



SYNCHRO TAPPING



suttontools

SYNCHRO TAPPING



Gun Synchro

General purpose steel, stainless steel, aluminium, and copper alloys.

Through holes

R50 Synchro

General purpose steel, and stainless steel.

Blind holes

L20 Synchro

General purpose steel, stainless steel, aluminium, and copper alloys.

Ideal for Through holes with interruptions or angular exit

R45 Synchro

Aluminium, and copper alloys.

Blind holes

RLC Synchro

General purpose steel, stainless steel, aluminium, and copper alloys.

Forming blind or through holes

Case Study

Material: AISI 4140/ 1.7223 / 41CrMo4
Tap size: M6
Drill size: 5,1
Depth: 12mm (blind hole)
Machine: Haas VF2-SS
Lubrication: Emulsion 7%

Comments:

- Synchro taps reduce costs & cycle time
- With the additional use of Synchro holder, approx 100% longer tap life was achieved.

Inputs:

Vc (m/min)	12	25
Pitch	1	1
Size	M6	M6
RPM	636	1325
Feed (mm/min)	636	1325
Depth	12	12

47% Savings



Tap type	T189 R40	T373 Sync
Material:	HSSE-V	PM-HSSE
Vc:	12m/min	25m/min
Tapping process:	Floating holder	Rigid holder
Holder type:	with length compensation	Sutton Synchro
Machine hourly rate:	€90,00	€90,00
Tool Cost:	€14,90	€25,20
Time/hole(secs):	5,7	2,7
Cost per hole:	€0,17	€0,09

ISO	VDI	Material Group	Sutton
P	A	Steel	N
M	R	Stainless Steel	VA
K	F	Cast Iron	GG
N	N	Non-Ferrous Metals, Aluminiums & Coppers	Al W
S	S	Titanium & Super Alloys	Ti
H	H	Hard Materials (≥ 45 HRC)	H

^ VDI 3323 material groups can also be determined by referring to the material cross reference listing in the application guide at the back of this catalogue.

For Synchro Tapping



Catalogue Code **M**
MF
 Material
 Surface Finish
 Sutton Designation
 Tapping Depth
 Limit & Nut Tolerance

Page	4	4	5	5	6	6	7	7	8	8
	T377	T379	T373	T375	T365	T367	T369	T371	T381	T383
	T766	T768	T762	T764	T754	T756	T758	T760	T770	T772
	PM-HSSE V3		PM-HSSE V3		PM-HSSE V3		PM-HSSE V3		PM-HSSE V3	
	TiCN		TiCN		TiCN		CrN		TiN	
	UNI		UNI		UNI		Al		UNI	
	2xØ		2xØ		2xØ		2xØ		2xØ	
	6HX		6HX		6HX		6HX		6HX	

