



tooling for punch presses  
**EUROMAC®**



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**MATRIX**

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# COMPANY PROFILE

## A dynamic team

Matrix' products, the result of our highly qualified technicians' competence which constantly deal with problems connected to production cycles as well as specific customer's requirements.

## The customer, a unique partner

Each customer deserves special care, that's why Matrix doesn't simply offer a product but also a specialized consulting service and technical support, in order to reach the high competitive level required by the market.

## Punches and dies born to last

The high reliability and life lasting which characterize Matrix' products, are the result of experience, devotion, constant research and use of superior quality raw materials.

Punches are manufactured in accordance with the most modern techniques and machineries, produced with a unique type of steel (M2) hardened with the first quality heat treatments.

Strippers and sliding guides are manufactured with steels either resistant to wearing or heavy stress, produced with proper tolerances to guarantee endurance to punches and punching machine turret.

All guides are hardened and whenever possible, supplied with proper lubricating grooves.

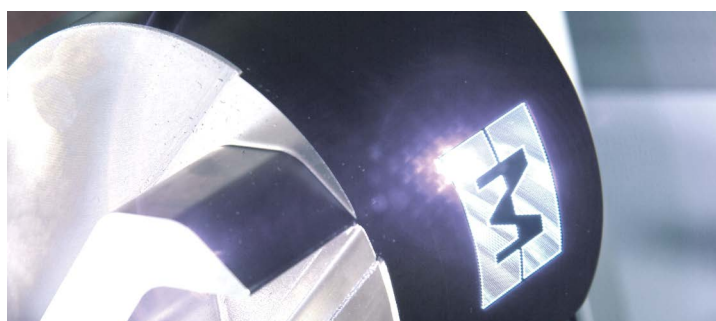
Full automatic production and control cycles guarantee to our dies a maximum level standard quality. Manufactured with high performing steels (D2).

## Innovative technologies for high performances

Matrix invests on the best technologies: from designing software to the most modern planning techniques, from cutting edge machineries to sophisticated control systems.

## Energies oriented to the maximum accuracy

The constant investments in machineries for our production is a must in order to keep the elevate standard level required by processing.





# WHAT'S NEW?

New series Green, White and Red offer a **great compatibility level** with different types of tools already on the market, getting **advantageous solutions** for each punching requirement.

All this, together with the high and **well known quality** which has been always characterizing Matrix' products.

For any tools model, or lubricating or end scrap evacuation system, **our products can satisfy any requirement** as far as quality, performing and innovation.



## Green series punch holders represent the best of Matrix' offer

Characterized by a quick adjusting and technical solutions for a better and longer tool life.

Perfectly compatible, **they perform with the most common thick turret tools available on the market**, either long original style, with or without lubrication, or various short and lubricated models.

Continuous tools stroke adjusting and quick stripper replacement, **keyless**.



## The most compatible series of Matrix' range

WHITE Series is the **suitable solution** to replace any other similar product available on the market, granting very high performances.

The extremely accurate combination between holder and stripper with its small die, considerably limits the unwanted punch displacement and let the tools of **Guided** line particularly adapt to nibbling, in which precision is a must.





# JETFORM

Jetform, line of tools for sheet metal forming, for **efficient machine performances**. Processings available from extrusions to engravings, clips and embosses and many others.

JETFORM inserts holder line is available on B, C, D and E station, with interchangeable inserts to reduce the costs for a new forming.

To better adapt to the specific customer's needs, Matrix' offer includes two types of inserts holders.

The Green Series characterized by an **accurate step adjusting of tool height**; the best choice for punching machines with imprecise or missing stroke adjusting.

The White series, **without adjusting**, exploits the stroke adjusting of the most recent punching machines.

All inserts holders are manufactured with a **total components lubrication system**; this works by getting a specific oil from the top, either automatically or manually.

# COMMON FORMING - JETFORM

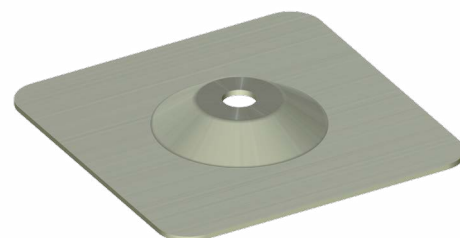
The most common forming are embosses, countersinks, engravings, logos, louvers and many others. The great diffusion of these forming allows to handle a **wide offer of standardized products**, reducing drastically delivery times. This type of forming is continuously growing, so please contact our sales department for assistance.



**M01**  
**ENGRAVED COUNTERSINK**  
FORMING



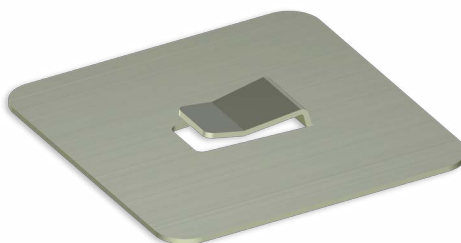
**M02**  
**EXTRUDED HOLE**  
FORMING



**M03**  
**ROUND EMBOSS**  
FORMING



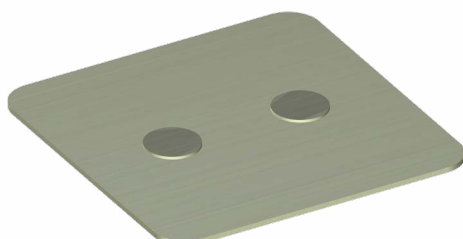
**M04**  
**ROUND COUNTERSINK**  
FORMING



**M09**  
**SPRING CLIP**  
SHEARING AND FORMING



**M12**  
**RADIUS BACK LOUVER**  
SHEARING AND FORMING



**M13**  
**SHEAR BUTTON**  
SHEARING AND FORMING



**M14**  
**ENGRAVING**  
ENGRAVING



**M23**  
**DOT SCRIBER**  
ENGRAVING

## SPECIAL FORMING - JETFORM

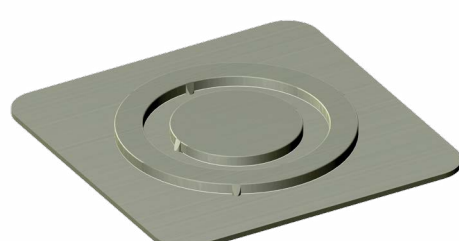
Our technical department is available to develop the **best solutions** for our customer's requirements. Thanks to this versatility we have no limits to satisfy the most complex requirements. The constant research of **new solutions** extends the possibility on the forming field, adding to normal engraving also **tridimensional images**.



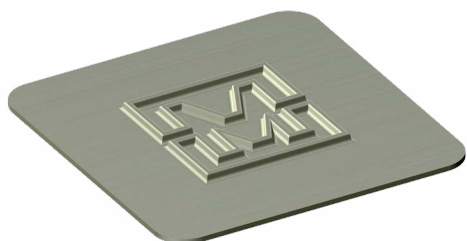
**M24 - STRENGTHENED CLIP UP  
WITH SAFETY BUTTON**  
SHEARING AND FORMING



**M25  
STRENGTHENED SPECIAL CLIP UP**  
SHEARING AND FORMING



**M10  
MULTIPLE KNOCKOUT**  
SHEARING AND FORMING



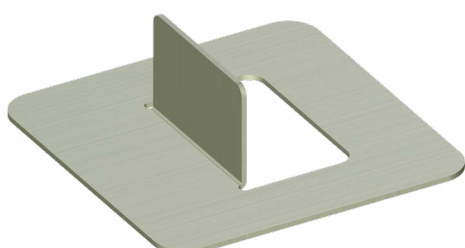
**M22  
CUSTOM LOGO**  
RELIEF



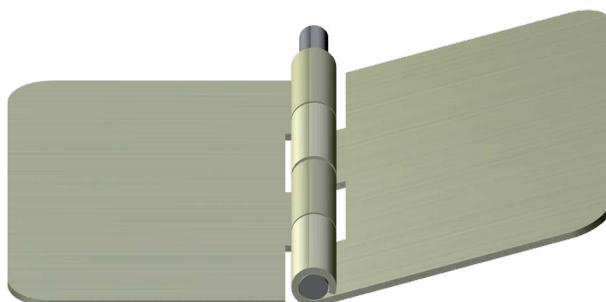
**M26  
EMBOSS FOR ELECTRICAL CABLES**  
SHEARING AND FORMING



**M27  
BRIDGED & EXTRUDED HOLE DOWN**  
SHEARING AND FORMING



**M28  
BENDING TOOL**  
FORMING



**M29  
HINGE**  
FORMING



# CONTINUOUS FORMING AND SPECIAL APPLICATIONS - JETFORM

The most recent technical solutions implemented on the modern punching machines for **much better tools control than in the past**, gives great impulse to new applications. New special tools have been developed to shear the protecting film laid on the sheet metal or continuous embosses or to deburr sheared parts.

These are only some examples of what you could get from your punching machine just using Matrix products.



**M15**  
**CONTINUOUS RADIUS BACK LOUVER**  
SHEARING & FORMING



**M20**  
**CONTINUOUS OBOUND EMBOSS**  
FORMING



**M30**  
**SCRIBER**  
ENGRAVING



**M31**  
**DEBURR**  
ENGRAVING



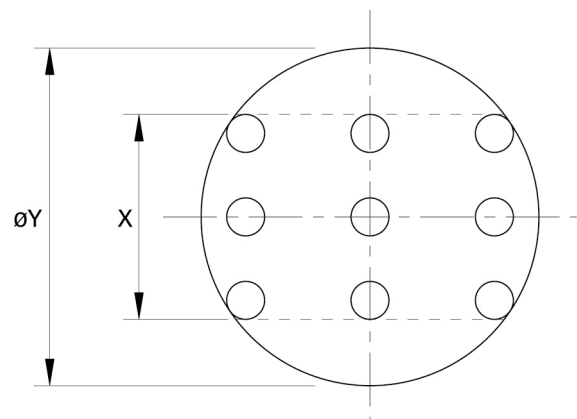
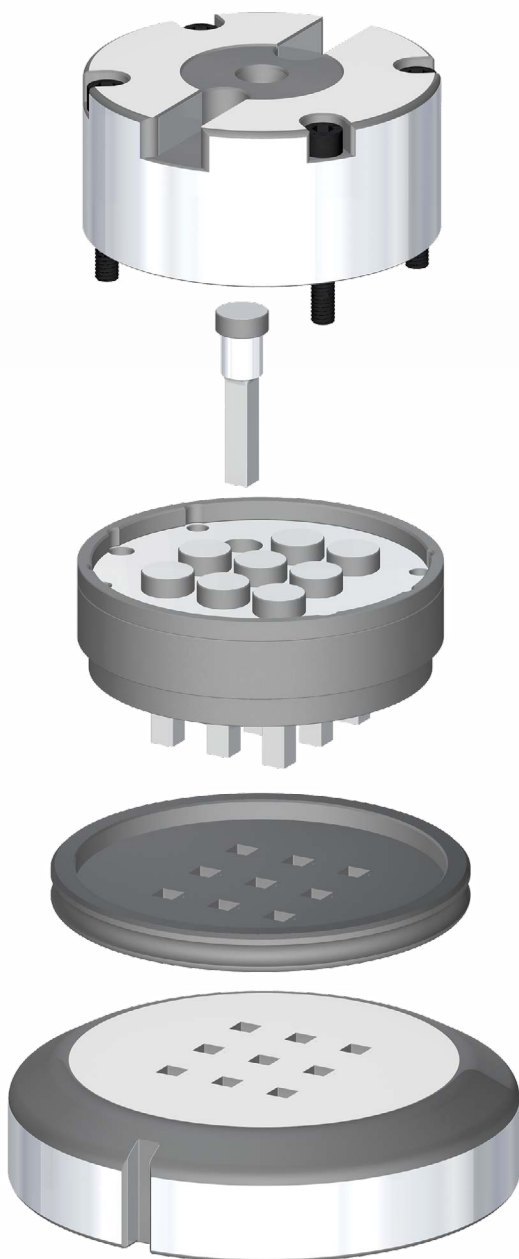
**M32**  
**FOIL SLITTING TOOL**  
ENGRAVING

