EUSKRON®

ABB*

*Antivibration Boring Bar

Modular Heads

Antivribation Boring Bar ABB

At Euskron we expanded our family of tools for turning with the launch of new anti-vibration bars. It is an innovative system based on the use of different materials that absorb vibrations in deep and very difficult boring operations.

We have a standard range that covers all the areas of application in measures 7xD and 10xD for diameters of 16 to 80 mm.
For bigger dimensions we offer special solutions.

Reasons for using an ABB in internal operations?

- Maintains tolerance levels
- Improves surface finish
- Increases metal removal
- Allows applying competitive speeds

Is it compatible with other products on the market?

Yes. The M1 grooved coupling system is compatible with other popular products on the market.

Is my machine suitable for deep boring operations?

The machine range will influence the performance, but in any case, the ABB bars can be adapted to any existing machine.
It is very important to follow the advice given in its assembly and use.

I'm not sure if I need an ABB…

We have a technical commercial service that can advise you on this choice. Not all problems are solved by buying products.
We have a long and extensive experience in machining so we can offer you the best boring solution, adjusted to your budget and need.

In this document you will find a user guide with the determinants for a successful machining, as well as a brief troubleshooting guide for a proper setup and optimized machining..

The Antivibrator Bars

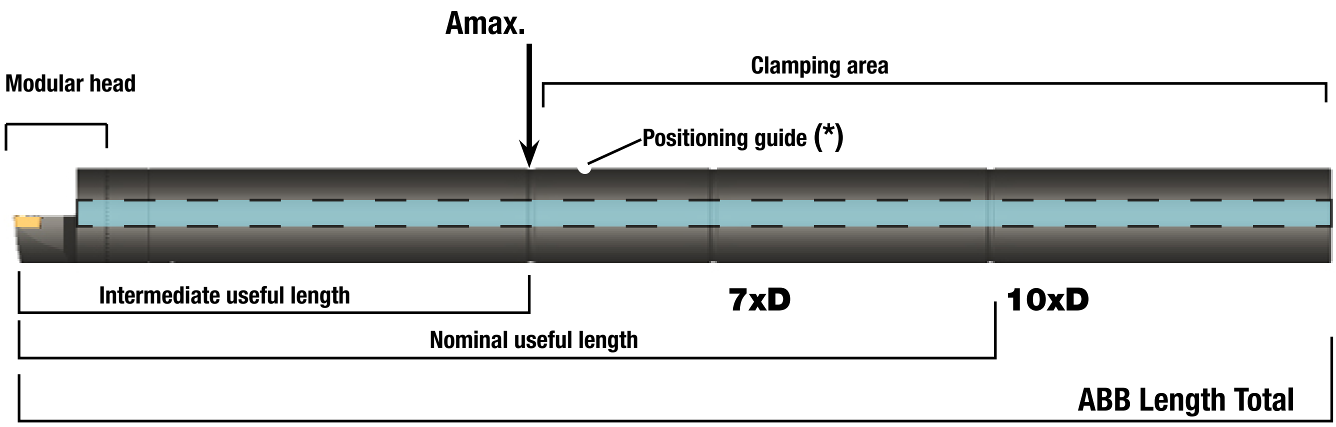
ABB bars have been designed and manufactured entirely in Euskron under the high quality standards that define our products. Not only the machining, but also the assembly is carried out manually (and unitary), taking care of details before reaching your hands.

Our own design is based on a hydraulic-mechanical system that offers a very robust mooring and an active zone for the absorption of vibrations. This combination of systems avoids in a high percentage, the deviation of the bar and the vibrations that the machining can cause to it.

In the tests carried out, both in clients and in our own house, we have been able to appreciate the incredible response that this combined system offers.

Take a look to our quick guide to find some tips for the application of ABBs. It includes tips and hits for a correct use key to reach productive machining with minimized vibration.

Ref.	Ratio	ØABB	Lu	Lt	Amax	Kg	Ref.	Ratio	ØABB	Lu	Lt	Amax	Kg
ABB.M1.016.156.07	7x	16	112	156	81	0.4	**ABB.M1.016.204.10**	10x	16	160	204	101	0.5
ABB.M1.020.200.07	7x	20	140	200	109	0.7	**ABB.M1.020.260.10**	10x	20	200	260	134	1.0
ABB.M1.025.255.07	7x	25	175	255	143	1.4	**ABB.M1.025.330.10**	10x	25	250	330	174	1.8
ABB.M1.032.320.07	7x	32	224	320	179	3.0	**ABB.M1.032.416.10**	10x	32	320	416	219	4.0
ABB.M1.040.408.07	7x	40	280	408	234	5.6	**ABB.M1.040.528.10**	10x	40	400	528	284	7.5
ABB.M1.050.510.07	7x	50	350	510	295	11.2	**ABB.M1.050.668.10**	10x	50	500	668	365	15.9
ABB.M1.060.620.07	7x	60	420	620	364	19.4	**ABB.M1.060.800.10**	10x	60	600	800	439	25.9
ABB.M1.080.840.07	7x	80	560	840	501	49.3	**ABB.M1.080.1080.10**	10x	80	800	1080	601	64.9



1: Nominal useful length
(7 x D, 10 x D)

In the boring process, this limit must not be exceeded.

2: Intermediate useful length
(5 x D, 7 x D)

In case of using the bar for lengths shorter than nominal, an intermediate useful length indicator is available which is, 5 times for the 7xD bars and 7 times for the 10xD bars. Same length is recommended for grooving or threaded operations.

3: Clamping area

In case of using the bar for lengths shorter than nominal, it is available an intermediate useful length indicator which is 5 x D in the 7 x D bars and 7 x D in the 10 x D bars. It also useful as guidance in the case of grooving or threaded operations.

4: Positioning guide

Bars of 60 diameter or larger are provided with a hole for supporting a positioning bar which allows the anti-vibration bar to be turned to the desired position by the introduction of a positioning bar. Due to the weight of these bars this system allows the operation by a single operator.

Modular Heads

Our range of models of modular heads can cover any machining that arises in a boring operation.

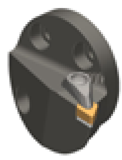
The high quality material gives them high strength and allows a reparability higher than the market average. That is why we also offer a repair service that will avoid you extra costs in the purchase of these modular heads, thus winning twice.
The more resistance less repairs and fewer repairs, saving on tooling.

The modular heads are coupled by a parallel grooved system (type M1) that ensures a good settlement along the entire surface of the bar.
All models have internal cooling directed to the cutting edge to provide the maximum level of cooling.

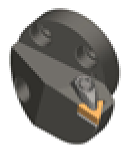
The diameters of the heads are designed to adapt to our bars perfectly, both those of the same diameter, as those of Upper diameters, as well as with other popular products on the market. Diameters can range from 16mm - 60mm. (For other measures please consult).

Below you can see the range offered with all the necessary technical details. If, on the other hand, you cannot find the model you are looking for or you require a tailor-made adjustment, feel free to contact us, we are highly qualified in special solutions.