ISO	VDI [^] 3323	Material	Condition	HB	N/mm ²										
P	1	Steel - Non-alloy, cast & free cutting	~ 0.15 %C	A	125	440	●	●	●	●	●	●	●	●	
	2			A	190	640	●	●	●	●	●	●	●	●	
	3			QT	250	840	●	●	●	●	●	○	○	○	
	4			A	270	910	●	●	●	●	●	●	●	●	
	5			QT	300	1010	○	○	○	○	○	○	○	○	
	6	Steel - Low alloy & cast < 5% of alloying elements	~ 0.45 %C	A	180	610	●	●	●	●	●	●	●	○	○
	7			QT	275	930	●	●	●	●	●	●	○	○	
	8			QT	300	1010	○	○	○	○	○	○	○	○	
	9			QT	350	1180	○	○	○	○	○	○	○	○	
	10	Steel - High alloy, cast & tool	~ 0.75 %C	A	200	680	●	●	●	●	●	●	○	○	
	11			HT	325	1100	○	○	○	○	○	○	○	○	
	12	Steel - Corrosion resistant & cast	Ferritic / Martensitic	A	200	680	●	●	●	●	●	●	●	●	
	13		Martensitic	QT	240	810	○	○	○	○	○	○	○	○	
M	14.1	Stainless Steel	Austenitic	AH	180	610	●	●	●	●	●	●	●	●	
	14.2		Duplex		250	840	●	●	●	●	●	●	○	○	
	14.3		Precipitation Hardening		250	840	○	○	○	○	○	○	○	○	
K	15	Cast Iron - Grey (GG)	Ferritic / Pearlitic		180	610	●	●	●	●	●	●	●	●	
	16		Pearlitic		260	880	○	○	○	○	○	○	○	○	
	17	Cast Iron - Nodular (GGG)	Ferritic		160	570	●	●	●	●	●	●	●	●	
	18		Pearlitic		250	840	○	○	○	○	○	○	○	○	
	19		Ferritic		130	460	●	●	●	●	●	●	●	●	
20	Cast Iron - Malleable	Pearlitic		230	780	○	○	○	○	○	○	○	○		
N	21	Aluminum & Magnesium - wrought alloy	Non Heat Treatable		60	210	●	●	●	●	●	●	●	●	
	22		Heat Treatable	AH	100	360	●	●	●	●	●	●	●	●	
	23	Aluminum & Magnesium - cast alloy ≤ 12% Si	Non Heat Treatable		75	270	●	●	○	○	●	●	●	●	
	24		Heat Treatable	AH	90	320	●	●	○	○	●	●	○	○	
	25	Al & Mg - cast alloy > 12% Si	Non Heat Treatable		130	460	○	○	●	●	○	○	○	○	
	26	Copper & Cu alloys (Brass/Bronze)	Free cutting, Pb > 1%		110	390	●	●	○	○	●	●	●	●	
	27		Brass (CuZn, CuSnZn)		90	320	○	○	○	○	○	○	○	○	
	28		Bronze (CuSn)		100	360	●	●	○	○	●	●	●	●	
	29	Non-metallic - Thermosetting & fiber-reinforced plastics													
	30	Non-metallic - Hard rubber, wood etc.													
S	31	High temp. alloys	Fe based	A	200	680	●	●	●	●					
	32			AH	280	950									
	33			A	250	840	●	●	●	●					
	34			AH	350	1180									
	35			C	320	1080									
	36	Titanium & Ti alloys	CP Titanium		400 MPa										
	37.1			Alpha alloys		860 MPa			●	●					
	37.2			Alpha / Beta alloys	A	960 MPa			●	●					
37.3	Alpha / Beta alloys			AH	1170 MPa										
37.4	Beta alloys			A	830 MPa			●	●						
37.5		AH	1400 MPa												
H	38.1	Hardened steel		HT	45 HRC										
	38.2			HT	55 HRC										
	39.1			HT	58 HRC										
	39.2			HT	62 HRC										
	40	Cast Iron	Chilled	C	400	1350									
41	HT			55 HRC											

Condition: A (Annealed), AH (Age Hardened), C (Cast), HT (Hardened & Tempered), QT (Quenched & Tempered)

● Optimal ○ Effective

ISO	VDI	Material Group	Sutton
P	A	Steel	N
M	R	Stainless Steel	VA
K	F	Cast Iron	GG
N	N	Non-Ferrous Metals, Aluminums & Coppers	Al W
S	S	Titaniums & Super Alloys	Ti Ni
H	H	Hard Materials (≥ 45 HRC)	H

^ VDI 3323 material groups can also be determined by referring to the material cross reference listing in the application guide at the back of this catalogue.

Catalogue Code **M**
MF
Material
Surface Finish
Designation
Geometry
Thread Depth



T377	T379	T373	T375	T365	T367	T369	T371	T381	T383
T754	T756	T758	T760	T762	T764	T766	T768	T770	T772
PM-HSSE V3		PM-HSSE V3		PM-HSSE V3		PM-HSSE V3		PM-HSSE V3	
TiCN		TiCN		TiCN		CrN		TiN	
High Speed Cutting		High Speed Cutting		High Speed Cutting		High Speed Cutting		High Speed Cutting	
IK		R50 R50 IK		L20 L20 IK		R45 R45 IK		IK	
≤ 2xØ		≤ 2xØ		≤ 2xØ		≤ 2xØ		≤ 2xØ	