## CLUSTER TOOL

Punching of cluster holes is easier with cluster tools which grants **great accuracy of final result.**

This particular type of tools can be manufactured either as integral tool or with interchangeable inserts for a **considerable saving** already on the medium use.

As for all our specials, our cluster tools – round and shaped – are followed up to testing by mean of coding and electronic filing of all particulars, for a **quick and precise availability.**



	B Station	C Station	D Station	E Station
X	21	21	56	71
$\varnothing Y$	31,7	50,8	88,9	114,3





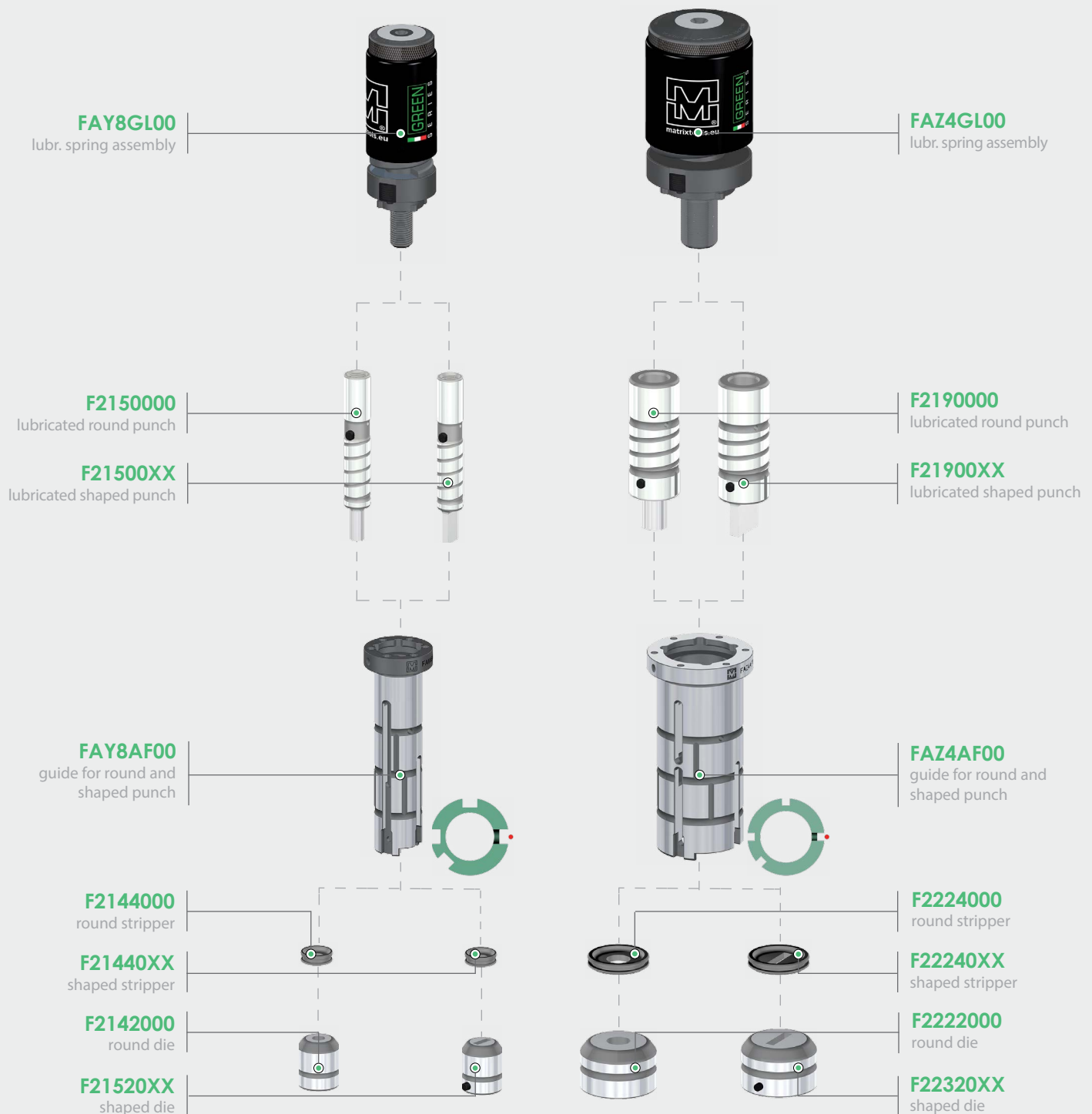
# PUNCH HOLDERS AND TOOLS



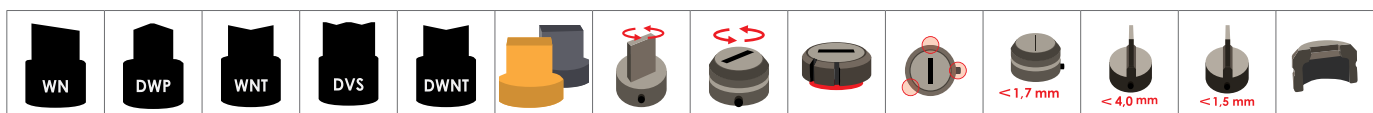
Tools codes indicated in our catalogues refer to the corresponding shape and can vary accordingly.