M1-DCLN R/L 95º



M1-DDUN R/L 93º

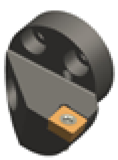


M1-DTUN R/L 93º

M1-DWLN R/L 95º

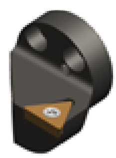
M1-PCLN R/L 95º

M1-PDUN R/L 93º



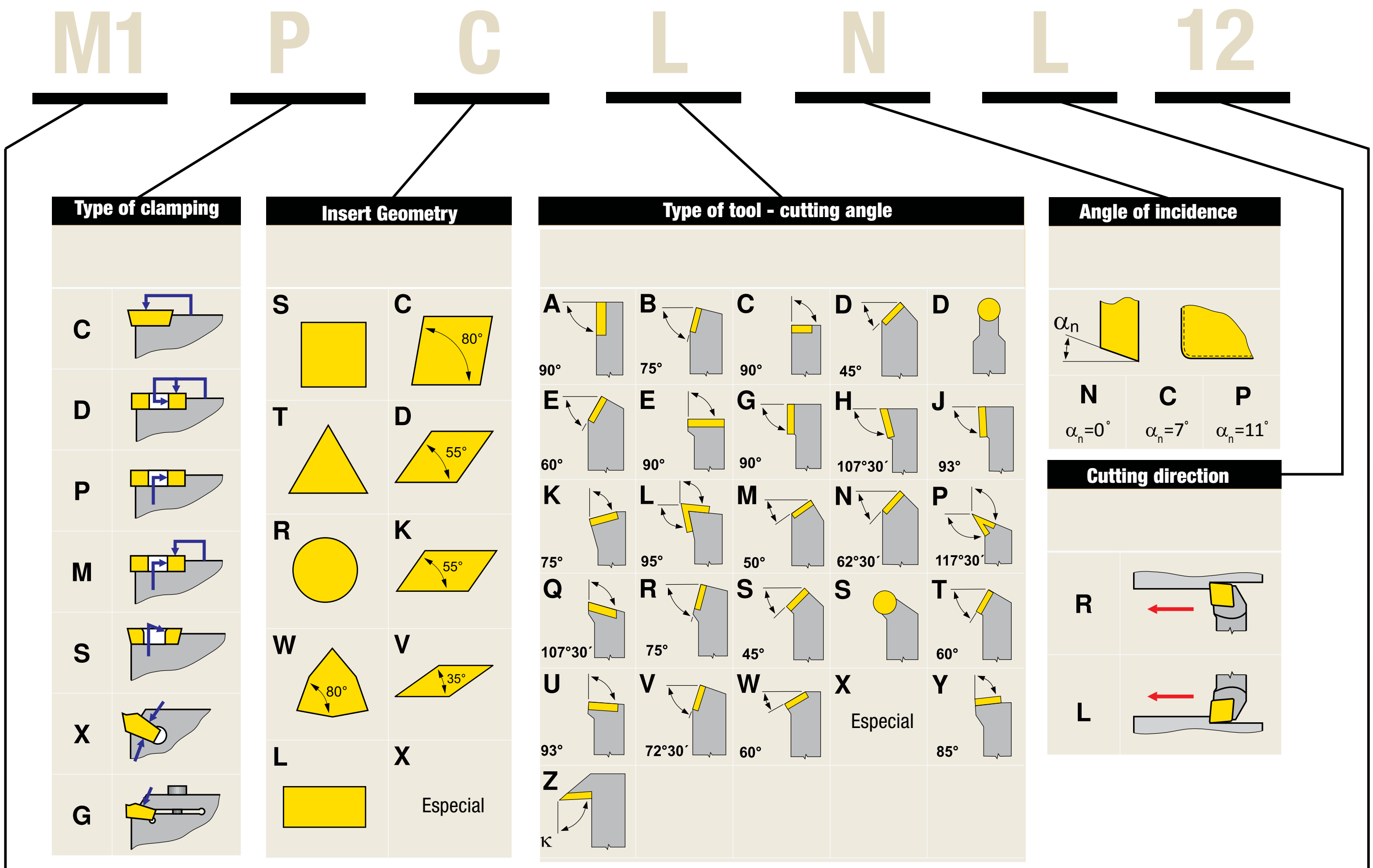
M1-SCLC R/L 95º

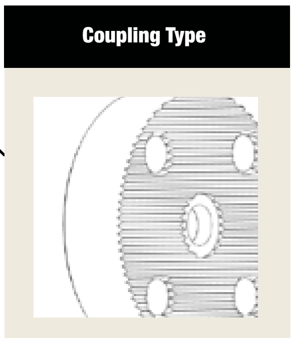
M1-SDUC R/L 93º



M1-STUC R/L 93º

Coding of references for the heads for ABB / ISO Code





Cutting edge lenght

d [mm]	S	C	E	D	V	K	W	T	R
3,97					07		02	06	
6,00			05					09	
6,35									06
7,94		06	06	07	13			11	
8,00		08	08		13				
9,5250	90	91		11	61	90	61	60	8
10,001									0
12,001									2
12,701	21	21		50			82	21	2
15,875	15	16						27	15
16,001									6
19,051	91	91							9
20,002									0
25,002									5
25,402	52	52							5

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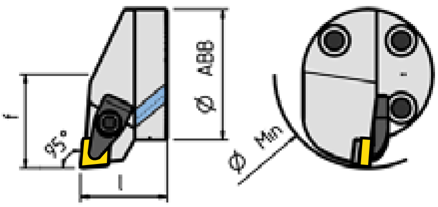
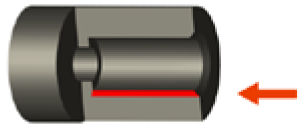
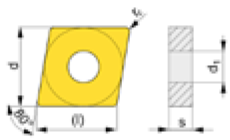
M1-DCLN R/L 95º





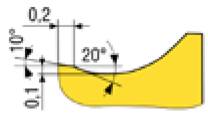
Ref.	ØABB	ØMin.	f	l							
M1-32 DCLN R/L12	32	40	22	38	CNMG 1204..	ICSN-432	AA61	BC12	AI07	DB95	EJ04
M1-40 DCLN R/L 12	40	50	27	38	CNMG 1204..	ICSN-432	AA60	BC12	AI07	DB95	EJ04

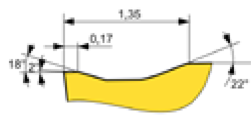


Insert	(l)	d	d_1	s
CNMG 1204..	15,5	12,700	5,16	6,35

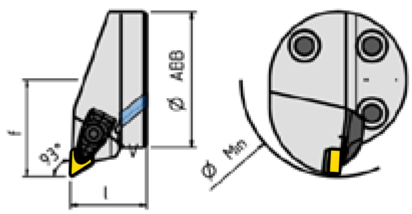
Grade P M K N S H

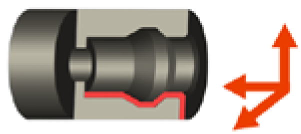
Chipbreaker



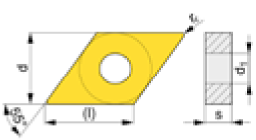


M1 - DDUN R/L 93º





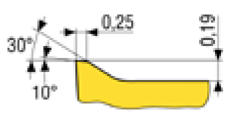
Ref.	ØABB	ØMin.	f	l							
M1-32 DDUN R/L 15	32	40	22	32	DNMG 1506..	IDSN-432	AA61	BC12	AI07	DB95	EJ04
M1-40 DDUN R/L 15	40	50	27	32	DNMG 1506..	ID SN-432	AA60	BC12	AI07	DB95	EJ04



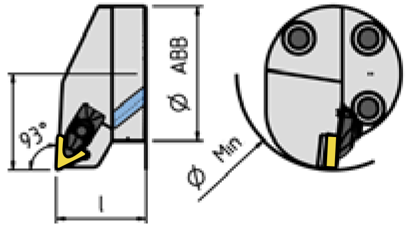
Insert	(l)	d	d_1	s
DNMG 1506..	15,5	12,700	5,16	6,35

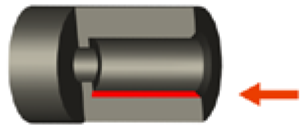
Grade P M K N S H

Chipbreaker

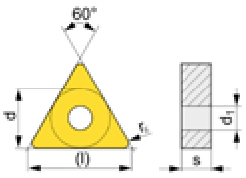


M1 - DTUN R/L 93º





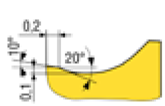
Ref.	ØABB	ØMin.	f	l							
M1-32 DTUN R/L 16	32	40	22	36	TNMG 1604..	ITSN-322	AA50	BC08	AI15	DB94	EJ25
M1-40 DTUN R/L 16	40	50	27	36	TNMG 1604..	ITSN-322	AA50	BC08	AI15	DB94	EJ25

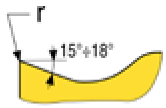


Insert	(l)	d	d_1	s
TNMG 1604..	16,5	9,525	3,81	4,76

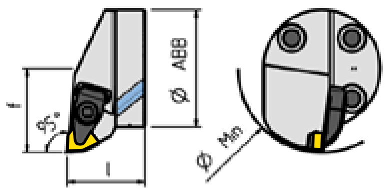
Grade P M K N S H

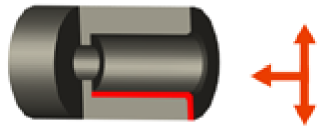
Chipbreaker



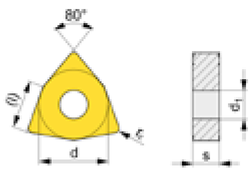


M1 - DWLN R/L 95º





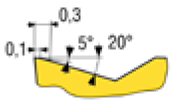
Ref.	ØABB	ØMin.	f	l							
M1-32 DWLN R/L 08	32	40	24	36	WNMG 0804..	IWSN-433	AA60	BC12	AI07	DB95	EJ04
M1-40 DWLN R/L 08	40	50	27	36	WNMG 0804..	IWSN-433	AA60	BC12	AI07	DB95	EJ04



Insert	(l)	d	d_1	s
WNMG 0804..	8,7	12,700	5,16	4,76

Grade P M K

Chipbreaker



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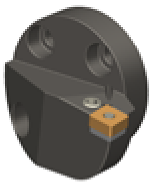
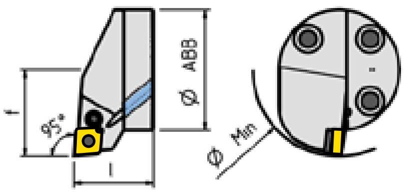
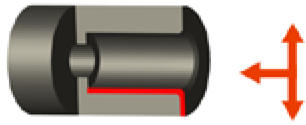
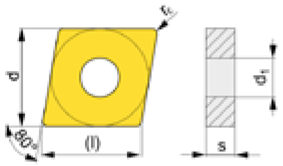
M1 - PCLN R/L 95º







Ref.	ØABB	ØMin.	f	l						
M1-32 PCLN R/L 12	32	40	22	32	CNMG 1204..	HC12	AF48	EJ03	CF12	DA12
M1-40 PCLN R/L 12	40	50	27	32	CNMG 1204..	HJ12	AF08	EJ03	CF12	DA12
M1-50 PCLN R/L 12	50	63	35	40	CNMG 1204..	HJ12	AF08	EJ03	CF12	DA12
M1-60 PCLN R/L 12	60	80	43	40	CNMG 1204..	HJ12	AF08	EJ03	CF12	DA12



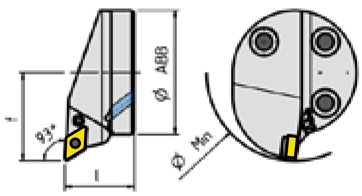
Insert	(l)	d	d_1	s
CNMG 1204..	12,9	12,700	5,16	4,76

Grade

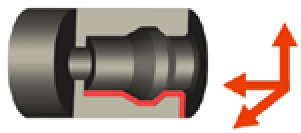
P	M	K	N	S	H

Chipbreaker

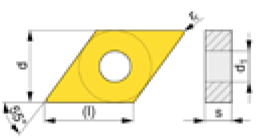
M1 - PDUN R/L 93º



27º



Ref.	ØABB	ØMin.	f	l						
M1-40 PDUN R/L 15	40	50	27	32	DNMG 1506..	HD15	AF38	EJ03	CG15	CA12
M1-50 PDUN R/L 15	50	63	35	40	DNMG 1506..	HD15	AF38	EJ03	CG15	CA12
M1-60 PDUN R/L 15	60	80	43	40	DNMG 1506..	HD15	AF38	EJ03	CG15	CA12

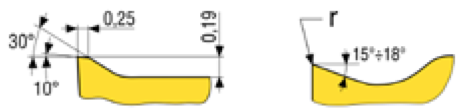


Insert	(l)	d	d_1	s
DNMG 1506..	15,5	12,700	5,16	6,35

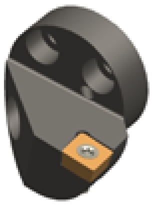
Grade

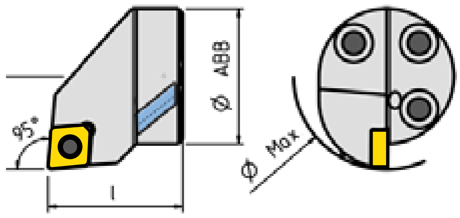
P	M	K	N	S	H

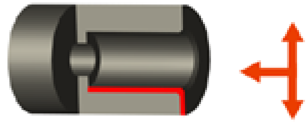
Chipbreaker



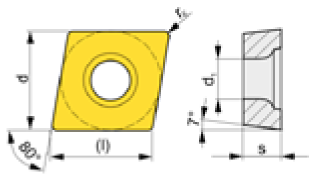
M1 - SCLC R/L 95º







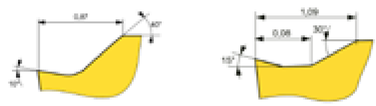
Ref.	ØABB	ØMin.	f	l			
M1-16 SCLC R/L 06	16	20	11	20	CCMT 0602..	AD25	EE07
M1-20 SCLC R/L 09	20	25	13	20	CCMT 09T3..	AD40	EE15
M1-25 SCLC R/L 09	25	32	17	20	CCMT 09T3..	AD40	EE15