ISO	VDI ³³²³	Material	Condition	HB	N/mm ²	Vc (m/min)										
P	1	Steel - Non-alloy, cast & free cutting	~ 0.15 %C	A	125	440	39	47	31	31	31	37	-	-	25	30
	2			A	190	640	39	47	31	31	31	37	-	-	25	30
	3		QT	250	840	32	39	26	26	26	31	-	-	21	25	
	4		~ 0.75 %C	A	270	910	36	43	29	29	29	34	-	-	23	27
	5			QT	300	1010	29	35	23	23	23	28	-	-	-	-
	6	Steel - Low alloy & cast < 5% of alloying elements	A	180	610	39	47	31	31	31	37	-	-	25	30	
	7		QT	275	930	26	31	21	21	21	25	-	-	17	20	
	8		QT	300	1010	19	23	16	16	16	19	-	-	-	-	
	9		QT	350	1180	-	-	-	-	-	-	-	-	-	-	
	10	Steel - High alloy, cast & tool	A	200	680	26	31	21	21	21	25	-	-	17	20	
	11		HT	325	1100	-	-	-	-	-	-	-	-	-	-	
	12	Steel - Corrosion resistant & cast	Ferritic / Martensitic	A	200	680	16	19	13	13	13	16	-	-	-	-
	13		Martensitic	QT	240	810	10	12	8	8	8	9	-	-	-	-
M	14.1	Stainless Steel	Austenitic	AH	180	610	19	23	16	16	16	19	-	-	12	15
	14.2		Duplex	250	840	13	16	10	10	10	12	-	-	8	10	
	14.3		Precipitation Hardening	250	840	10	12	8	8	8	9	-	-	-	-	
K	15	Cast Iron - Grey (GG)	Ferritic / Pearlitic	180	610	39	47	31	31	31	37	-	-	-	-	
	16		Pearlitic	260	880	32	39	26	26	26	31	-	-	-	-	
	17	Cast Iron - Nodular (GGG)	Ferritic	160	570	39	47	31	31	31	37	-	-	-	-	
	18		Pearlitic	250	840	32	39	26	26	26	31	-	-	-	-	
	19	Cast Iron - Malleable	Ferritic	130	460	49	58	39	39	39	47	-	-	-	-	
20	Pearlitic		230	780	39	47	31	31	31	37	-	-	-	-		
N	21	Aluminum & Magnesium - wrought alloy	Non Heat Treatable	60	210	39	47	31	31	31	37	31	31	25	30	
	22		Heat Treatable	AH	100	360	49	58	39	39	39	47	39	39	31	37
	23	Aluminum & Magnesium - cast alloy ≤12% Si	Non Heat Treatable	75	270	49	58	39	39	39	47	39	39	31	37	
	24		Heat Treatable	AH	90	320	49	58	39	39	39	47	39	39	31	37
	25	Al & Mg - cast alloy >12% Si	Non Heat Treatable	130	460	32	39	26	26	26	31	-	-	-	-	
	26	Copper & Cu alloys (Brass/Bronze)	Free cutting, Pb > 1%	110	390	26	31	21	21	21	25	21	21	-	-	
	27		Brass (CuZn, CuSnZn)	90	320	58	70	47	47	47	56	47	47	-	-	
	28		Bronze (CuSn)	100	360	45	54	36	36	36	44	36	36	29	35	
	29	Non-metallic - Thermosetting & fiber-reinforced plastics				-	-	-	-	-	-	-	-	-	-	
30	Non-metallic - Hard rubber, wood etc.				-	-	-	-	-	-	-	-	-	-		
S	31	High temp. alloys	Fe based	A	200	680	10	12	8	8	-	-	-	-	-	
	32			AH	280	950	-	-	-	-	-	-	-	-	-	
	33		Ni / Co based	A	250	840	8	10	6	6	-	-	-	-	-	
	34			AH	350	1180	-	-	-	-	-	-	-	-	-	
	35			C	320	1080	-	-	-	-	-	-	-	-	-	
	36	Titanium & Ti alloys	CP Titanium	400 MPa		-	-	-	-	-	-	-	-	-		
	37.1		Alpha alloys	860 MPa		-	-	-	-	13	16	-	-	-		
	37.2		Alpha / Beta alloys	A	960 MPa		-	-	-	-	13	16	-	-	-	
	37.3			AH	1170 MPa		-	-	-	-	-	-	-	-	-	
	37.4		Beta alloys	A	830 MPa		-	-	-	-	8	9	-	-	-	
37.5	AH	1400 MPa		-	-	-	-	-	-	-	-	-	-			
H	38.1	Hardened steel	HT	45 HRC			-	-	-	-	-	-	-	-	-	
	38.2			55 HRC			-	-	-	-	-	-	-	-	-	
	39.1		HT	58 HRC			-	-	-	-	-	-	-	-		
	39.2		HT	62 HRC			-	-	-	-	-	-	-	-		
	40		Cast Iron	Chilled	C	400	1350	-	-	-	-	-	-	-	-	
	41	HT			55 HRC			-	-	-	-	-	-	-		

Condition: A (Annealed), AH (Age Hardened), C (Cast), HT (Hardened & Tempered), QT (Quenched & Tempered)

Bold = Optimal | Regular = Effective

Notes on Tapping

- The speeds listed above are a recommendation only, and are based on depth of thread listed, speeds can be adjusted on application.
As a general rule;
- If hole depth required is less than above mentioned = increase speed
- If hole depth required is more than above mentioned = reduce speed
- Taps must be driven by the square to eliminate slippage, eg, ER-GB collets (square drive).
- When using spiral flute taps with length compensation tapping attachment, it is recommended to short pitch the feed 95%, to eliminate tap cutting oversize, eg, M6x1 @ 1000RPM, Feed rate= 950mm/min.
- Forming taps are suitable for materials with >10% elongation