## GREEN SERIES - A STATION B STATION

- MAX Ø  $\varnothing$  = mm 12,7
- MAX Ø  $\varnothing$  = mm 31,7

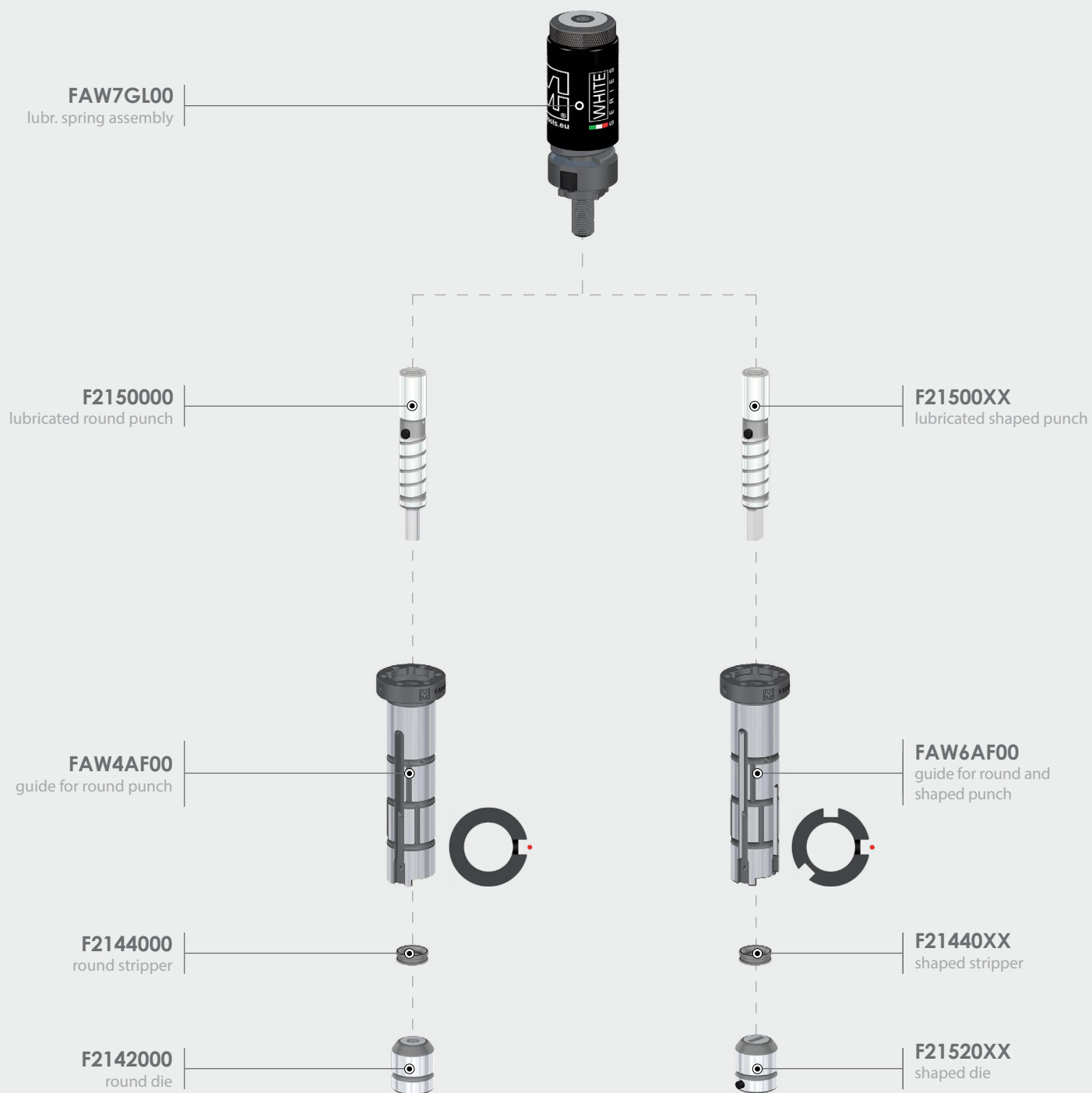


## OPTIONS AND NOTES

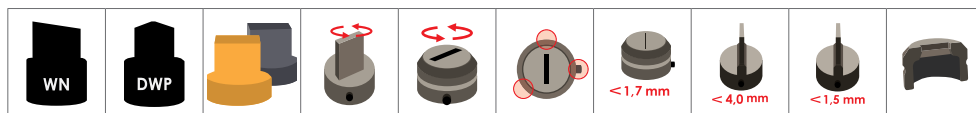




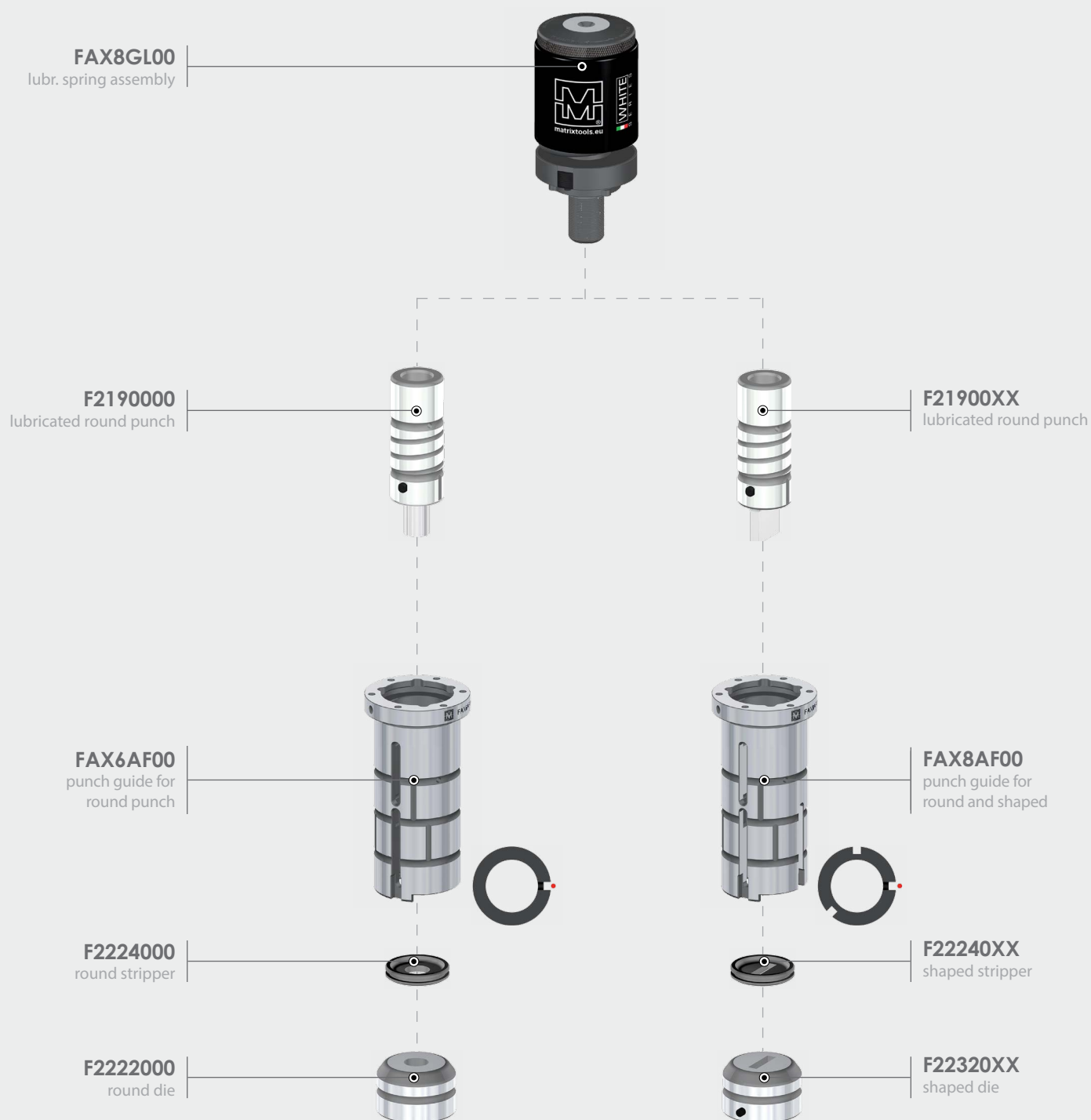
# WHITE SERIES - A STATION - MAX Ø $\varnothing$ = mm 12,7



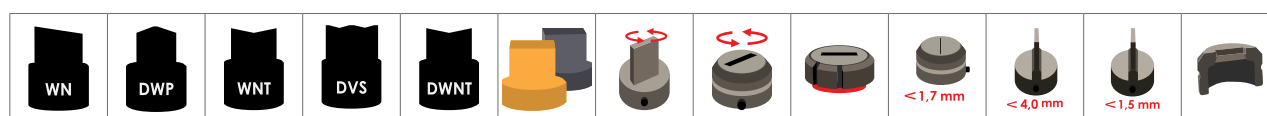
## OPTIONS AND NOTES



# WHITE SERIES - B STATION - MAX Ø $\nabla$ = mm 31,7



## OPTIONS AND NOTES



# WHITE SERIES - B STATION *Guided* - MAX Ø $\varnothing$ = mm 31,7

**FAX87200**  
lubricated spring assembly



**F2190000**  
lubricated round punch



**F21900XX**  
lubr. shaped stripper



**FB53AF00**  
punch guide for  
round and shaped



**FB53AE00**  
stripper's ring



**FB534000**  
round stripper



**FB5340XX**  
shaped stripper



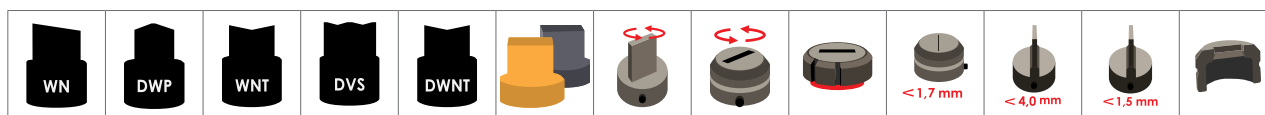
**F2222000**  
round die



**F22320XX**  
shaped die



## OPTIONS AND NOTES







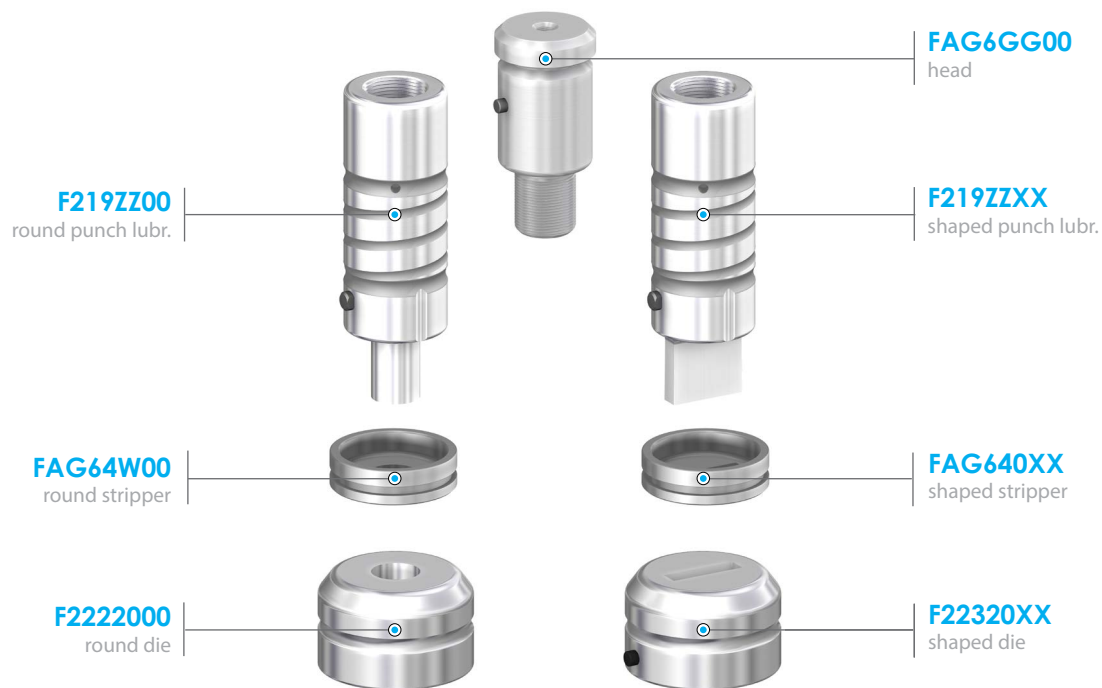
[illegible]



# TOOLS FOR MULTITOOLS

Tools codes indicated in our catalogues refer to the corresponding shape and can vary accordingly.