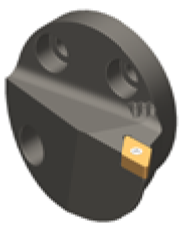
Insert	(l)	d	d_1	s
CCMT 0602..	6,4	6,350	2,90	2,38
CCMT 09T3..	9,7	9,525	4,50	3,97

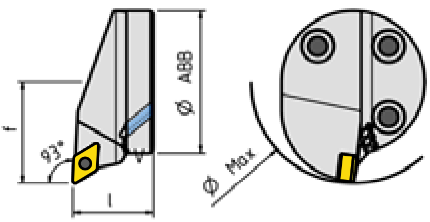
Grade P M K N H

Chipbreaker

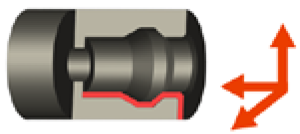


M1 - SDUC R/L 93º

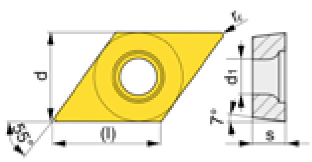




27º



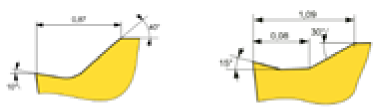
Ref.	ØABB	ØMin.	f	l			
M1-16 SDUC R/L 07	16	20	11	20	DCMT 0702..	AB25	EE07
M1-20 SDUC R/L 11	20	25	13	20	DCMT 11T3..	AB40	EE15
M1-25 SDUC R/L 11	25	32	17	20	DCMT 11T3..	AB40	EE15



Insert	(l)	d	d_1	s
DCMT 0702..	6,4	6,350	2,90	2,38
DCMT 011T3..	9,7	9,525	4,50	3,97

Grade P M K N H

Chipbreaker



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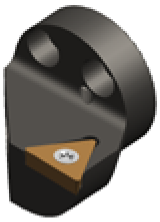
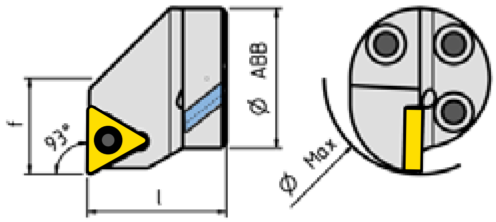
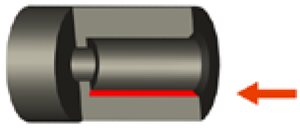
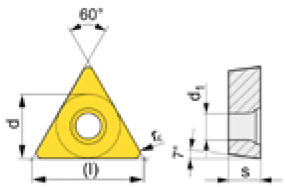
M1 - STUC R/L 93º







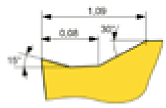
Ref.	ØABB	ØMin.	f	l					
M1-16 STUC R/L 11	16	20	11	20	TCMT 1102..	AB25	EE07	-	-
M1-20 STUC R/L 11	20	25	13	20	TCMT 1102..	AB40	EE07	-	-
M1-25 STUC R/L 11	25	32	17	20	TCMT 1102..	AB40	EE07	-	-
M1-32 STUC R/L 16	32	40	22	32	TCMT 16T3..	AB40	EE16	CD14	AG50
M1-40 STUC R/L 16	40	50	27	32	TCMT 16T3..	AB40	EE16	CD14	AG50



Insert	(l)	d	d_1	s
TCMT 1102..	11,0	6,350	2,90	2,38
TCMT 16T3..	16,5	9,525	4,50	3,97

Grade P M K N H

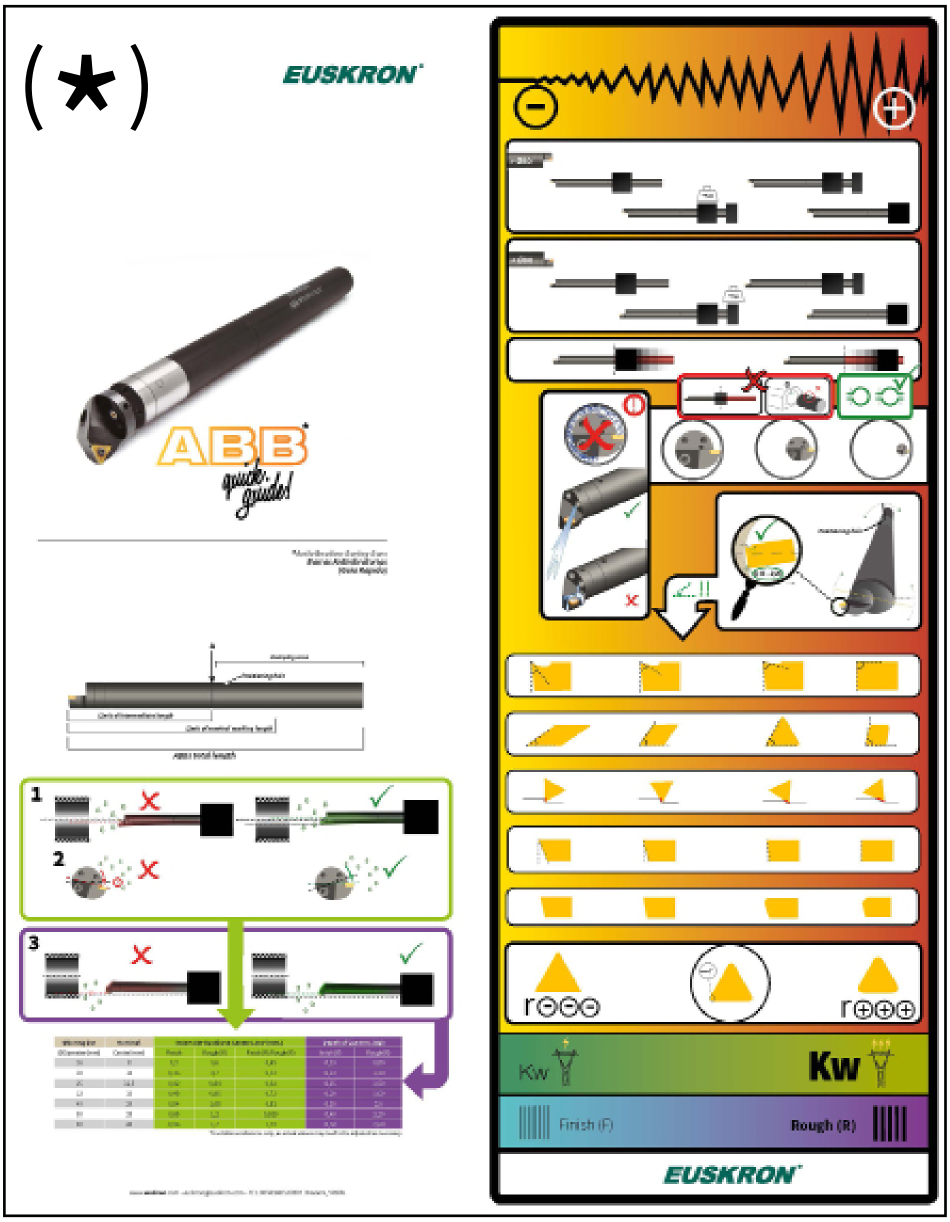
Chipbreaker



(*)

*The ***Quick Guide*** attached to this document in ***Poster*** format is intended to be used by the technician coach as a summary of the use guide presented in this document

It has a graphic approach to give you a quick and universal reading. It´s not meant to explain each term but to remind the operator of all elements to consider and to be able to operate quickly with its ABB.



In this section we have the table of adjustment by flexion and twist of the bar in cases of great overhang. The adjustments to be made by torsion ***(2)*** and ***deflection of the bar in the “Z” axis (1)*** appear in ***green***.

In ***purple*** we find the adjustments by deflection of the bar ***on the shaft “Y” (3)***. Due to cutting pressure placed on the insert during deep boring, the stress is multiplied with a long overhang of the boring bar.

The ***options on the left*** of the table are those that will vibrate less, consume less power (Kw) and will be the optimal solutions for finishing operations.

The ***options on the right*** of the table, will bring more vibrations, more machine consumption but will be valid for roughing operations.

User Guide

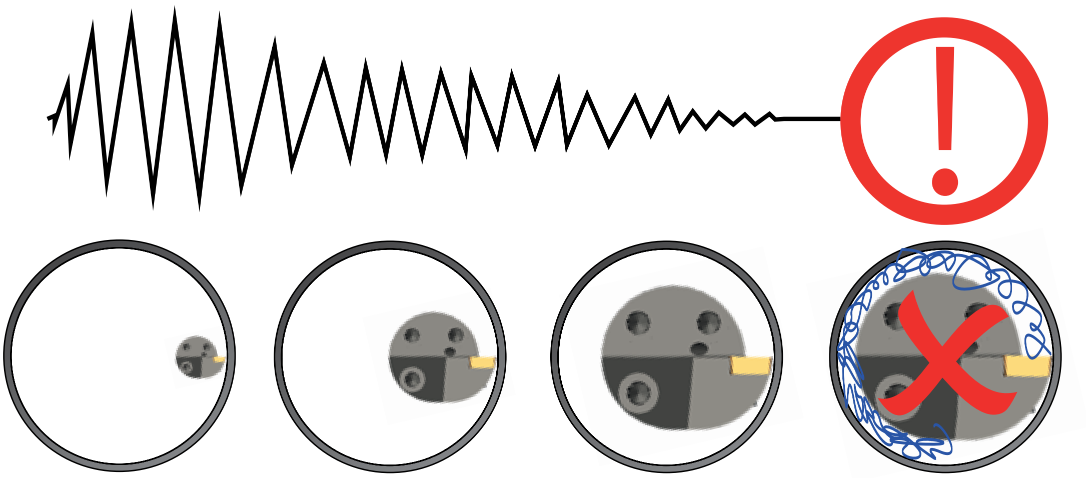
Machining in deep holes with large overhanging tools requires difficult technical decisions without prior knowledge. With this user guide you will know in advance the bases to successfully manage any operation with the ABB of ***EUSKRON***.

