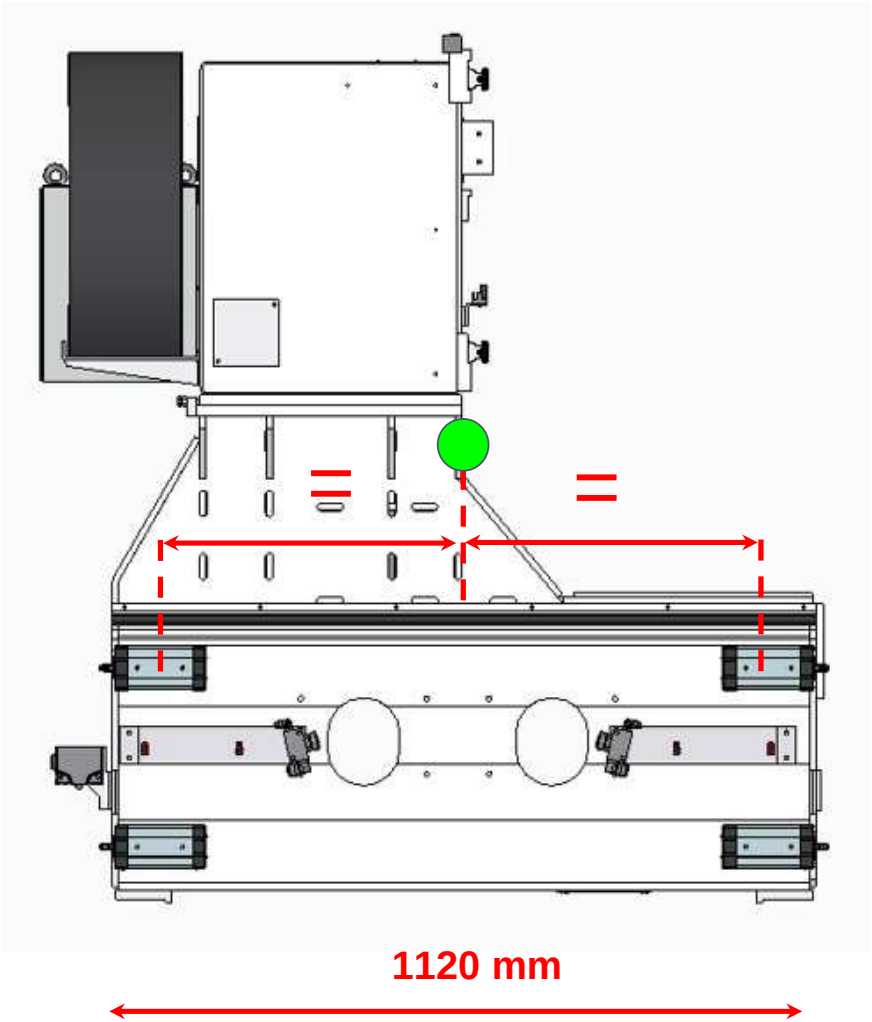


MONOBLOCK STRUCTURE
Max Center Distance / levelling feets
750 mm
(MBB 1050 mm)

IMPROVED
RIGIDITY & STABILITY

Cms
your technology partner

TAO- X main features – STRUCTURE – BRIDGE



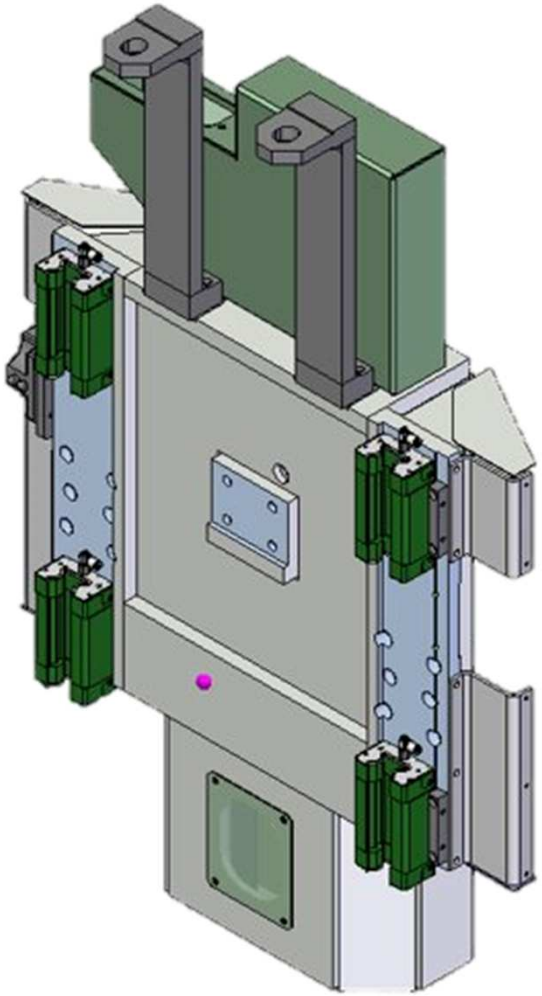
BIGGER STRUCTURE
INCREASED INTERAXES
(on the MBB is 970 mm)