## MultiMT Series XB - MAX Ø $\varnothing$ = mm 31,7



Suitable Multifools  
Mate Precision Tooling  
XMTE4

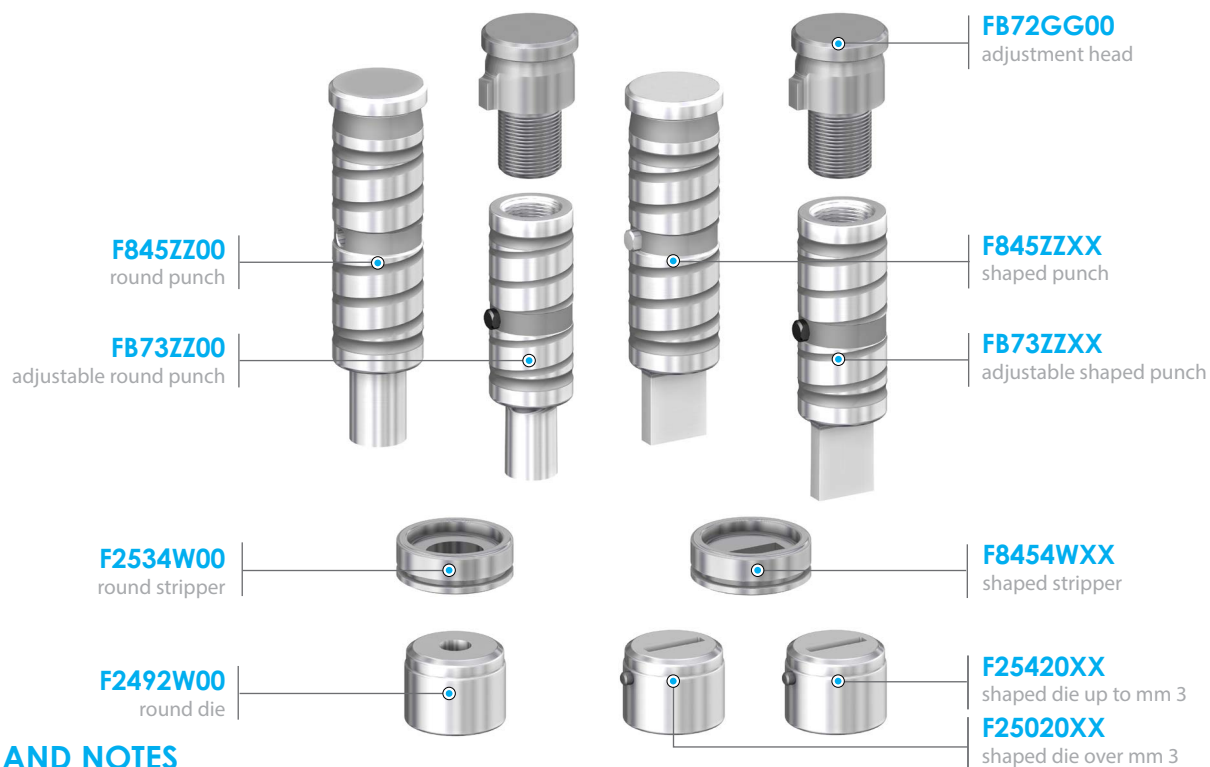
### OPTIONS AND NOTES

#### Dimensions (mm)

Punch: H = 100,5 Ø = 31,75  
Stripper: H = 11 Ø = 38,11  
Die: H = 30,4 Ø = 47,62



## MultiMT Series 6/24-6 and Serie 6/24-6 AR - MAX Ø $\varnothing$ = mm 24



Suitable Multifools  
Matrix  
6/24-6 ERHP, 6/24-6 EMMX  
Mate Precision Tooling  
XMTE10

### OPTIONS AND NOTES

#### Dimensions (mm)

Punch: H = 100 Ø = 24 (6/24-6)  
Punch: H = 80,5 Ø = 24 (6/24-6 AR)  
Stripper: H = 10,5 Ø = 30  
Die: H = 24 Ø = 31



# MultiMT Series X12,7 - MAX Ø $\varnothing$ = mm 12,7

Suitable Multitools  
Mate Precision Tooling  
XMTE10

**FAFRZZ00**  
round punch



**FAFRZZXX**  
shaped punch



**FAFQ4W00**  
round stripper



**FAFQ4WXX**  
shaped stripper



**FAFQ2W00**  
round die



**FAFR20XX**  
shaped die



## OPTIONS AND NOTES

### Dimensions (mm)

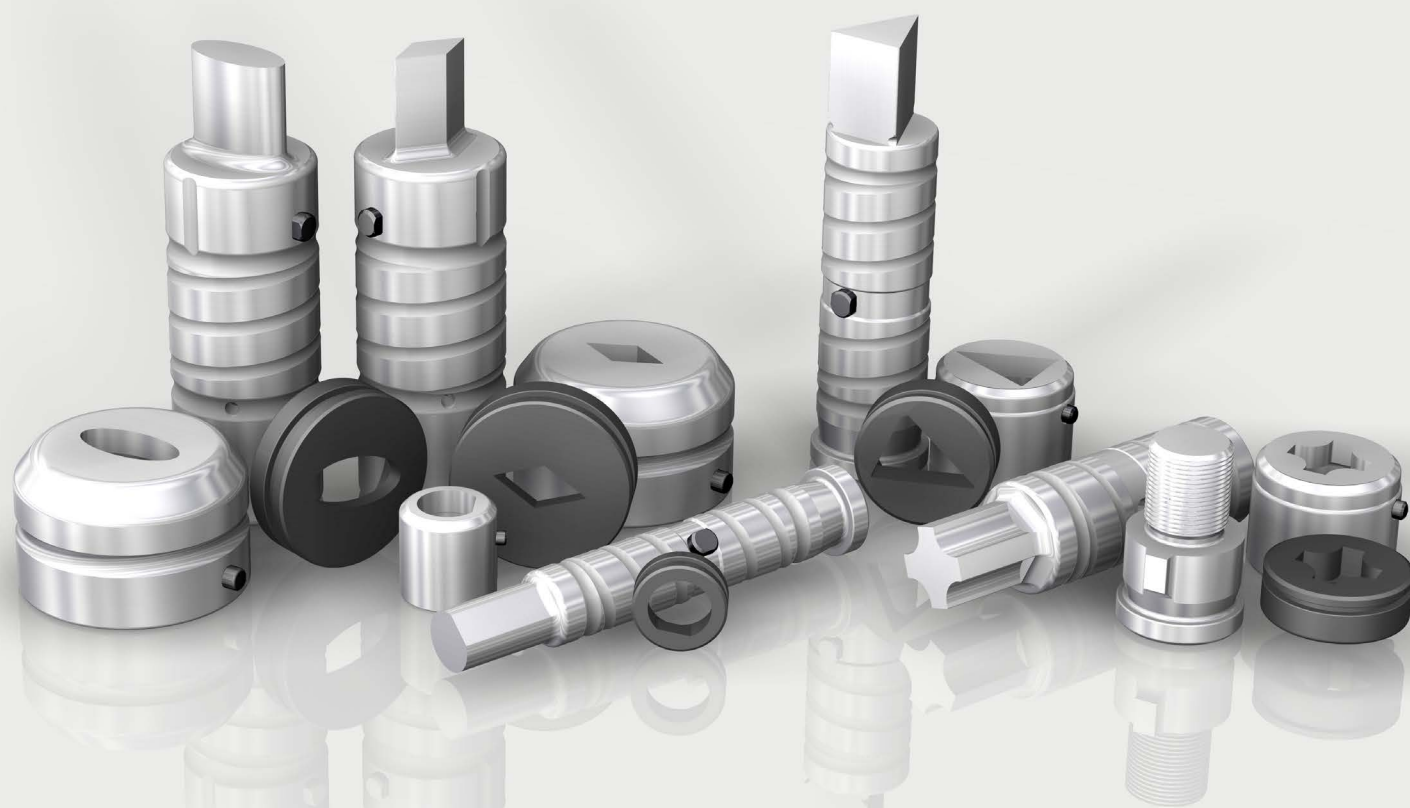
Punch: H = 100 Ø = 16  
Stripper: H = 7 Ø = 19,1  
Die: H = 20 Ø = 20



< 1,7 mm

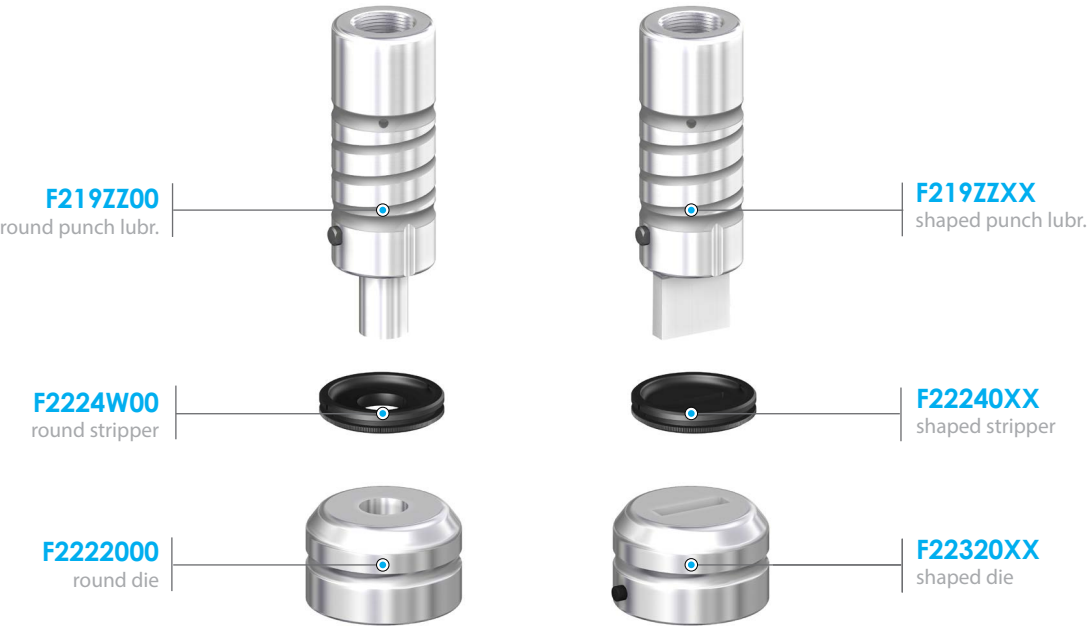
< 4,0 mm

< 1,5 mm



# MultiMT Series TTB - MAX Ø ∅ = mm 31,7

Suitable Multitools  
Matrix  
4B RHP, 4B F MMX, 4B R MMX  
Mate Precision Tooling  
MTE4, Ultra IMT3, Ultra MT3



## OPTIONS AND NOTES

Dimensions (mm)	WN	DWP	WNT	DVS	DWNT						
Punch: H = 100,5 Ø = 31,75											
Stripper: H = 6,9 Ø = 38,05											
Die: H = 30,4 Ø = 47,62											