Also, along with this documentation, we attach a ***Quick Guide*** that summarizes the guide of use graphically in poster format to have it handy in your technical office or near the operator. We explain how this guide is structured on the previous page.

Diameter of the bar

Placement and adjustment

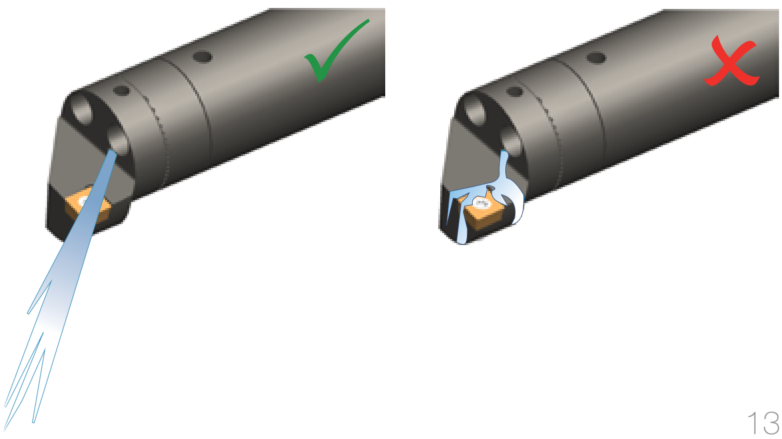
The greater the diameter of the ABB with respect to the surface to be machined the less the vibrations and the buckling will be. Always allowing a good evacuation of the chip, for which we will use the highest possible pressure in the refrigeration.



Inside Ø to be machined	Ø of the bar
100	80
75	60
60	50
50	40
40	32
30	25
25	20
20	16

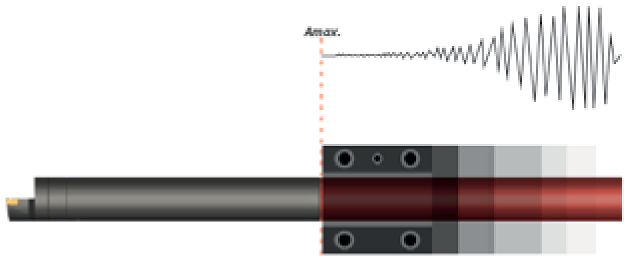
As indicated above, the size of the bar may be the cause of vibrations and could even completely ruin the machining.
Use the left-hand table as an approximate guide only, since the stability of machining can vary depending on factors such as material, insert geometry, type of machining, etc...

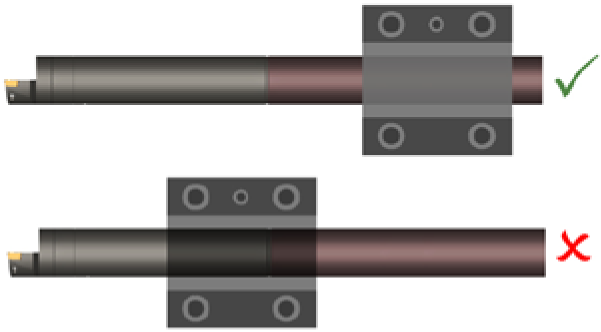
Keep in mind that cooling is of vital importance in evacuating the chip removed. Always use the maximum pressure available on your machine to ensure correct chip removal.



The Clamping

A good clamping system can limit the vibration so that it does not exceed to an uncontrollable point. We must clamp the ABB with the largest
rigidity and with the bigger the overhang, therefore the buckling and vibration will increase.
That is why we will try to clamp the ABB as close as possible to the Amax without exceeding it.

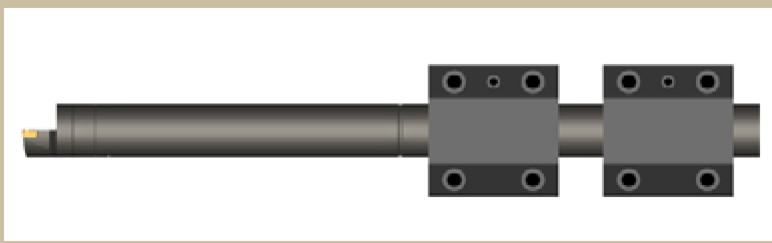


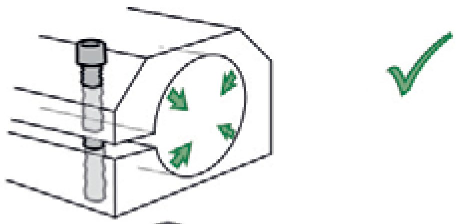


It is very important not to clamp the tool beyond the Amax since the ABB system of Euskron begins at that point and is no longer clamped in solid steel and it could deform the boring bar.

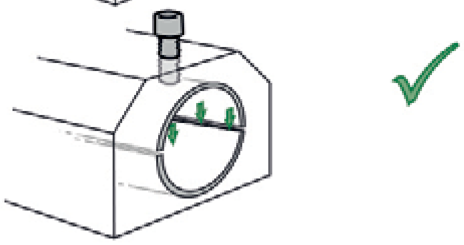
In the use of larger ABBs such as 10xD, it is highly recommended, and in some cases even necessary, a reinforcement clamp.

Always clamp exclusively at the clamping area, leaving the hole for the adjustment bar clear.

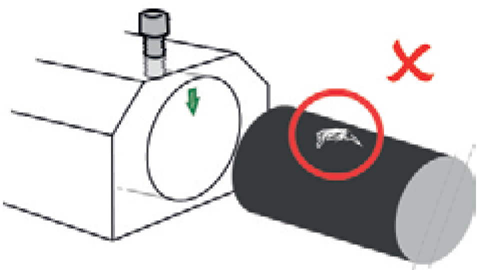




The clamping of the bar must be as rigid as possible, providing a direct tightening in 360º.



The use of bushings, even with a single opening, does not provide a 360º clamp, since the force exerted by the tightening screw is unidirectional.



Never clamp the bar directly with a screw or similar system, as it will create a single point of support losing much rigidity. In addition, the screw will damage the bar surface, which will make positioning difficult later on.

The Buckling
And its adjustment

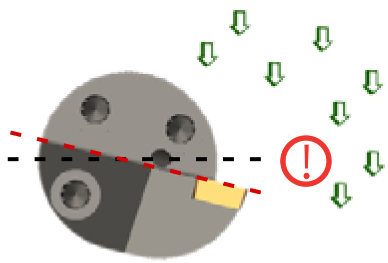
The buckling is the displacement of the end of the bar that it is given by the flexion of this. The longer the bar is, the more possibilities there are that it flexes.

The buckling occurs in two axes (X and Y) and we have a third deviation in relation to the rotation of the tool with respect to its axis that affects us directly in the angle of attack of the insert, as shown in Figures 1, 2 and 3.

1

2

3

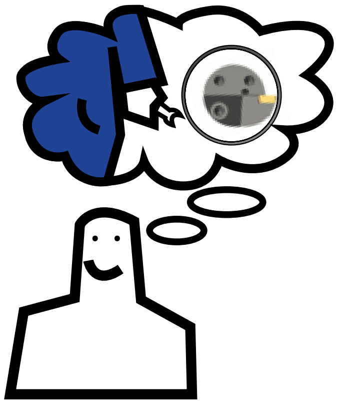


This is a reference table of the measures to be taken considering deflection the flexion in the buckling of the tool.

ØBar	Nominal	Insert adjustment to center (mm)			Depth of cut (Ap)(mm)	
Diameter (mm)	Center(mm)	Finishing	Roughing	Roughing/Finishing	Finishing	Roughing
16	8	0,3	0,6	0,45	0,10	0,80
20	10	0,36	0,7	0,53	0,10	1,30
25	12,5	0,42	0,84	0,63	0,15	1,50
32	16	0,48	0,96	0,72	0,20	1,60
40	20	0,54	1,08	0,81	0,30	2,0
50	25	0,65	1,2	0,925	0,40	2,20
80	40	0,96	1,7	1,33	0,50	2,60

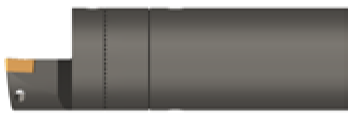
**Use the table as a reference only, the values may have to be adjusted according to your need.*

Short

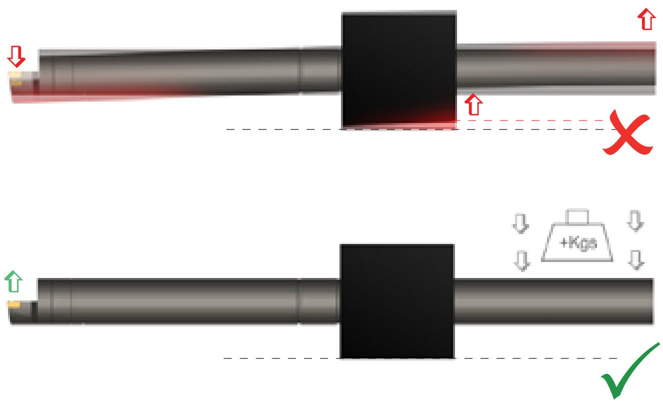


For short machining, we will place the ABB in the usual way as the alternative assembly is not necessary due to the low weight of the tool.

If ***the piece*** to be machined ***is large***, it will be essential to use a ***bezel*** that reduces the vibrations in the tool, as these will be transmitted to the bar, consequently increasing the vibrations.