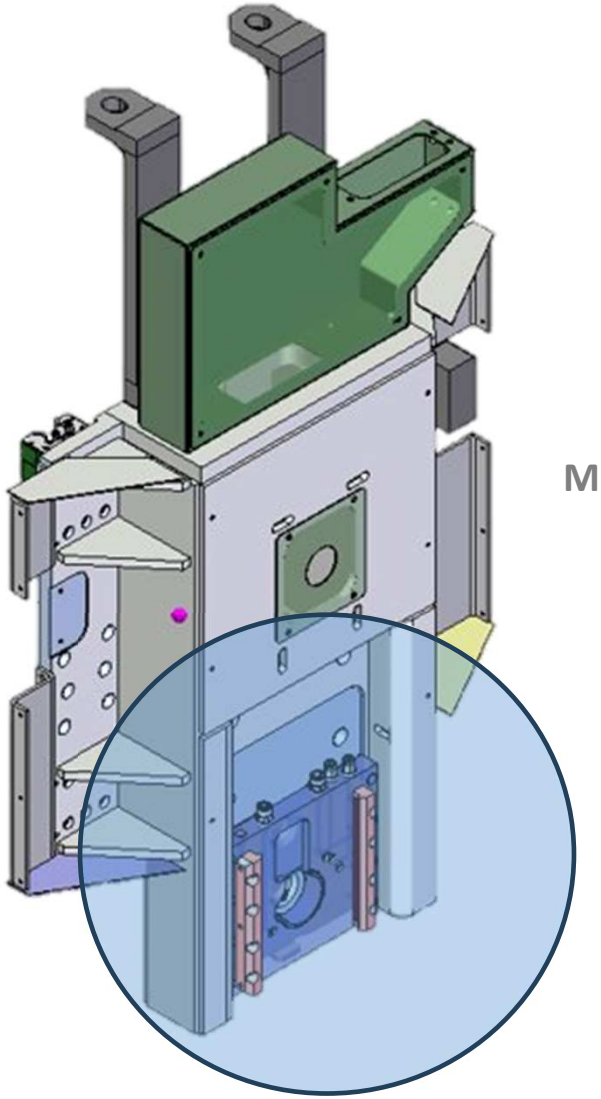
N. 4 SLIDING BLOCKS

BETTER DISTRIBUTION OF WEIGHTS

Cms
your technology partner

TAO- X – Z AXES CARRIAGE





Z AXES CARRIAGE WITH «U SHAPE»

