



# FIN-FAN

## Maintenance tools



**KRAIS®**

Tube & Pipe Tools

# MINIDRILL GFF

## FinFan cooler machining platform



TAILOR MADE ONLY!

MiniDrill GFF is a unique machining platform designed to safely perform the repair or increase the FinFan Cooler plug thread and other operations on heat exchangers, boilers and similar thermal exchange equipment. This system can drill, ream, bore and even re-machine serrations in steam drums. With a 80 mm (3.150") travel, tool is suited for the majority of plant equipment. The system is fully torque reacted with 2 clamping arms that are independent of one another and can accommodate most pitch configurations. Once locked into the tubes, the MiniDrill is extremely stable.

WORKING RANGE	LOCKING RANGE	FREE SPEED	POWER	TORQUE			
12,5– 51,0 mm	According to the drawing	100 Rpm	1,3 Hp	140 Nm			
0,492 – 2,000"				105 Ft.Lbs			
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m3/min	2,32"	59 mm	13,1"	335 mm	17,5 Lbs	8 kg



### RIGID LOCKING

On standard FinFan gas coolers machine locks onto two shafts on the adjacent holes. The locking plate is manufactured according to the tube hole pitch to ensure precise tool alignment.



### UNIVERSAL REACTION PLATE

MiniDrill FinFan is delivered with locking plate and 2 reaction shafts. Construction of the plate allows for locking machine with both shafts on one side to allow to machine the last holes in the row. Plate can be etc.

## FINFAN THREAD REPAIR PROCESS

### PROPER MACHINE LOCKING FOR ALL STEPS

Choose the correct locking jaws to suit the existing plug holes



PLUG SIZE		JAW SET (2 REQUIRED)	
1-1/8"	28,58 mm	12 TPI	701MM #36-1-1/8-GFF
1-1/4"	31,75 mm	12 TPI	703MM #36-1-1/4-GFF
1-3/8"	34,93 mm	12 TPI	705MM #36-1-3/8-GFF
1-1/2"	38,10 mm	12 TPI	707MM #36-1-1/2-GFF
1-5/8"	41,28 mm	12 TPI	709MM #36-1-5/8-GFF
1-3/4"	44,45 mm	12 TPI	711MM #36-1-3/4-GFF
1-7/8"	47,63 mm	12 TPI	713MM #36-1-7/8-GFF



### STEP 1

Heads for weld removal over the welded plugs (in case are welded)



PLUGS SIZE		HEAD	INSERT	SCREW
1-1/8"	28,58 mm	TFWR-GFF-350	CS-5D	MHS-4
1-1/4"	31,75 mm	TFWR-GFF-380	CS-5D	MHS-4
1-3/8"	34,93 mm	TFWR-GFF-410	CS-5D	MHS-4
1-1/2"	38,10 mm	TFWR-GFF-440	CS-5D	MHS-4
1-5/8"	41,28 mm	TFWR-GFF-470	CS-5D	MHS-4
1-3/4"	44,45 mm	TFWR-GFF-500	CS-5D	MHS-4
1-7/8"	47,63 mm	TFWR-GFF-540	CS-5D	MHS-4



### STEP 2

Select the appropriate size drill head to match the desired new thread size



DRILL HEAD SIZE		DRILL HEAD	INSERT	SCREW
1-1/8 to 1-1/4"	28,58 to 31,75 mm	MD-29,6-DRILL-L-130	CS-0,4	MHS-4
1-1/4 to 1-3/8"	31,74 to 34,93 mm	MD-32,9-DRILL-L-130	CS-0,4	MHS-4
1-3/8 to 1-1/2"	34,93 to 38,10 mm	MD-36,1-DRILL-L-130	CS-0,4	MHS-4
1-1/2 to 1-5/8"	38,10 to 41,28 mm	MD-39,3-DRILL-L-130	CS-0,4	MHS-4
1-5/8 to 1-3/4"	41,28 to 44,45 mm	MD-42,5-DRILL-L-130	CS-0,4	MHS-4
1-3/4 to 1-7/8"	44,45 to 47,63 mm	MD-45,5-DRILL-L-130	CS-0,4	MHS-4

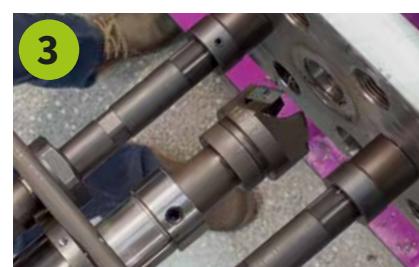


### STEP 3

Select the chamfering head to chamfer the hole before tapping (heads need a Weldon flange: MD-FLANGE-STWRMH)