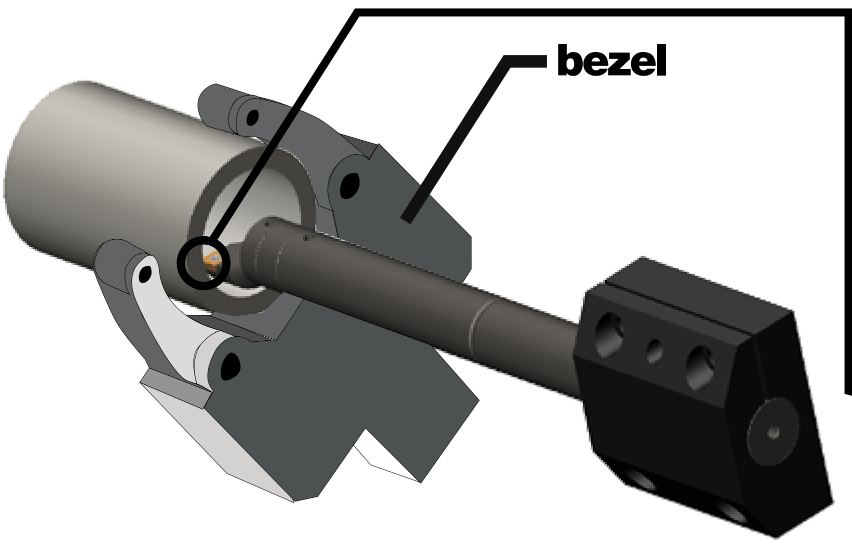


Standard assembly
An easier handling



The traditional assembly is more vulnerable to the pressure exerted by the overhang of the bar. This could be accentuated according to the conditions in which the carriage is.

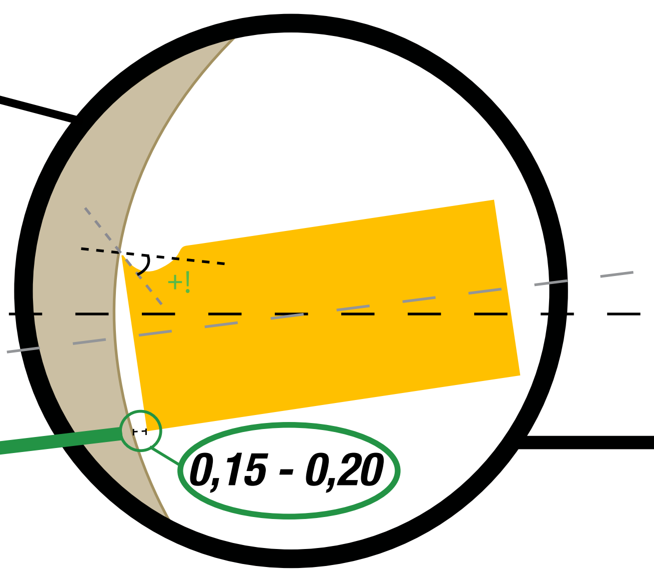
In case of being affected by a great vibration, place weight in the other end of the bar or on the carriage itself (on the clamping).

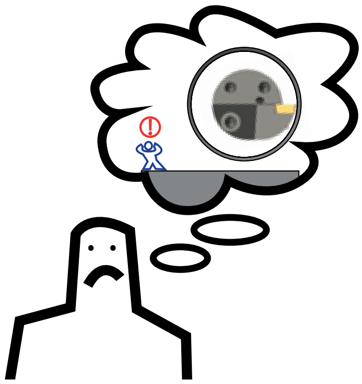


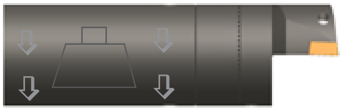
The old trick

Incidence Position Tolerance:

0.15 - 0.20mm







Alternative assembly
Take advantage of the weight of the bar itself.

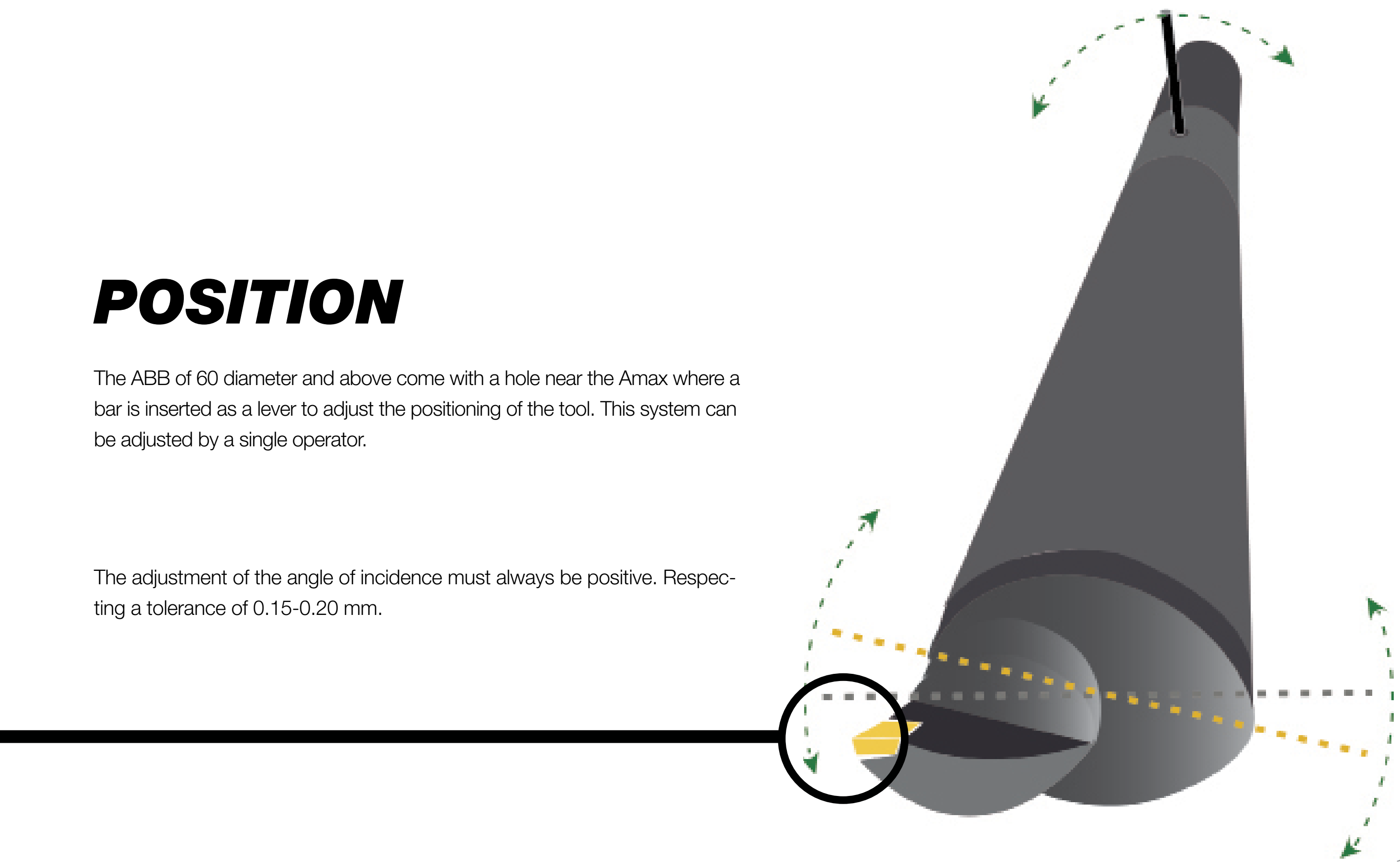
The advantage of using a very large diameter in the tool (commented before on page 13), is not always possible.
In large machining, we will have to use the weight of the ABB to counteract buckling and vibration caused during machining. This is what we call Alternative Assembly. This type of assembly minimizes problems due to carriage misalignment. For old carriages, the alternative assembly is highly recommended.

The use of a ***bezel*** always helps. There are bezels of all sizes and shapes and will always help tool to be machined to vibrate less and therefore, ABB will vibrate less. Sometimes ***machining a very thin wall*** can cause large vibrations despite not being a large tool.

POSITION

The ABB of 60 diameter and above come with a hole near the Amax where a bar is inserted as a lever to adjust the positioning of the tool. This system can be adjusted by a single operator.

The adjustment of the angle of incidence must always be positive. Respecting a tolerance of 0.15-0.20 mm.



The Vibration

The origin of the problem

In buckling, adjusting the tool to correct these deviations is relatively easy. However, in case of vibration, it is not that simple. It is an active effect that is born without notice and according to the frequency of this vibration, multiplies to more or less speed.

The solutions that we must find are much more subtle and difficult to see with the naked eye. These corrections will come given in the choice of the grade of the insert, the radius or the angle of cut of the same and other details that we show in the following table.

INSERT VIBRATION

INSERT GEOMETRY

INSERT RADIUS
Use un menor radio para limitar las vibraciones.

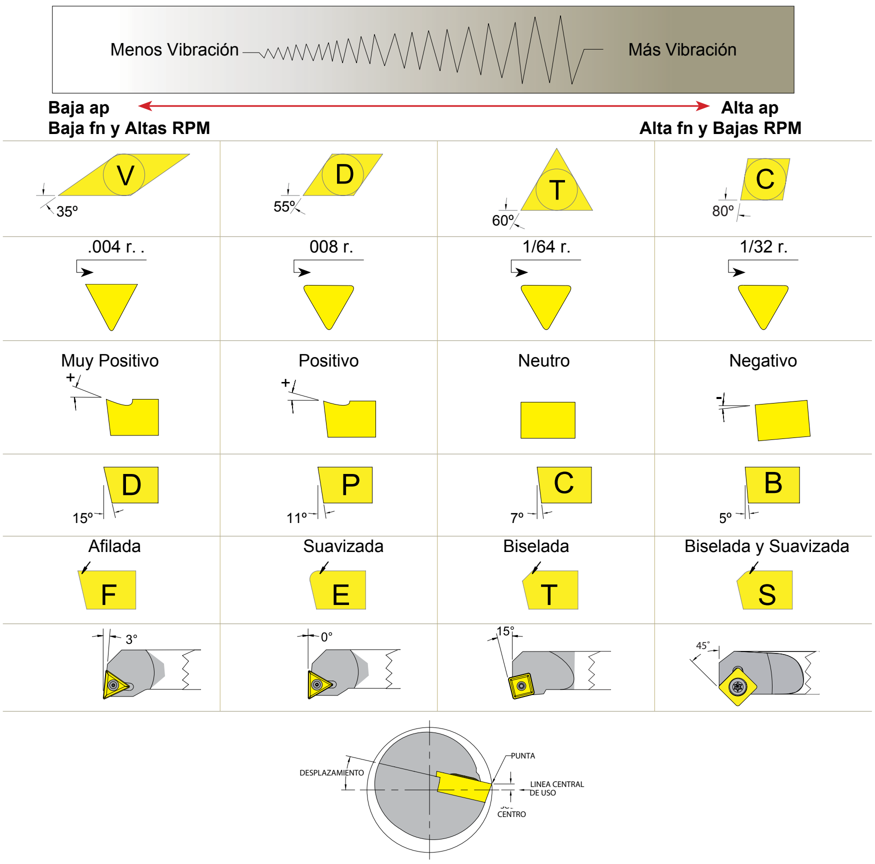
INSERT CUTTING RAKE
Use positive angles to limit vibrations.