# MultiMT Series 24 - MAX Ø $\varnothing$ = mm 24

Suitable Multitools  
Mate Precision Tooling  
MT6, MT8, MTE6, MTE10

**F253ZZ00**  
round punch



**F253ZZXX**  
shaped punch



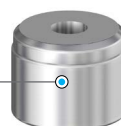
**F2534W00**  
round stripper



**F2544WXX**  
shaped stripper



**F2492W00**  
round die



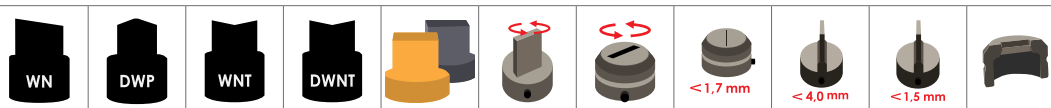
**F25420XX**  
shaped die



## OPTIONS AND NOTES

### Dimensions (mm)

Punch: H = 70,5 Ø = 24  
Stripper: H = 10,5 Ø = 30  
Die: H = 24 Ø = 31



# MultiMT Series 8 - MAX Ø $\varnothing$ = mm 8

Suitable Multitools  
Mate Precision Tooling  
MT20, MT24, MTE10

**F257ZZ00**  
round punch



**F257ZZXX**  
shaped punch



**F2574W00**  
round stripper



**F2584WXX**  
shaped stripper



**F2572W00**  
round die



**F25820XX**  
shaped die



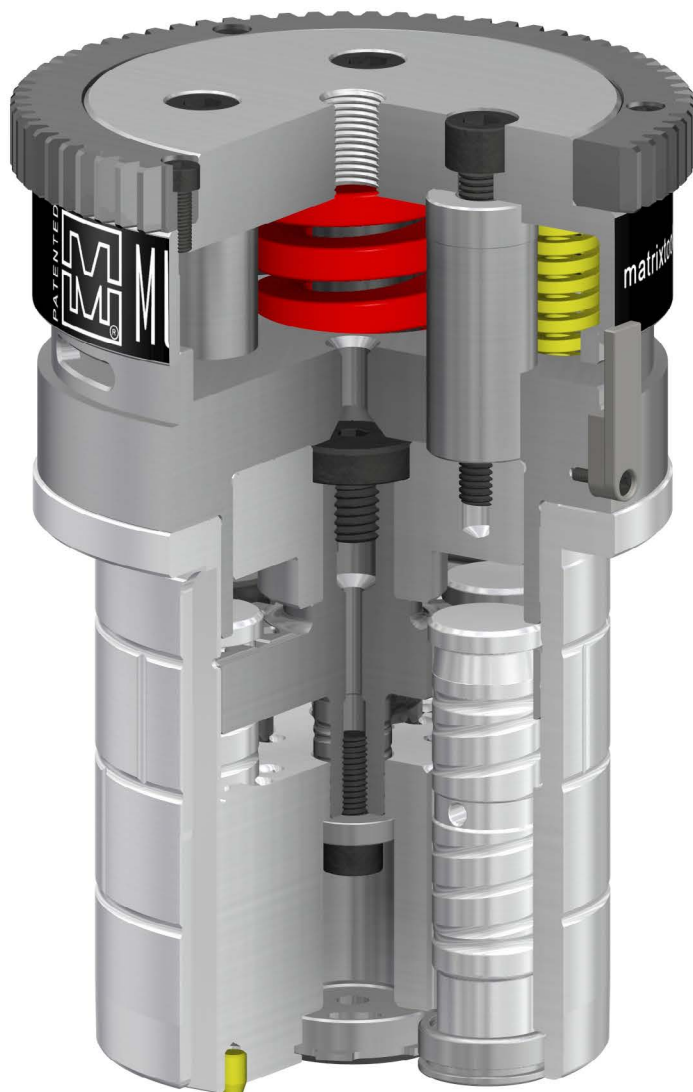
## OPTIONS AND NOTES

### Dimensions (mm)

Punch: H = 70,5 Ø = 8  
Stripper: H = 6 Ø = 16  
Die: H = 17 Ø = 16



# MultiMATRIX 6/24-6 E-MMX



**F845AH00**  
complete  
upper tool



**FB64EF00**  
complete die holder

## PATENTED

- 6 punch stations with maximum diagonal mm 24
- The spring on axis with the selected punch guarantees a high inflexibility that can be compared with the one in the mono tool
- Maximum tonnage on standard working:  
- 15 Tons  
*Warning: This tonnage could limit both kind and speed of processing*
- Quick stripper unlocking
- Total lubrication: inner and external, manual or automatic
- It can be inserted in a normal Thick Turret D Station
- It can be used in punch machine with rotating station (index)
- Dies holder with 3 positioning references for each station
- It is perfectly compatible with *Euromac®* punching machines



**FB648000**  
interchangeable pin  
for die holder

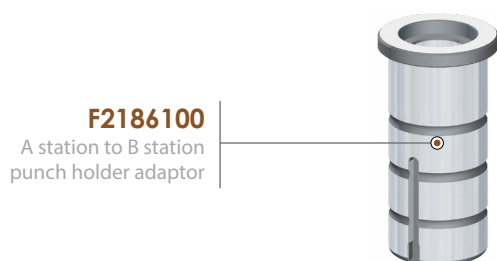
## MULTIMATRIX ROTATING SERIES



# ACCESSORIES

## STANDARD ADAPTORS - thick turret

Essential for monopunch machines, for a better flexibility even on thick turret punching machines. With specific adaptor it is possible to use smaller stations.



**F2186100**  
A station to B station  
punch holder adaptor



**F2276100**  
B station to C station  
punch holder adaptor



**F2186300**  
A station to B station  
die adaptor



**F2276300**  
B station to C station  
die adaptor



**F2346100**  
B station to D station  
punch holder adaptor



**F2346800**  
C station to D station  
punch holder adaptor



**F2346300**  
B station to D station  
die adaptor



**F2346400**  
C station to D station  
die adaptor

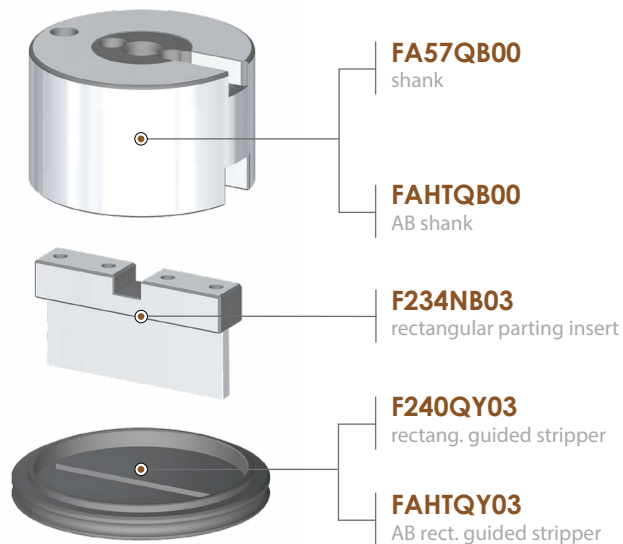
# PARTING TOOLS - thick turret

Simple inserts replacement for an economical solution, preserving the supports elements.  
Special stripper available as parting insert guide, for wearing reduction and better system rigidity.