RANGE		HEAD	INSERT	SCREW
0,787 to 1,653"	20,00 to 42,00 mm	STWRMH-317	WRI	MHS-4
1,417 to 2,244"	36,00 to 57,00 mm	STWRMH-444	CDI	MHS-4



### STEP 4

Select tapping head to suit the required thread size



PLUGS THREAD SIZE		TAP HEAD	RATCHET FEED ARM
1-1/8"	28,58 mm	12 TPI	MD-RS-H28
1-1/4"	31,75 mm	12 TPI	MD-RS-H28
1-3/8"	34,93 mm	12 TPI	MD-RS-H28
1-1/2"	38,10 mm	12 TPI	MD-RS-H28
1-5/8"	41,28 mm	12 TPI	MD-RS-H28
1-3/4"	44,45 mm	12 TPI	MD-RS-H28
1-7/8"	47,63 mm	12 TPI	MD-RS-H28



### STEP 5

Produce new gasket seat using MiniMill-300GFF. Choose heads and jaws on page 6.



# MINIMILL 300GFF

## Gasket seat machining tool

Ideal for gasket seat machining of any size of fin fan cooler. A standard machine is equipped with a cutter head and a special locking system to fit your application. The machine locks directly into the plug thread.



### GASKET FINFAN SET

Supplied with 20 mm shaft, one set of jaws to suit plug thread diameter, pilot and gasket seat milling head. Plug size details must be provided by customer with order.

Custom machined jaws. Showing locked and unlocked position.

STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	POWER	TORQUE
APPLICATION RANGE (ID-OD)	LOCKING RANGE (ID)				
12 TPI	Suit to thread of the plug	20 mm	300 Rpm	1,3 Hp	43 Nm
1,125 - 2,125"		0,787"			32 Ft.Lbs
AIR USE		BODY WIDTH		BODY HEIGHT	
55 cfm	1,3 m <sup>3</sup> /min	2,32"	59 mm	13,1"	335 mm
BODY WEIGHT		13,2Lbs		6 kg	

### WORK EXAMPLES



FinFan cooler before a maintenance



Plug hole before re-machining the gasket seat



Safely re-machine gasket surfaces in seconds.



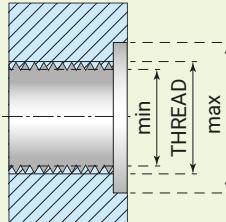
All types of water box materials can be machined with the carbide inserts

### GASKET SEAT FACING HEADS AND JAWS NUMBERS

HEAD TYPE	PLUG SIZE			SEAL NEST DIAMETER				INSERT	NO. OF INSERTS	JAWS SET NUMBER	PLUG SIZE			TPI	PILOT
	[INCH]	[MM]	TPI	MIN [INCH]	MAX [INCH]	MIN [MM]	MAX [MM]				[INCH]	[MM]	TPI		
FFGSMH-1125	1,125	28,58	12	0,940	1,496	24,00	38,00	CI 5x5	4	701MM #36-1-1/8-GFF	1,125	28,575	12	PGFF-1125	
FFGSMH-1250	1,250	31,75	12	1,063	1,614	27,00	41,00	CI 5x5	4	703MM #36-1-1/4-GFF	1,250	31,750	12	PGFF-1250	
FFGSMH-1350	1,375	34,93	12	1,220	1,772	31,00	45,00	CI 5x5	4	705MM #36-1-3/8-GFF	1,375	34,925	12	PGFF-1350	
FFGSMH-1500	1,500	38,10	12	1,339	1,890	34,00	48,00	CI 5x5	4	707MM #36-1-1/2-GFF	1,500	38,100	12	PGFF-1500	
FFGSMH-1625	1,625	41,27	12	1,457	2,008	37,00	51,00	CI 5x5	4	709MM #36-1-5/8-GFF	1,625	41,275	12	PGFF-1625	
FFGSMH-1750	1,750	44,45	12	1,590	2,140	40,40	54,40	CI 5x5	4	711MM #36-1-3/4-GFF	1,750	44,450	12	PGFF-1750	
FFGSMH-1875	1,875	47,62	12	1,720	2,270	43,60	57,60	CI 5x5	4	713MM #36-1-7/8-GFF	1,875	47,625	12	PGFF-1875	

Other sizes on request. If plug holes are damaged beyond repair, our MiniDrill 55 can be used to upsize them to the next size. Example: 1-1/8" to 1-3/8".