ANGULO RELIEF ANGLE

INSERT EDGE PREP

INSERT CUTTING EDGE ANGLE
Use an angle as close as 90º as possible

INSERT CENTER LINE
Insert center line, 0.050 to 0.635 mm (0.002 to 0.025) above center line, to compensate for bar deflection and reduce vibration.



Cutting Formulas

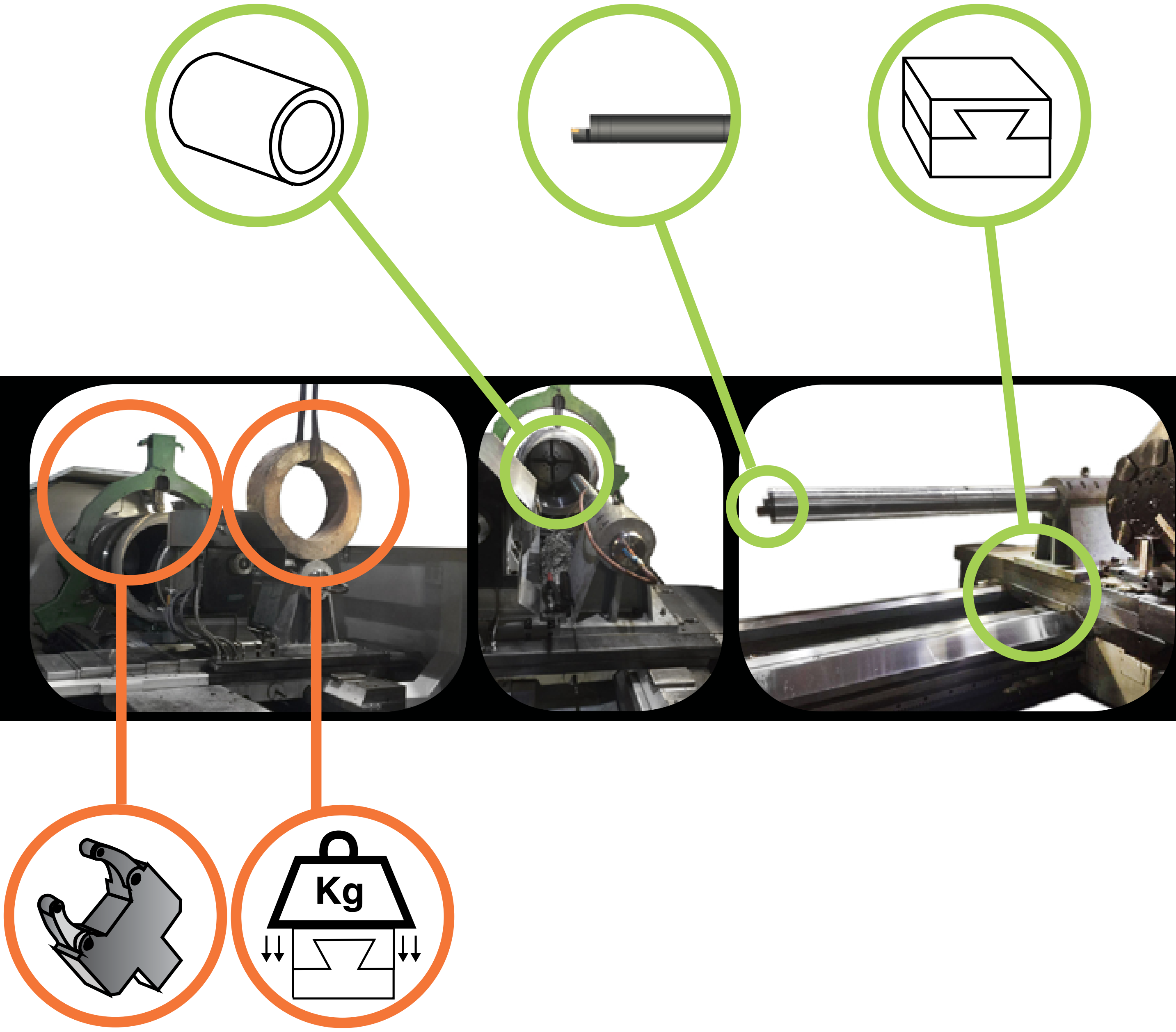
Once we have solved the most basic issues of this type of machining at great depth, we will be able to embark on the optimization of cutting conditions.

It is highly recommended for irregular surfaces such as cast metals or welding parts to make a first cut with a little small depth of cut (half the radius of the insert used) to normalize the surface. After this test, we will be able to increase the speed of cut with greater security of avoiding the insert to be broken and saving us time.

Fórmulas para Mandrinado — **Sistema Métrico**

(Ap)	Porfundidad de Corte	mm	Kc	Fuerza específica Corte	Nm
(Dm)	Diámetro de pieza	mm	n	Revoluciones por minuto	Rev / Min
Fn	Avance por revolución	mm / Rev	Vc	Velocidad de corte	m / Min
Lm	Longitud Mecanizada	mm	Tc	Tiempo de mecanizado	Min
Q	Volumen Viruta mecanizado	mm3 / Min	Rmax	Profundidad del perfil	µm
Pc	Potencia Consumida	kw	r	Radio punta plaquita	mm

Velocidad decorte en Metros por minuto $Vc = \frac{\pi \times Dm \times n}{1000}$	Ej: Determina la Velocidad de Corte (Vc) requerida para tornear una pieza de 50 mm. de diámetro a 600 RPM (velocidad del eje) $Vc = \frac{\pi \times 50 \times 600}{1000} = 94{,}25$ m / Min
Revoluciones del eje por minuto RPM $n = \frac{Vc \times 1000}{\pi \times Dm}$	Ej: Determina la velocidad del eje (n) para tornear una pieza de 32mm de diámetro a una velocidad de corte (Vc) de 100 m/ min. $n = \frac{100 \times 1000}{\pi \times 32} = 994{,}72$ Rev / Min
Volumen de Viruta Mecanizado mm^3/min $Q = vc \times ap \times fn \times 1000$	Ej: Determina el volumen de viruta mecanizada (Q) en un mecanizado de 1,5 mm de profundidad de pasada (Ap) con una velocidad de corte (Vc) de 200 m/min. $Q = 200 \times 1{,}5 \times 0{,}4 \times 1000 = 120.000$ mm^3 / min
Potencia en Kilovatios Consumida $Pc = \frac{vc \times ap \times fn \times kc}{1.460.000}$	Ej: Determina la Potencia requerida (Pc) para tornear un material con una fuerza específica de corte (Kc) de 20.500, una profundidad de pasada (Ap) de 1,5 y una velocidad de corte (Vc) de 200 m/min y un avance por revolución de 0,4 mm. $Pc = \frac{200 \times 1{,}5 \times 0{,}4 \times 20.500}{1.460.000} = 1{,}68$ kW
Tiempo de Mecanizado en minutos $Tc = \frac{lm}{fn \times n}$	Ej: Determina el tiempo requerido para mecanizar una pieza de longitud 200 mm., con una velocidad de eje de 600 rpm y un avance de 0,4 mm/Rev. $Tc = \frac{200}{0{,}4 \times 600} = 0{,}83$ Min (50 Seg)
Profundidad de Perfil (nm $R_{max} = \frac{fn^2 \times 10^6}{8r\,\varepsilon}$	Ej: Determina la profundidad del perfil (Rmax.) de una superficie mecanizada con una plaquita de radio 0,8 y un avance de 0,4 mm/rev. $R_{max} = \frac{0{,}4^2 \times 10^6}{8 \times 0{,}8} = 25$ µm


Kg

Optimization tips

In borings at great depth we have three main elements that come into play:

The Carriage   The work piece   The Bar

Analyze these three elements to know which one or which of these are the source of the problem. It is not easy task, but if the discard it´s done correctly, you will find the source of the mismatch much more quickly. Check your situation regarding the work to be done, the working piece to be machined, if your ABB will work with large overhang and if so, if the clamping and the carriage may be vulnerable to that overhang. This way you will quickly find ways to reinforce the shortcomings of that situation or take advantage of the strongest resources you have.

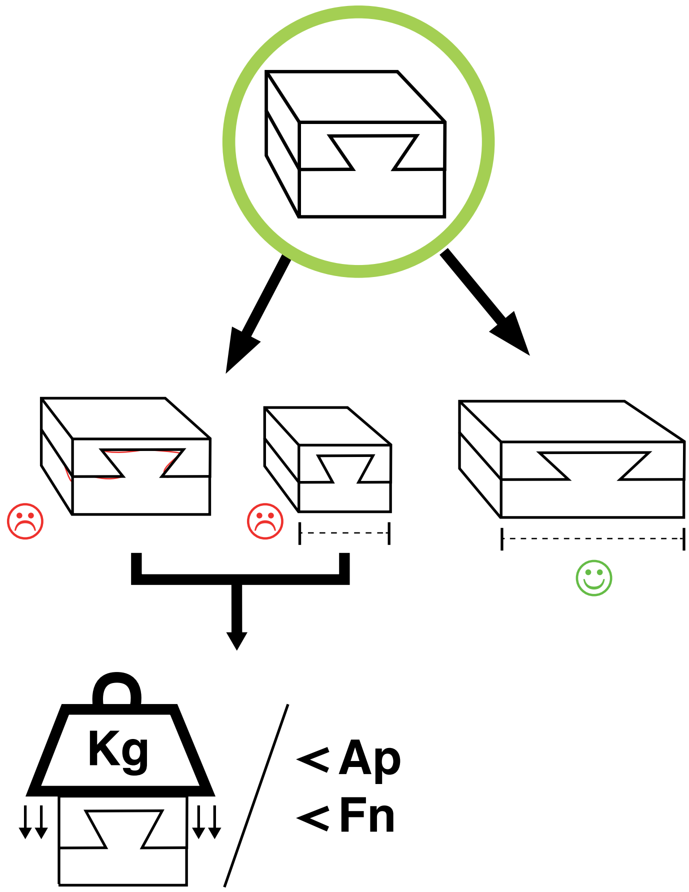
THE CARRIAGE

The larger the overhang, the more the carriage will suffer from both forces.
In an old carriage with many years of work there may be gaps hitherto unknown to exert a considerable lever in it.