## C STATION

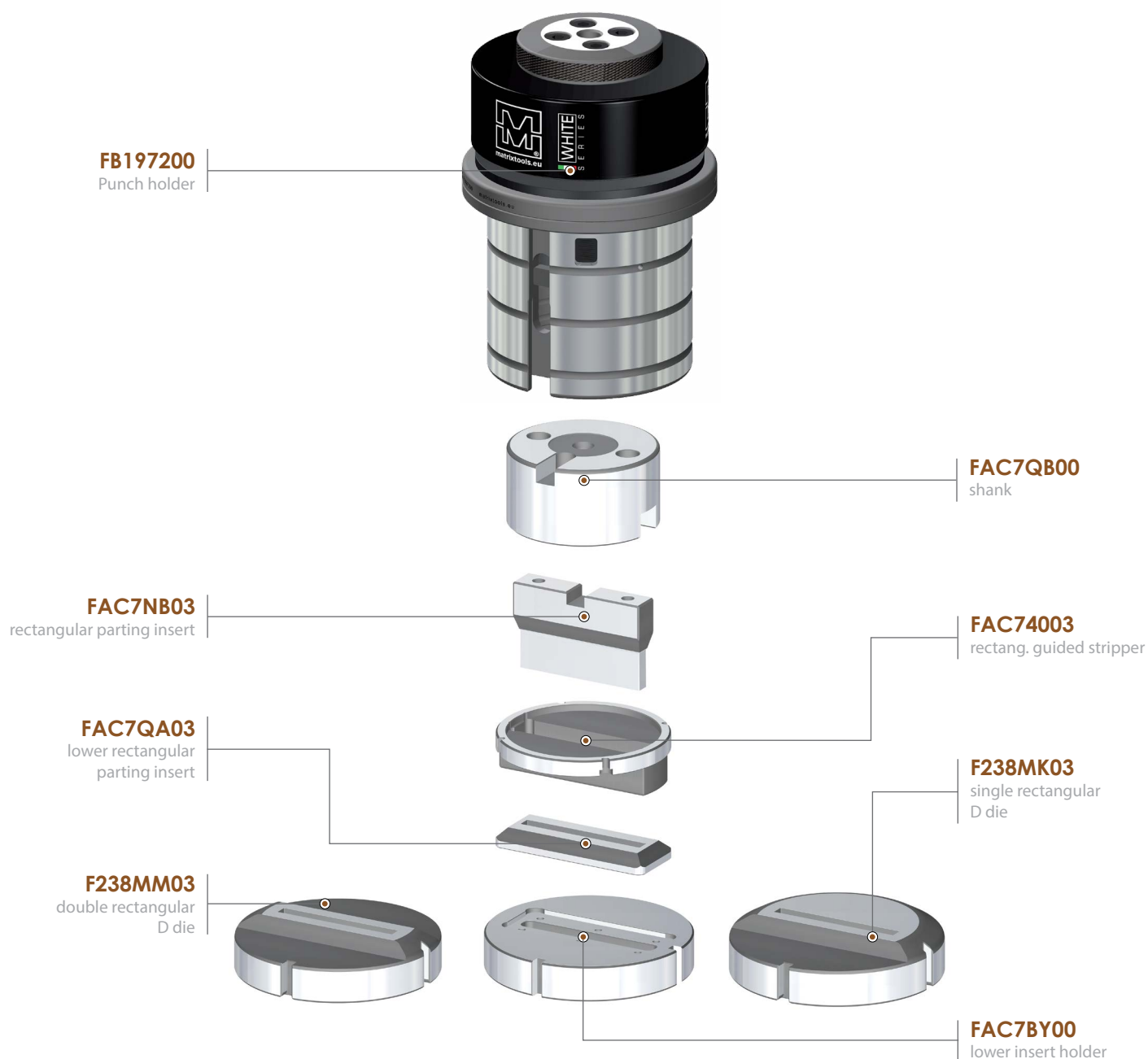


## D STATION



# PARTING TOOLS CLOSE TO CLAMP - thick turret D station

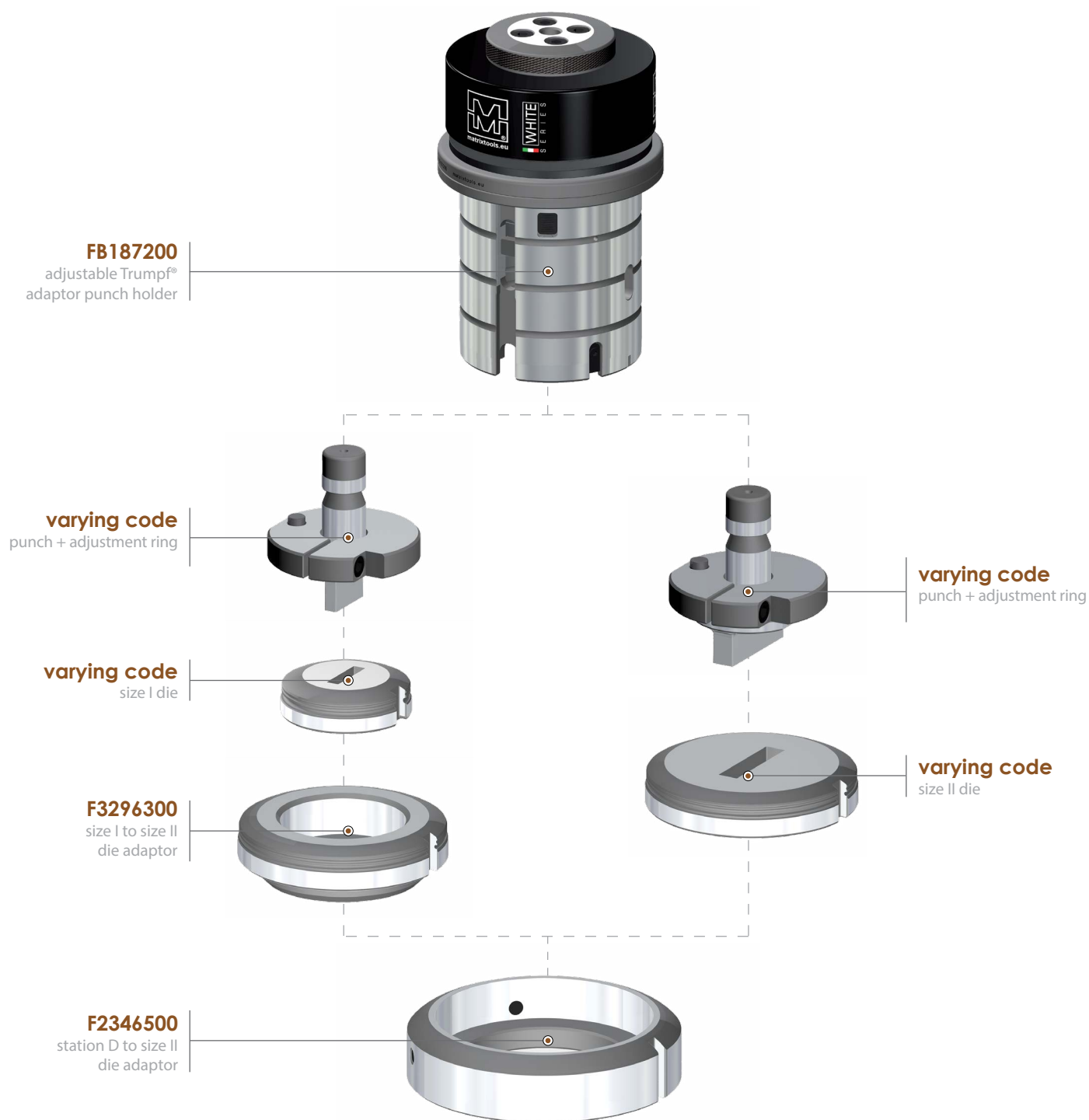
Used for cutting metal sheets close to clamps; special stripper as parting insert guide, for wearing reduction and better system rigidity.





# TRUMPF® ADAPTORS - MAX Ø $\varnothing$ = mm 76,2

For Trumpf® tools to be used on Thick Turret D station. For standard and sharpened tools, standard strippers.  
After sharpening, for a longer life the tools height is restored by step adjustment and without modifying the punch press stroke.  
Quick tools replacement, tools oriented from 0° to 360° with 45° steps. All this, for great performances.



## MULTIMATRIX MAINTENANCE

Every precision mechanism requires a proper maintenance to keep its own characteristics and when the equipment is very important for the production line, to do without it, often turns into an economic loss.

To avoid even brief machine stops it is important to consider a preventive maintenance of key equipments. For these reasons Matrix offers a rapid maintenance service for its MultiMATRIX range.

The standard package includes:

- Complete disassembling and verification of every single element
- Replacement of all compressing springs
- Replacement of all collar screws
- Replacement of the main small metal parts
- Replacement of rubber pins
- Assembling and testing

To minimize the machine stop, the whole process will be carried out within 48 hours from receipt of the Multitool.

You can also join an annual programmed maintenance service and decide together with our commercial department the most convenient date to carry it out.

For further information please contact our sales department at: [sales@matrixtools.eu](mailto:sales@matrixtools.eu)

## GRINDING: THE IMPORTANCE OF TOOLING MAINTENANCE

Professional maintenances and grinding grant constant and more durable performances to the punching tools.

To the first wearing sign it is recommended to grind the tools considering that the material removal will be minimum: wearing grows progressively, reducing the total number of hits performable with one single tool.

After sharpening it is recommended to demagnetize the tools to avoid scraps pulling and it is furthermore necessary to restore the punch height, in case it is adjustable or, otherways, the machine stroke.

All this can be done by machine operators with grinding machines and accessories for an easy, quick and economical operation.

Matrix can satisfy these requirements with a range of machines, accessories, lubricants and instructions. Specific documentation available on demand.



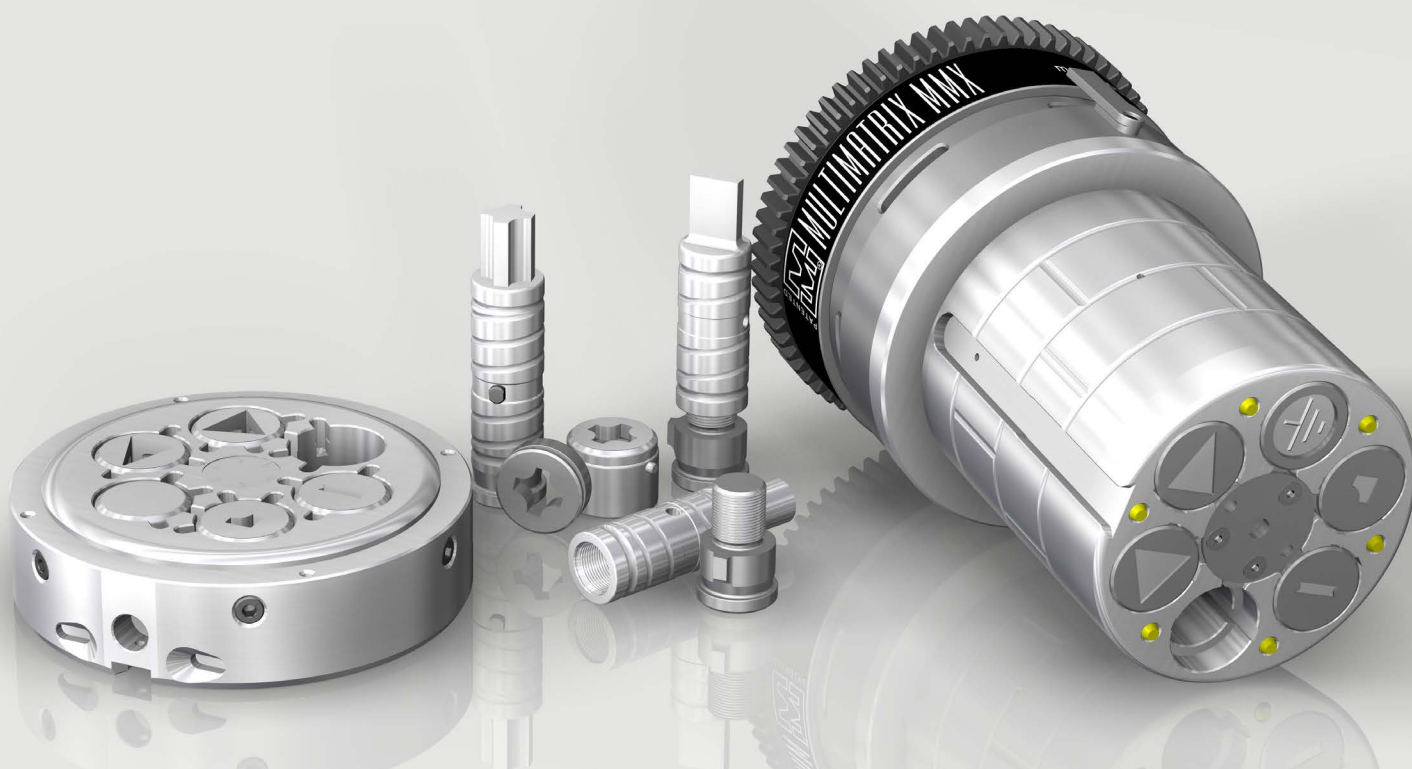
## CENTERING TOOLS B and D Stations

It requires great care to keep in good condition punch holders and tools as well as a perfect centering of the punching machine. Specific tools for the most common stations, characterized by high precision, for a simple and quick maintenance.

**B STATION** FAT77800



**D STATION** FAT97800



# OPTIONS

## SURFACE COATINGS (PVD)

In order to improve working characteristics, the surface of all punches can be coated; this treatment gives to the tool surface a considerably greater hardness and self-lubrication. MATRIX uses two types of coatings, Type A (Titanium Nitrite) and type B (Titanium-Aluminum Nitrite). Type A coating yellow-gold coloured, provides to the punch a higher surface

hardness up to four times the initial one and an optimal self-lubrication capability with a friction coefficient equal to 0,44. It's recommended for exacting working processes, without lubrication or with dough materials difficult to be pulled, such as copper or aluminum alloys. Type B coating grey-blue coloured, is an evolution of the previous one which, besides

imparting a higher hardness on tool surface, is more solid and its endurance increases; this coating resists to higher temperature, little lower than 900°. Thanks to these characteristics, it's recommended in case of high speed punching machines (500:1000 strokes per minute) and it's also excellent for STAINLESS STEEL processing.

## ANTI SLUG

Slug pulling could get several kind of problems, from the simple downtime to the tools damaging.

In major cases, slug pulling occurs when a scrap gets in between punch and sheet metal so that next punching cycle is performed on a double thickness with imaginable consequences.

For this reason and in order to avoid the problem, our dies, to be used according to specific process, are accordingly designed.

## SHEAR SHARPENING

For punch shear sharpening we mean various geometry of their faces which grants several benefits such as:

- Noise Reduction
- Reduction of vibration and counterstrokes of all machine components

- Slug pulling reduction
- Tonnage reduction
- Easy pulling

On the other hand, tools with special shear provides punch holders springs a harder functioning.