#### Seal nest diameter diagram



#### AVAILABLE ACCESSORIES

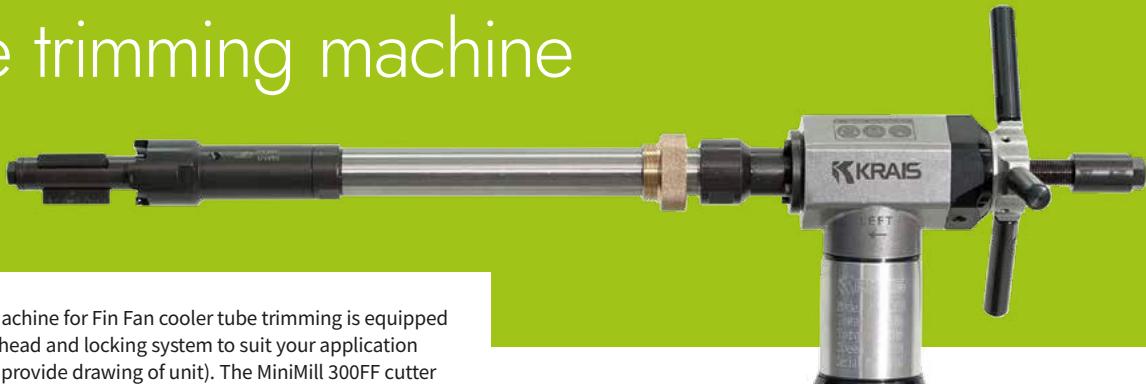


##### FAST CLAMPING SYSTEM

System offers rapid tube to tube cycle time, increased productivity (up to 4x) with little operator fatigue. Ideal for large amount of end preps.

# MINIMILL 300FF

## Tube trimming machine



A standard machine for Fin Fan cooler tube trimming is equipped with custom head and locking system to suit your application (customer to provide drawing of unit). The MiniMill.300FF cutter heads have 3 carbide inserts with 4 cutting edges each.



### FINFAN ATTACHMENT

Special attachment for facing tubes in fin fan gas coolers. A locking shaft with adjustable length and a support bushing are screwed into the plug thread, making this tool the best one available on the market today. The cycle is approx. 1 min from tube to tube. For this application we recommend our 300 Rpm machine

STANDARD WORKING RANGE			FEED STROKE	FREE SPEED	POWER	TORQUE
APPLICATION RANGE (ID-OD)		LOCKING RANGE (ID)				
12,5– 51,0 mm		According to the drawing	20 mm	300 Rpm	1,3 Hp	43 Nm
			0,787"			32 Ft.Lbs
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT
55 cfm	1,3 m <sup>3</sup> /min	2,32"	59 mm	13,1"	335 mm	13,2Lbs
						6 kg

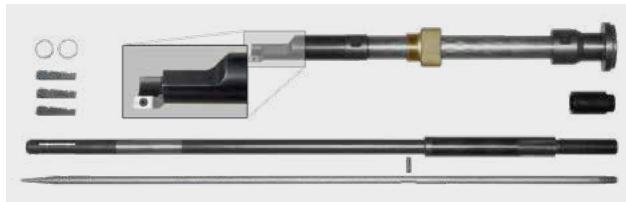
### FINFAN ATTACHMENT PART NUMBERS

FINFAN	TUBE CAPACITY (OD)			INSERT	NO. OF INSERTS	SCREW	JAWS COVER	
	[INCH]	[MM]	BWG				MIN	MAX
601-FinFan-1-12"	1,000	25,40	12-23	CI	3	1-1/8	207MM#36	213MM#36
603-FinFan-1-1/8-12"	1,125	28,58	12-23	CI	3	1-1/4	211MM#36	217MM#36
605-FinFan-1-1/4-12"	1,250	31,75	11-23	CI	3	1-3/8	103MM#36	107MM#36
607-FinFan-1-1/2-12"	1,500	38,10	11-23	CI	3	1-5/8	107MM#36	111MM#36
609-FinFan-1-3/4-12"	1,750	44,45	9-23	CI	3	1-7/8	111MM#36	115MM#36
611-FinFan-2-12"	2,000	50,80	9-23	CI	3	2-1/8	115MM#36	119MM#36