Regarding this situation, we propose the placement of weight in the carriage to seat it. A great weight on the carriage will help you to face large overhangs.

The width of the carriage can be relevant depending on the work to be done. A job with a large bar overhang and a lot of cutting pressure may be too much for a narrow carriage. In this case placing weight on the carriage may help once more but it is likely that we will have to lower the cutting conditions.

In the opposite case, a very wide carriage would provide us with a great support and stability which would allow us to increase the cutting conditions with optimum results.

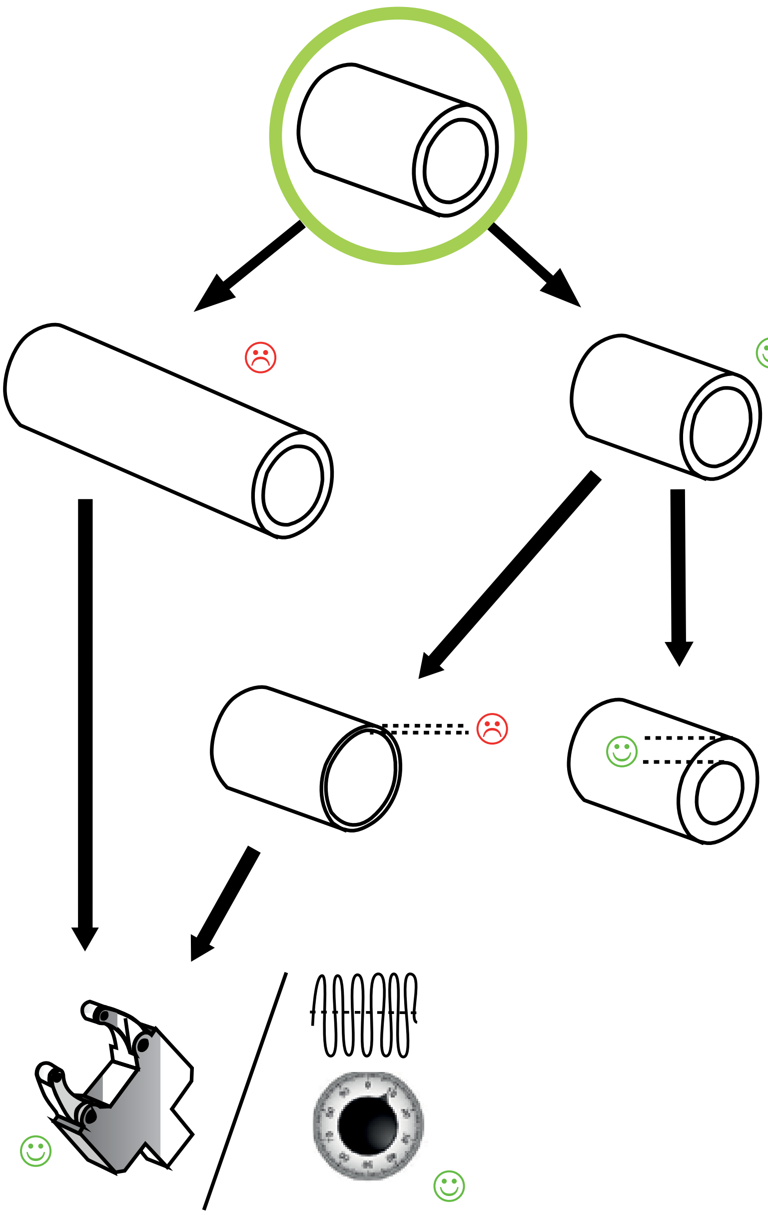


THE WORK PIECE

The tube or work piece is another frequent source of vibrations. The longer the tube, the higher vibration. As well as the length, regarding the thickness of the wall of the tube to be machined, we can also say that the thinner the wall, more vibrations, therefore with thicker walls, we will have less vibrations.

A very long tube with thin wall will probably be the focus of all problems while using a short tube with thick wall will discard it as the focus of the problem and you can center the attention in the other two elements, the carriage and the bar.

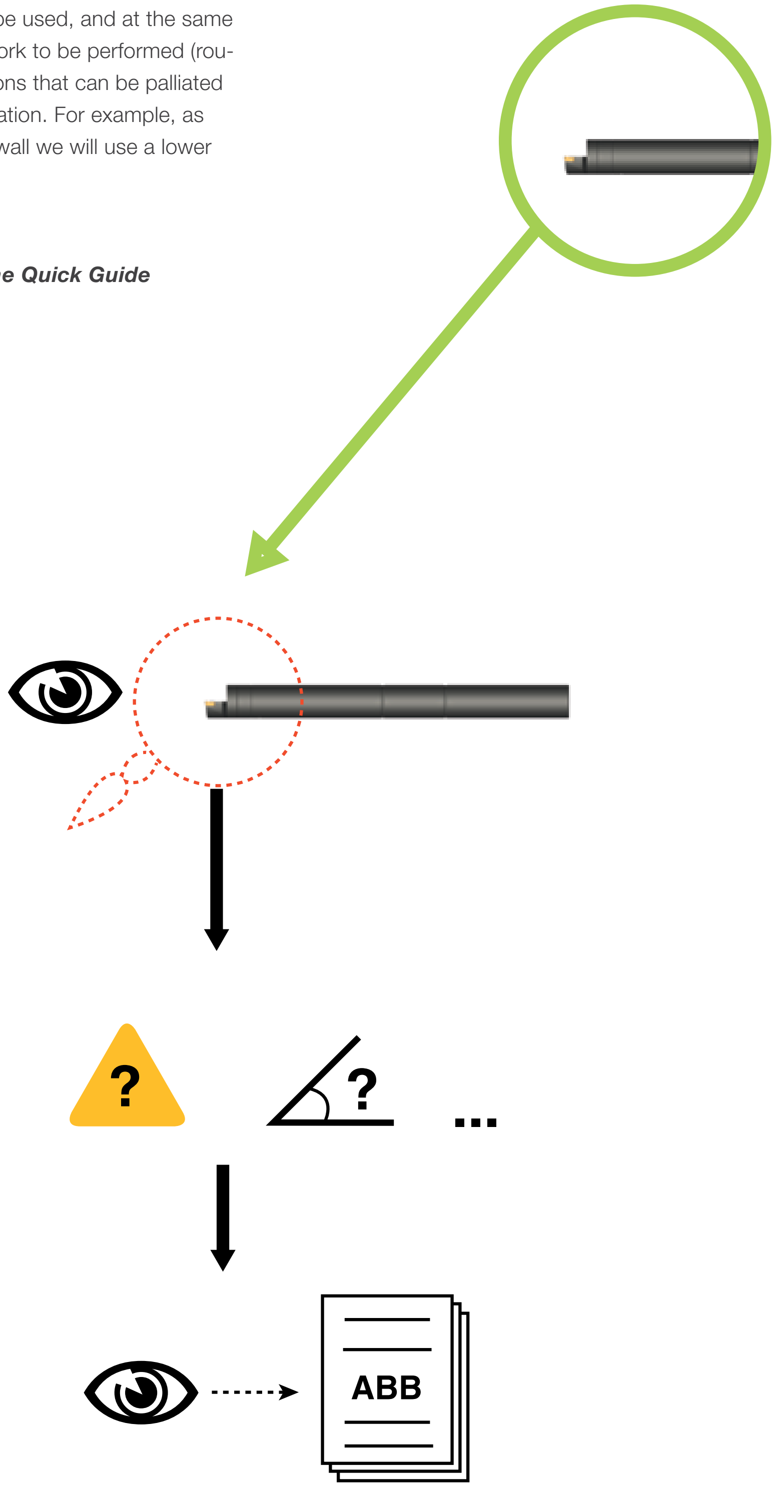
We can also find optimal results if we lower the cutting speed around 30%, reduce the depth of cut (Ap) and feed (Fn). It will also help reducing the radius of the plate. A more positive cutting angle or any other choice of plate that generates less vibrations (as described on page 18 or in the ***Quick Guide)*** will work better.