METRIC TAPS (mm size)	
Ø	= nominal tap size (mm)
P	= thread pitch (mm) $n = \frac{v_c \times 1000}{\phi \times \pi} \approx \frac{v_c}{\phi} \times 318$
n	= spindle speed (RPM)
v _c	= cutting speed (m/min) $v_c = \frac{n \times \phi \times \pi}{1000} \approx \frac{n \times \phi}{318}$
v _f	= feed rate (mm/min)
v _r	= feed rate per rev (mm/rev) $v_f = n \times P$



Synchro Tapping Attachment with unique Double Flexure

Unlike other "synchronous" tap drivers that use soft plastic components or belleville washers similar as above, to cushion the taps' entry into the hole, Synchro utilizes a (computer generated, precisely machined, special steel alloy) Double Flexure between the mount and the chuck.

It compensates both axially for the unavoidable discrepancies between the machine's programmed RPM, feed and traverse and the exact thread pitch and precise hole location.

The Synchro is dependable and predictable. You can expect long life performance under all working conditions. What's more, you'll make significant savings when it comes to tap costs.

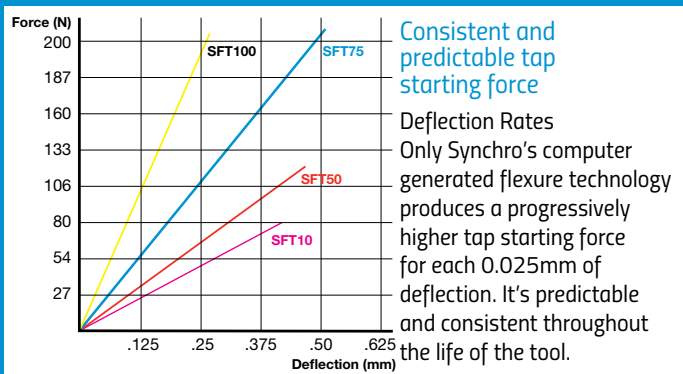


Synchro Proven Results

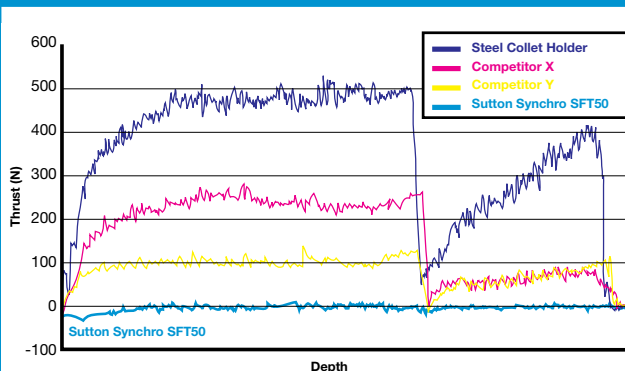
Independent tests in real world applications confirm Synchro is unmatched in performance

- Tap life increased by 100% or more
- Thread quality improved
- Increased production due to less tap breakage
- Less down time
- Reduced costs. The most economical rigid tapping

Synchro exerts lower thrust and torque forces than any other tap holder on the market. In any given material the lower the thrust and torque forces on the tap, the longer the tap life.



Test One (Thrust): 10 holes, M6 R45A1, 2 flute tap, 3x Dia. deep in AL7075 at 1000 RPM



Graph illustrates the final hole tapped by each tap driver.

Holder Type	Average Thrust (N)	Average Down Cut Thrust (N) Entering Hole	Average Reverse Thrust (N) Exiting Hole
Steel Collet Holder (Rigid)	1008	1379	930
Competitor X	681	879	445
Competitor Y	320	425	266
Synchro	-12	-29	-31

Test Two (Torque): 10 holes, M6 R45A1, 2 flute tap, 3x Dia. deep in AL7075 at 2000 RPM

Holder Type	Average Torque (Ncm)	Average Down Cut Torque (Ncm) Entering Hole	Average Reverse Torque (Ncm) Exiting Hole
Steel Collet Holder (Rigid)	481	631	-387
Competitor X	593	639	-354
Competitor Y	542	730	-392
Synchro	268	371	-190



- For the best rigid tapping results
- Holder designed for machines with rigid tapping
- Machine reversal required
- Increases tap life by 100% or more
- Improve thread quality
- Flexure design, acts like shock absorber