Shear types most commonly offered are:

- **DVS** for shearing tools and high thicknesses
- **DWP** for balanced loadings and high thicknesses
- **DWNT** for thin thicknesses - nibbling processes with big shapes
- **WNT** for thin thicknesses - nibbling processes with small shapes
- **WN** for thin thicknesses - nibbling processes with small shapes



## MAX DIAGONALS THICK TURRET TOOLS

A Station	B Station	C Station	D Station	E Station	F Station
mm 12.7	mm 31.7	mm 50.8	mm 88.9	mm 114.3	mm 153.5

## PUNCH GRINDING EFFECTS ON TONNAGE

Find here below an illustrative table concerning tonnage reduction, considering DWP shear with standard depth.

Material thickness in mm	1	1,5	2	2,5	3	4	5	6
Tonnage reduction in %	60	50	40	35	25	20	15	10

## TONNAGE GENERAL FORMULA

$$\frac{P \times S \times K}{28,3}$$

**P** = shape perimeter  
**S** = material thickness  
**K** = material coefficient

Material	K material
Aluminum	0.6
Copper	0.6
Brass	0.6
Mild steel	1
Stainless steel	1.5

Exemple:  $\frac{40 \text{ (square perimeter of mm 10 edge)} \times 2 \text{ (material thickness in mm)} \times 1,5 \text{ (K stainless steel)}}{28,3} = 4,24 \text{ (tonnage)}$

## DIES TOLERANCE IN PERCENTAGE TO THICKNESS

Material	Thickness Range		Minimum or Blanking*	Standard	Maximum
Aluminum Copper Brass 20÷25% Kg/mm <sup>2</sup>	Up to	mm 2	8%	10%	12%
	From to	mm 2 mm 4	10%	12%	15%
	Over	mm 4	12%	15%	20%
Mild steel 30÷40% Kg/mm <sup>2</sup>	Up to	mm 2,5	15%	18%	20%
	From to	mm 2,5 mm 5	18%	22%	25%
	Over	mm 5	20%	25%	30%
Stainless steel 60÷80% Kg/mm <sup>2</sup>	Up to	mm 1,5	15%	20%	22%
	From to	mm 1,5 mm 3	18%	22%	25%
	Over	mm 3	20%	25%	28%

\* Blanking: when the scrap is the requested part.

## LUBRICATION: A MUST

It's the first rule to apply; being punching a shearing and extrusion process, in order to get a good result, lubrication of the shearing area is a must.

Lubrication has an essential role on punching machines, particularly on punching stamps.

During punching phases, small quantities of material get stuck to the punch surface.

A lubricant oil with proper characteristics acts as a barrier between punch and material reducing significantly both friction and material build up on the punch surface, improving therefore the punch life.

If for some reasons lubrication is a problem, Titanium coated punches could help.

On machines without an automatic lubricating system please daily fill up the central bore with sliding oil and always to each equipping.

When you fit a punch on the punch holder we recommend to lightly oil the punch body with graphite grease.

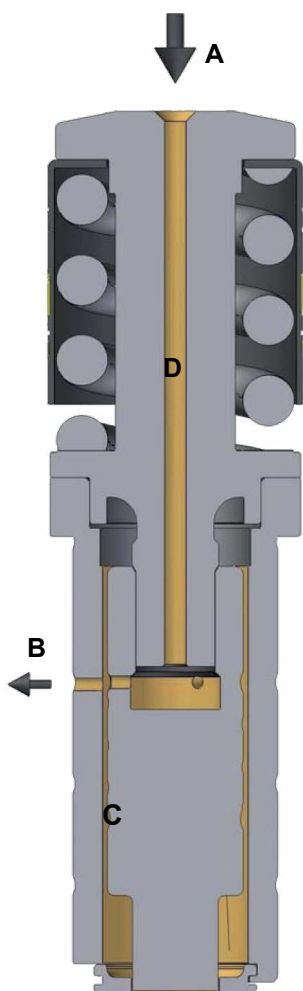
Inobservance of this rule will cause an excessive punch holders wearing.

With the schema on the left, valid for A and B stations, you can see the course of the lubricant.

The letters respectively indicate:

- A** Bore for lubricant liquid
- B** Bore to let the lubricant liquid into the outer punch holder walls and its housing contact area
- C** The oil, by lubricating the punch cutting part, improves shearing and pulling
- D** Tank for lubricant

Matrix can supply lubricant and shearing oils for different working requirements. Evaporable oils are also available whenever grease waste parts must be avoided.







**M**  
**M**  
**MATRIX**

**JETFORM**

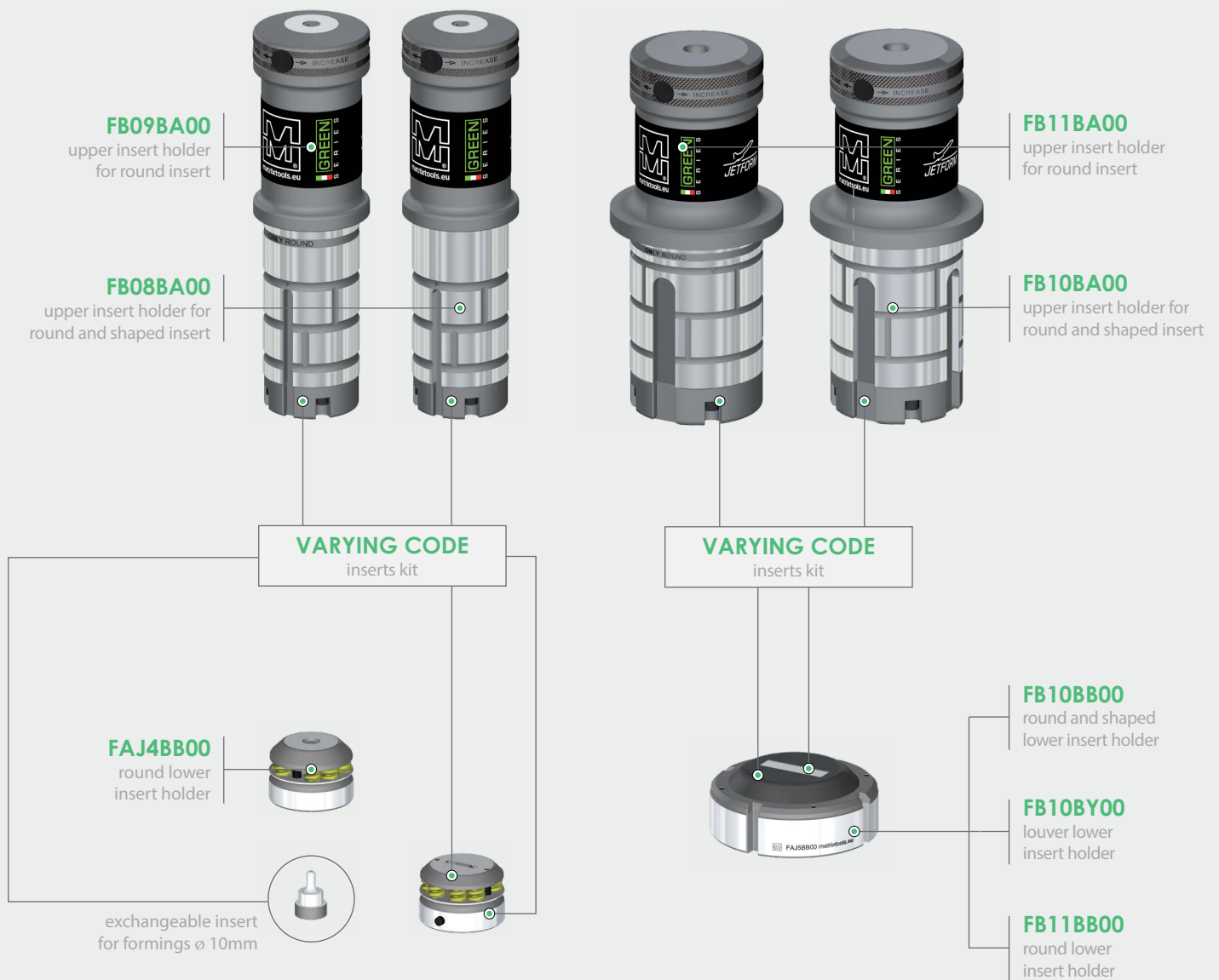
## JETFORM - GREEN SERIES - ADJUSTABLE HEIGHT

### B STATION

MAX Ø  $\nabla$  = mm 25

### C STATION

MAX Ø  $\nabla$  = mm 40

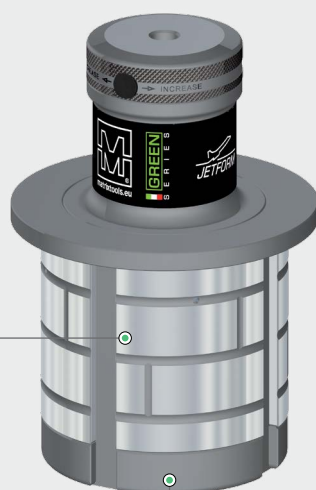


**Accurate tool height adjusting** by mean of 0.08 mm steps which characterize Green Series punch holders, for the maximum performances on punching machines with imprecise or without stroke adjusting.

## D STATION

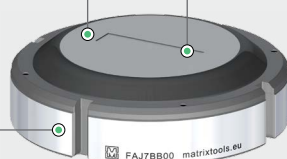
MAX Ø  $\nabla$  = mm 70

**FB12BA00**  
upper insert holder for  
round and shaped insert



**VARYING CODE**  
inserts kit

**FB12BB00**  
round and shaped  
lower insert holder



**FB12BY00**  
louver lower  
insert holder



Tools for the most common formings are available for a quick delivery.  
Our sales department is at your complete disposal to provide you with updated list.