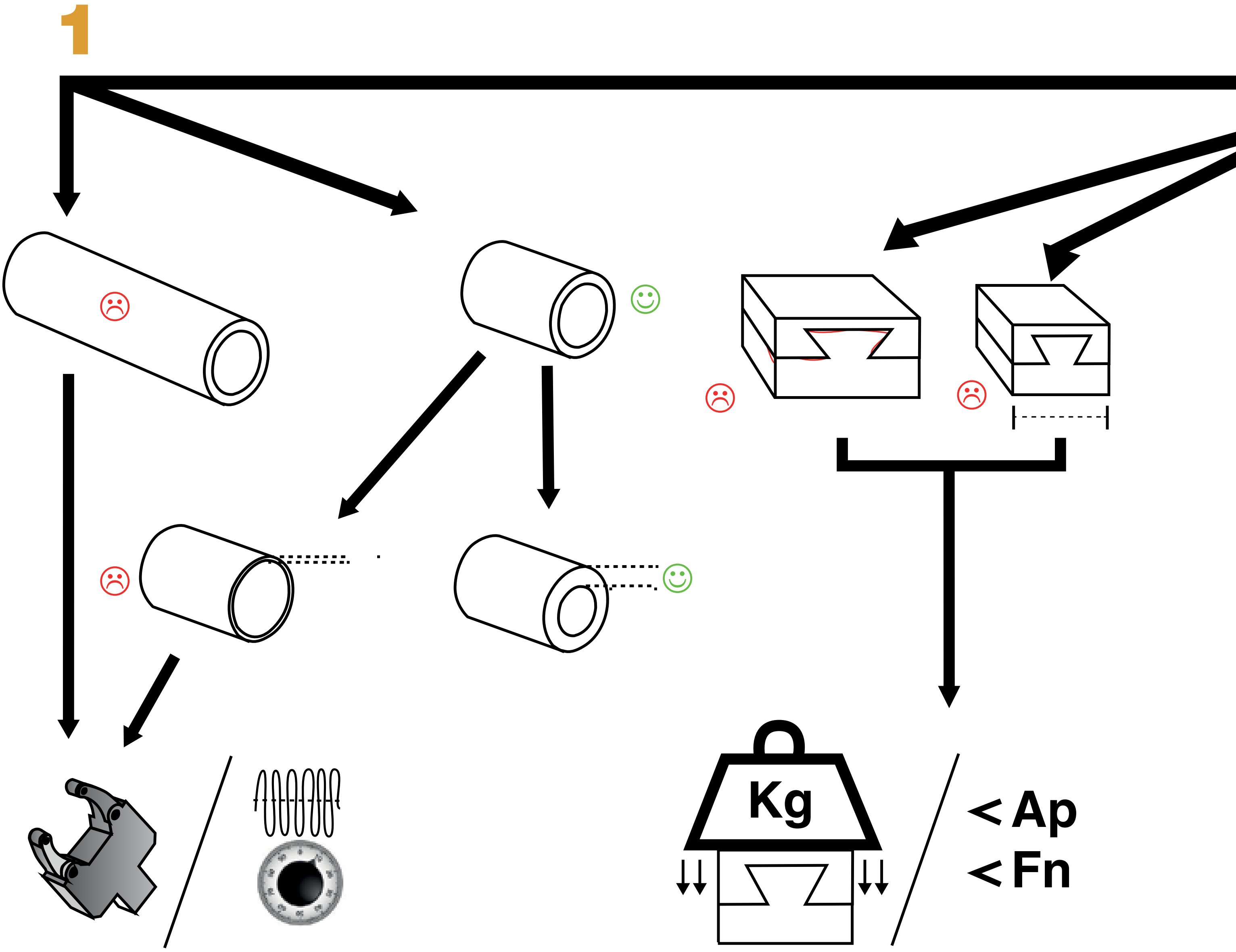


THE BORING BAR

Finally, once discarded the tube and the carriage, we will have to check the position of ABB.
The positioning will depend on the insert to be used, and at the same time, the choice of this will depend on the work to be performed (roughing or finishing) and other external conditions that can be palliated with the correct choice according to the situation. For example, as mentioned above, in a long tube with a thin wall we will use a lower insert radius to reduce vibrations.

(For a general check out you can use the Quick Guide attached to this documentation.)




1
Kg
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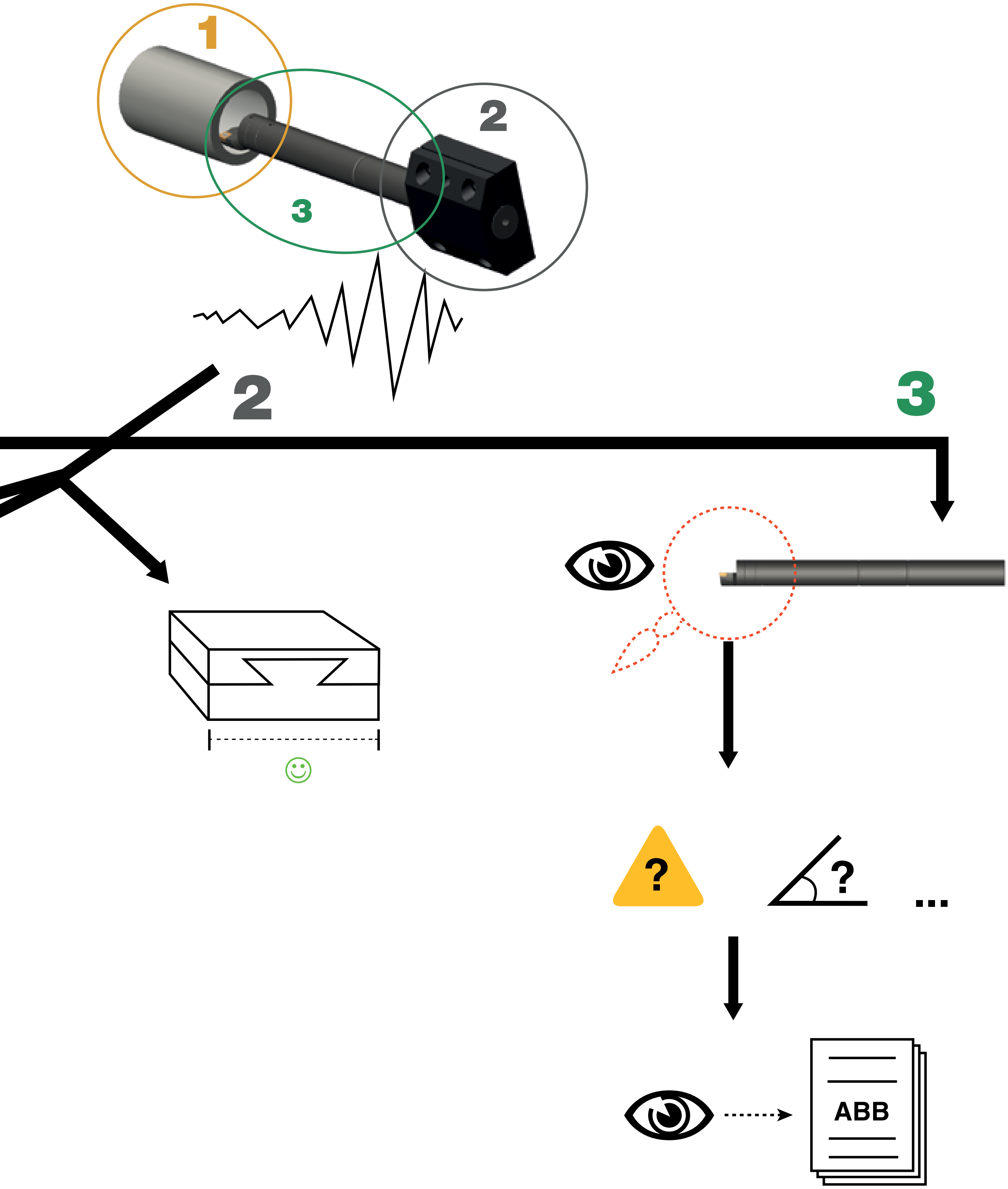
1
2
3
2
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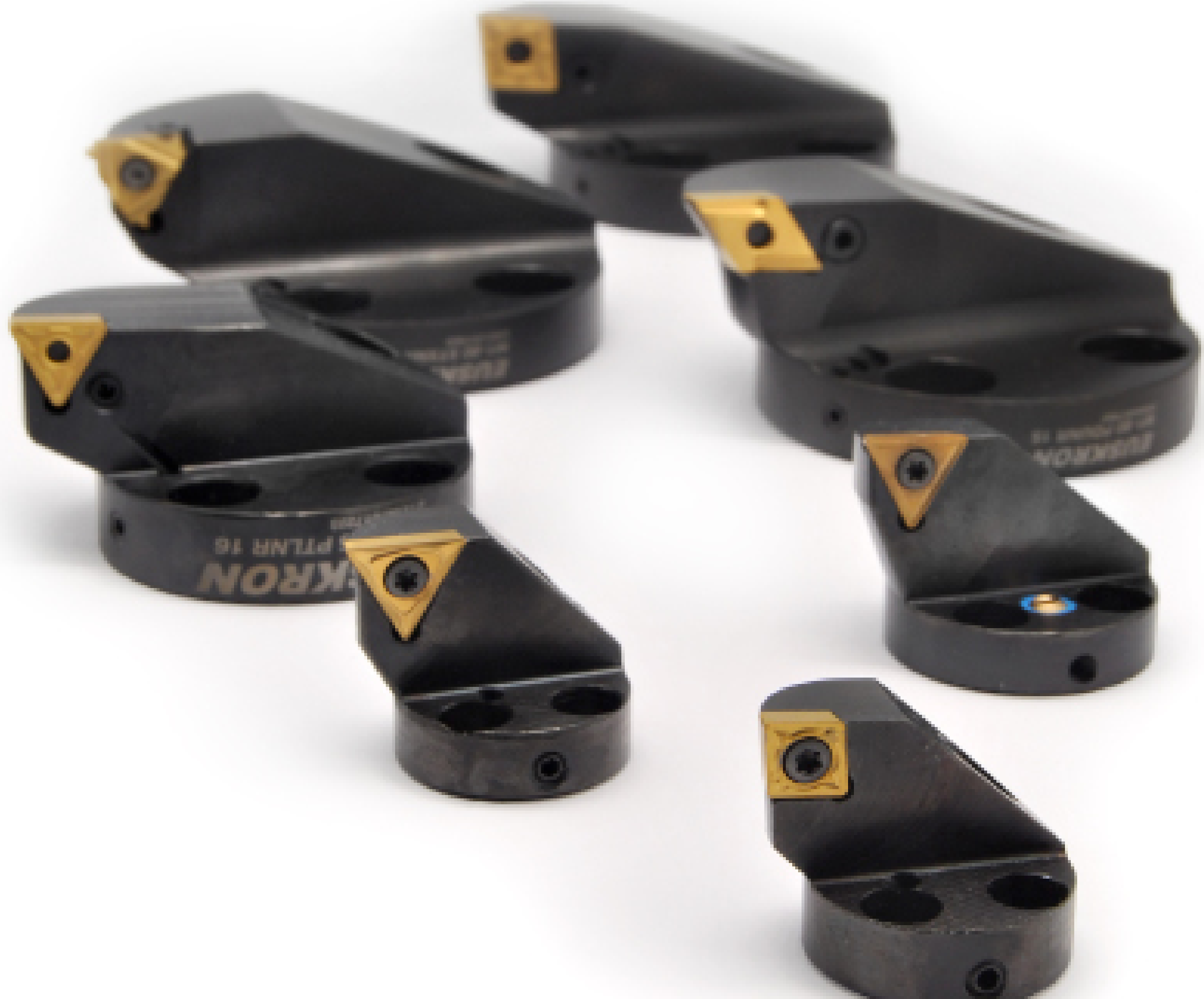
?
?
...
ABB

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