Appareil à tarauder CNC, pour taraudage rigide

- Pour de meilleurs résultats en taraudage
- Adapté pour le taraudage rigide sur machine CNC
- Machines à inversion recommandées
- Jusqu'à 100% de durée de vie supplémentaire
- Meilleure qualité de taraudage
- Absorbeur de chocs



Maschiatore CNC – Maschiatura rigida

- Per la miglior soluzione di maschiatura rigida
- Utensile progettato per macchine predisposte alla maschiatura rigida
- Invertitore richiesto
- Può aumentare la vita utensile del 100% e oltre
- Migliora la qualità del filetto
- Progettato per essere flessibile e assorbire eventuali stop improvvisi



Roscador CNC - Roscado Rígido

- Para los mejores resultados en roscado rígido
- Soporte diseñado para máquinas con roscado rígido
- Se requiere inversión en la máquina.
- Aumenta la vida útil del macho en un 100% o más
- Mejora la calidad de rosca
- Diseño flexible, actúa como corrector



ER25 Collet (Sq. Drive)



Patented Flexure Design



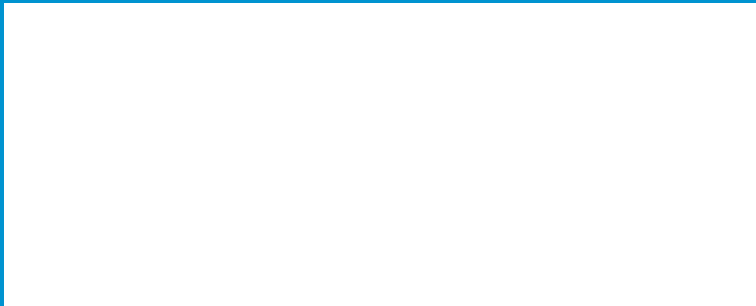
Collet SFT50



Collet SFT100

Size Ref.	Description	Size Capacity	Mount	Collet Series	Ref Code	Item #
Tapping Attachments (Discount Group Z1104)						Z101
SFT10	Synchro SFT10	M1-M6 #2-#10	25mm SS	ER11	43102511	Z101 SFT10
SFT50	Synchro SFT50	M4-M12 #8-1/2	25mm SS	ER20	43502520	Z101 SFT50
SFT75	Synchro SFT75	M4-M16 3/8 - 3/4	25mm SS	ER25	43752525	Z101 SFT75
SFT100	Synchro SFT100	M8-M30	25mm SS	ER40	431002540	Z101 SFT100
Collets - SFT10 (Round Drive) (Discount Group Z1110)						Z110
0025	2-2.5mm	M1-1.8	-	ER11		Z110 0025
0030	2.5-3mm	M2-2.6	-	ER11		Z110 0030
0035	3-3.5mm	M3	-	ER11		Z110 0035
0040	3.5-4mm	M3.5	-	ER11		Z110 0040
0045	4-4.5mm	M4	-	ER11		Z110 0045
0050	4.5-5mm	M4 JIS	-	ER11		Z110 0050
0055	5-5.5mm	M5 JIS	-	ER11		Z110 0055
0060	5.5-6mm	M5/M6 / M2-M6 Synchro	-	ER11		Z110 0060
Collets - SFT50 (Square Drive) (Discount Group Z1110)						Z111
0045	Ø 4.5mm	M4 DIN371	-	ER20		Z111 0045
0050	Ø 5mm	ISO	-	ER20		Z111 0050
0060	Ø 6mm	M5/M6 DIN371 / M2-M6 Synchro	-	ER20		Z111 0060
0070	Ø 7mm	M10 DIN376	-	ER20		Z111 0070
0080	Ø 8mm	M8 DIN371 / M8 Synchro	-	ER20		Z111 0080
0090	Ø 9mm	M12 DIN376	-	ER20		Z111 0090
0100	Ø 10mm	M10 DIN371 / M10 Synchro	-	ER20		Z111 0100
Collets - SFT75 (Square Drive) (Discount Group Z1110)						Z112
0045	Ø 4.5mm	M4 DIN371	-	ER25		Z112 0045
0060	Ø 6mm	M5/M6 DIN371 / M2-M6 Synchro	-	ER25		Z112 0060
0070	Ø 7mm	M10 DIN371	-	ER25		Z112 0070
0080	Ø 8mm	M8 DIN371 / M8 Synchro	-	ER25		Z112 0080
0090	Ø 9mm	M12 DIN376	-	ER25		Z112 0090
0100	Ø 10mm	M10 DIN371 / M10 Synchro	-	ER25		Z112 0100
0110	Ø 11mm	M14 DIN376	-	ER25		Z112 0110
0120	Ø 12mm	M16 DIN376 / M12 Synchro	-	ER25		Z112 0120

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