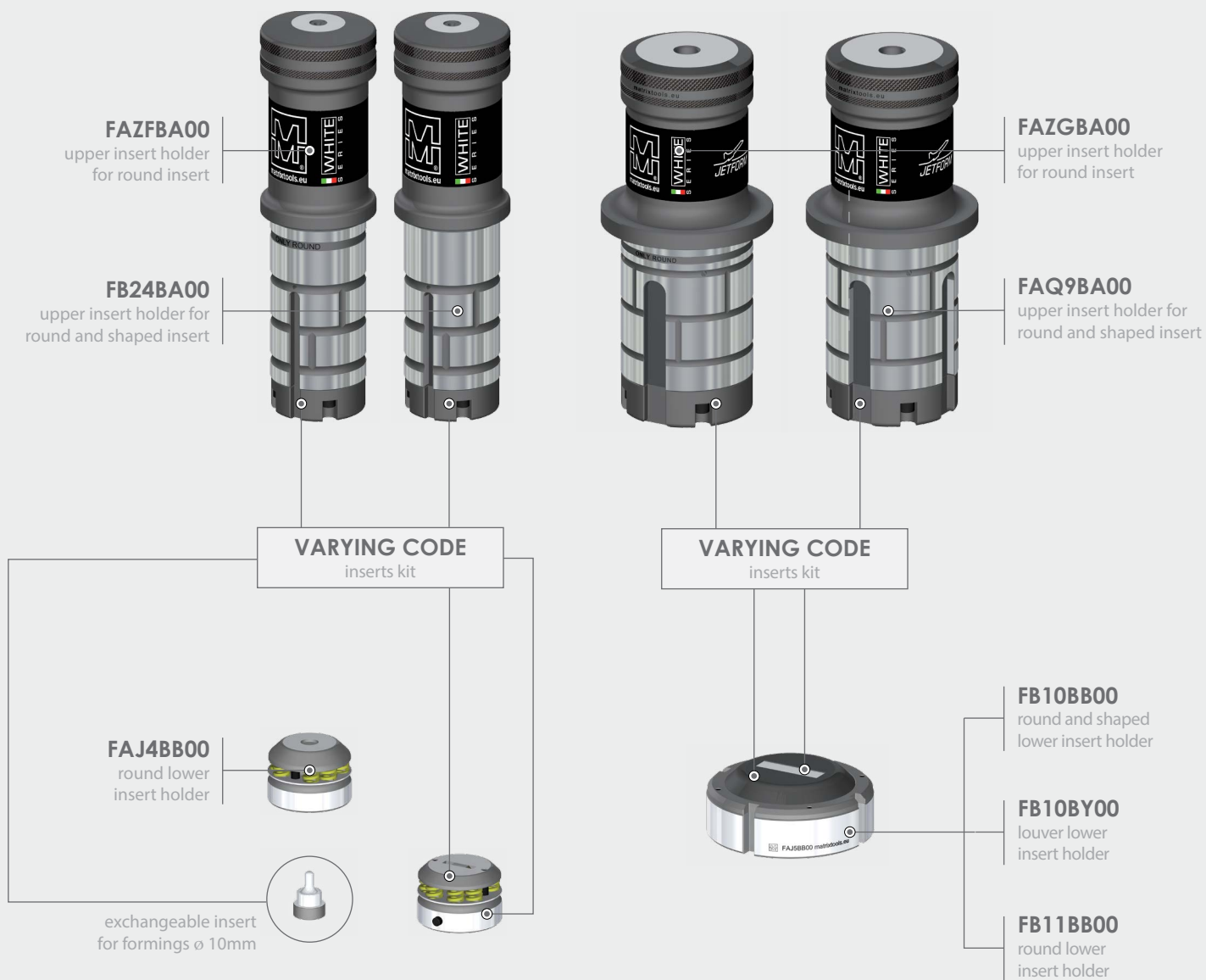
## JETFORM - WHITE SERIES

### B STATION

MAX Ø  $\nabla$  = mm 25

### C STATION

MAX Ø  $\nabla$  = mm 40

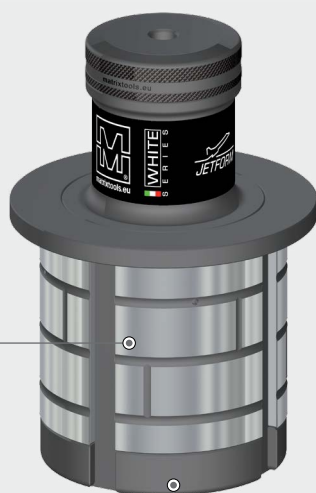


White Series punch holders, for extremely advantageous forming processes on punching machines recently manufactured, taking advantage from the stroke adjusting.

## D STATION

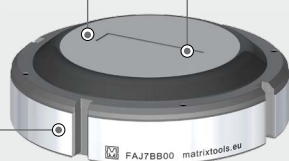
MAX Ø  $\square$  = mm 70

**FAR0BA00**  
upper insert holder for  
round and shaped insert

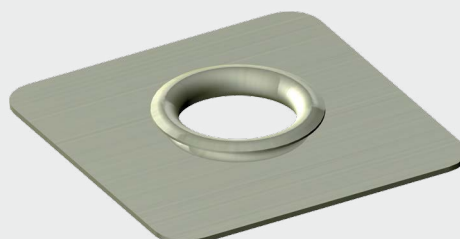
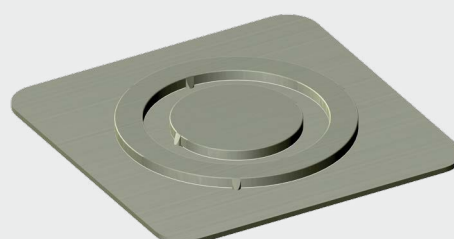
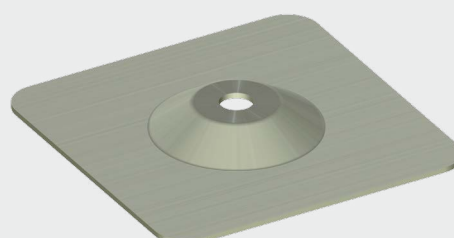
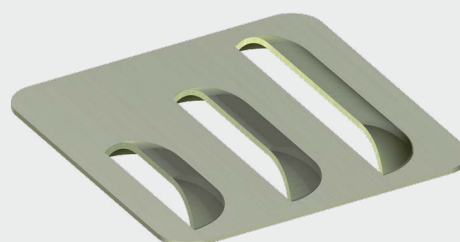


**VARYING CODE**  
inserts kit

**FB12BB00**  
round and shaped  
lower insert holder



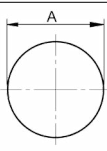
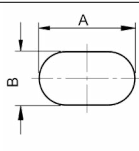
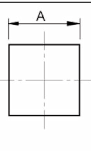
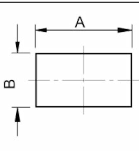
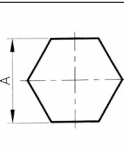
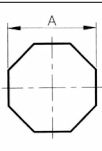
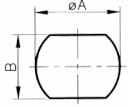
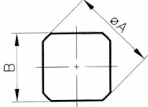
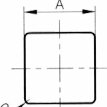
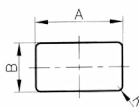
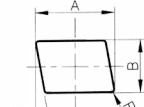
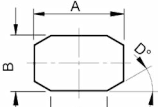
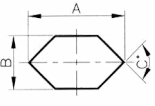
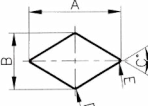
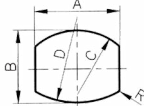
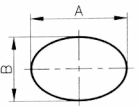
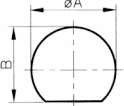
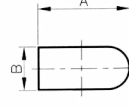
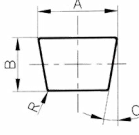
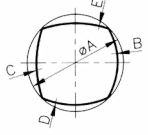
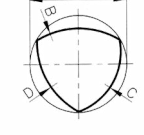
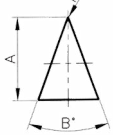
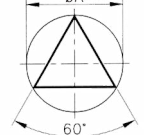
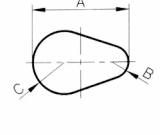
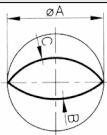
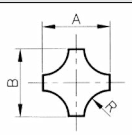
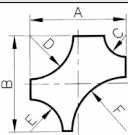
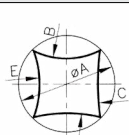
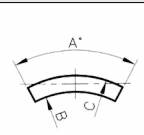
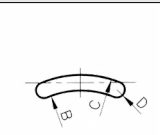
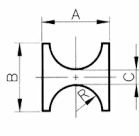
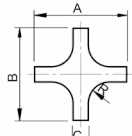
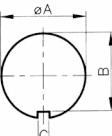
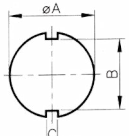
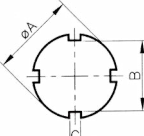
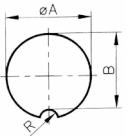
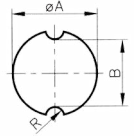
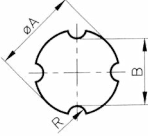
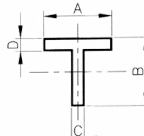
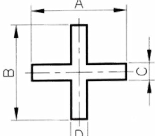
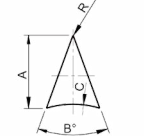
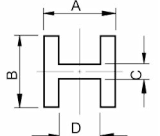
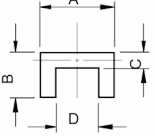
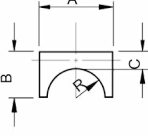
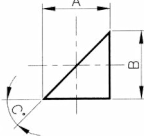
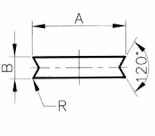
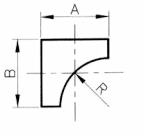
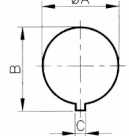
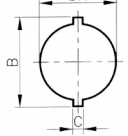
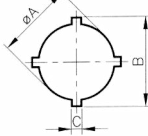
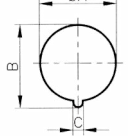
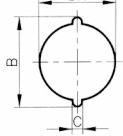
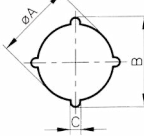
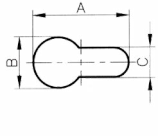
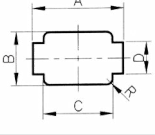
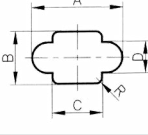
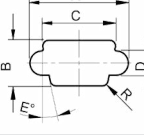
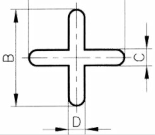
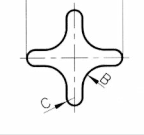
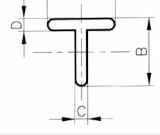
**FB12BY00**  
louver lower  
insert holder



Tools for the most common formings are available for a quick delivery.  
Our sales department is at your complete disposal to provide you with updated list.



# MATRIX SHAPE CODING

					
A0A	A0B	A0C	A0D	A01	A02
					
A03	A04	A05	A06	B01	B02
					
B03	B04	B05	B06	C01	C02
					
C03	C04	C05	C06	C07	C08
					
C09	C10	C11	C12	C13	C14
					
C15	C16	D01	D02	D03	D04
					
D05	D06	E01	E02	E03	E04
					
E05	E06	F01	F02	G01	H01
					
H02	H03	H04	H05	H06	H07
					
H08	H09	H10	H11	H12	H13





## NOTES







## MATRIX

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