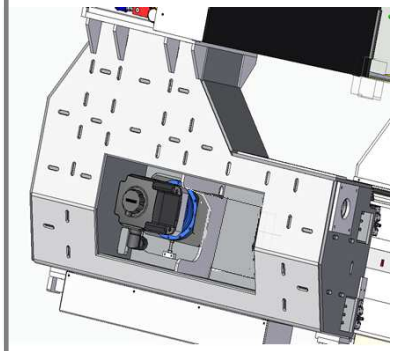
MINIMIZED THE DISTANCE SPINDLE AXIS / SLIDES

- **RIGIDITY**
- **SPACE FOR THE NEW SPECIFIC SUCTION HOOD**

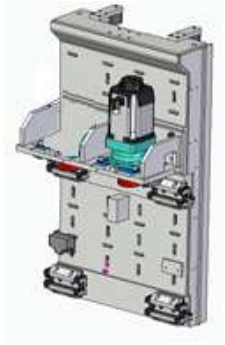
Cms
your technology partner

TAO-X 2 MACRO COMPOSITIONS

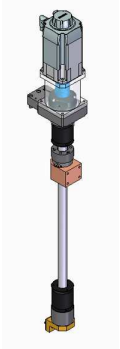
TAO-X CONFIGURATION



X GANTRY



Y SINGLE DRIVE



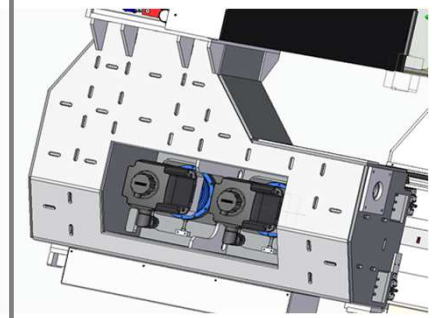
SCREW DRIVES

BALL RAIL SYSTEMS

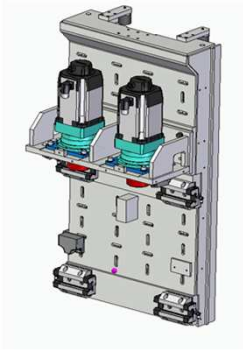
BELLOWS X-Y

QUICK POSITIONING SPEED [m/min]
X 50 m/min
Y 50 m/min
Z 30m/min

TAO-X HP - HIGH PERFORMANCE CONFIGURATION



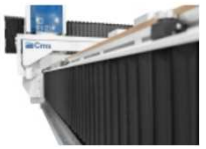
X GANTRY DUAL DRIVE



Y DUAL DRIVE

SCREW DRIVES

ROLLER TYPE SYSTEMS



BELLOWS X-Y

QUICK POSITIONING SPEED [m/min]
X 80 m/min
Y 80 m/min
Z 30 m/min

Cms
your technology partner

NUMERICAL CONTROL

FANUC 31i B5 PLUS

SIEMENS ONE

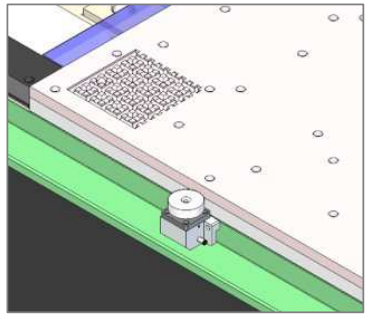
Cms
your technology partner

SOME OPTIONS

LUBRIX

RENISHAW NC4

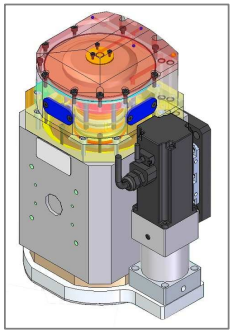
LINEAR SCALES



REFERENCE STOPS

RENISHAW PRIMO

VERTICAL TABLE



RR – 4° AXES

Cms
your technology partner

TaO-X HP actually in CMS available for demo

STROKES

- X=5040 mm
- Y 2200 mm
- Z 450 mm

COMPOSITION OF THE MACHINE AT THE TECH-CENTER (sn BA75)

- Safety fences all around the machine
- FANUC 31iB5 PLUS
- Working Table **4080x2050** mm

Working table configuration:

  - Pure-nesting (MDF) (3x2 m)
  - Vilmill (1x1 m)
  - Vac Mat (1x1 m)

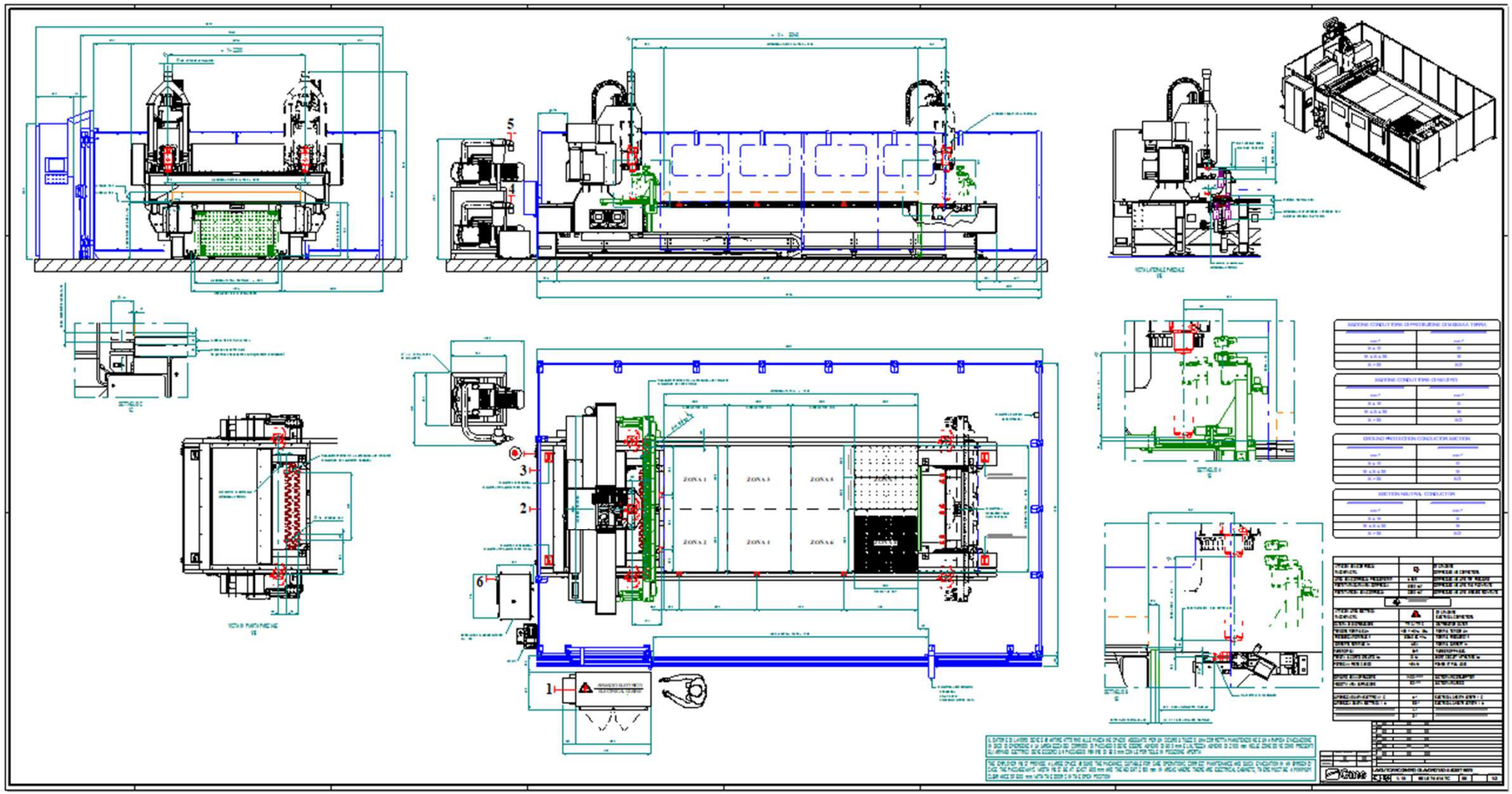
- **Vertical Table** (included 1 vacuum zone)
- N. 8 independent vacuum zone – **DYNAMIC MANAGEMENT**
- N. 2 x 250 m3/h vacuum pumps with double filter and metal frame
- N- 5 side reference stops

- **3 axes** working unit
- N. 1 **24-place** tool changer magazine + n. 1 **23-place (on board) -> tot 47-place**

- Spindle **20 kW HSK63A** Synchronous, NC controlled with internal passage for MQL
- LUBRIX with 10 litres auto-refill (internal & external)
- RMP60
- Renishaw PRIMO (tool length)
- Specific **NC controlled suction hood** suitable for aluminium processing

- Bellows on X Y
- Double Roller guides
- X movement: **Gantry Dual drive (80 m/min)**
- Y movement: **Dual drive (80 m/min)**

Cms
your technology partner



Cms
your technology partner

THANK YOU
for your attention!

Cms
your technology partner