### AVAILABLE LENGTHS

MODEL	LENGTH	
	[MM]	[INCH]
601-FinFan-xx-6	152,4	6"
601-FinFan-xx-8	203,2	8"
601-FinFan-xx-10	254,0	10"
601-FinFan-xx-12	305,0	12"
601-FinFan-xx-14	355,6	14"
601-FinFan-xx-16	406,4	16"

## AVAILABLE ACCESORIES



### FINFAN SEAL WELD REMOVAL ATTACHMENT

Simply the best solution for seal weld removal from air coolers. Adjustable length locking shaft and support bushing that fits into the plug thread, making this tool the best one available on the market today. A cycle time of approximately 1 min from tube to tube can be expected.



### FINFAN CHAMFERING ATTACHMENT

FINFAN-CMF-000-00 Chamfering Attachment for tube sheet holes in the FinFan tube sheet before welding. Available for 45-degree chamfer and R4 radius J-Prep.



#### SPEED REDUCER

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.



#### RATCHET FEED

Feed system allowing to work in narrow and tight locations, e.g. in water walls.



#### LEVER FEED

Quick and easy feed system. Used in many basic applications.



## WORK EXAMPLES



Water box demonstration of the simplicity of machine operation.



An operator trimming back tubes prior to seal welding.



Machine locks securely both to the tube and the plug thread of the water box.

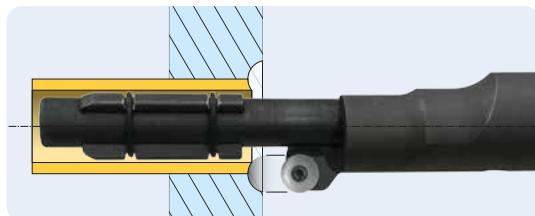
# MINIMILL 101FF-JPREP

## J-prep strength weld removal



Simply the best solution for J-prep strength weld removal from air coolers. Adjustable length locking shaft and support bushing that fits into the plug thread make this tool the most efficient on the market today. A cycle time of approximately 1 min from tube to tube can be expected!

### FINFAN JPREP ATTACHMENT



The attachment, with a head of a specially designed shape, uses a large round cutting bit. The size and shape allow for the simultaneous processing of the pipe and the tube sheet. The working area covers the entire weld to be removed.

WORKING RANGE			FEED STROKE	FREE SPEED	POWER	TORQUE	
APPLICATION (ID-OD)	LOCKING (ID)						
12,5- 51,0 mm	According to the drawing		20 mm	100 Rpm	1,3 Hp	120 Nm	
0,492 – 2,000"			0,787"			88,5 Ft.Lbs	
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m <sup>3</sup> /min	2,32"	59 mm	13,1"	335 mm	13,2Lbs	6 kg

### **FINFAN JPREP ATTACHMENT PART NUMBERS**

FINFAN	TUBE CAPACITY (OD)			INSERT	NO. INSERTS	SCREW	JAWS COVER	
	[INCH]	[MM]	BWG				MIN	MAX
601-FF-JPREP-1-12"	1,000	25,40	12-23	O10-Co	1	1-1/8	207MM#36	213MM#36
603-FF-JPREP-1-1/8-12"	1,125	28,58	12-23	O10-Co	1	1-1/4	211MM#36	217MM#36
605-FF-JPREP-1-1/4-12"	1,250	31,75	11-23	O10-Co	1	1-3/8	103MM#36	107MM#36
607-FF-JPREP-1-1/2-12"	1,500	38,10	11-23	O10-Co	1	1-5/8	107MM#36	111MM#36
609-FF-JPREP-1-3/4-12"	1,750	44,45	9-23	O10-Co	1	1-7/8	111MM#36	115MM#36
611-FF-JPREP-2-12"	2,000	50,80	9-23	O10-Co	1	2-1/8	115MM#36	119MM#36

### **AVAILABLE LENGTHS**

MODEL	DŁUGOŚĆ	
	[MM]	[INCH]
601-FF-JPREP-xx-6	152,4	6"
601-FF-JPREP-xx-8	203,2	8"
601-FF-JPREP-xx-10	254,0	10"
601-FF-JPREP-xx-12	305,0	12"
601-FF-JPREP-xx-14	355,6	14"
601-FF-JPREP-xx-16	406,4	16"

## OTHER OPTIONAL ACCESSORIES



SPEED REDUCER

Highly recommended!

Gearbox for 3x speed reduction in cutting hard carbon steel, stainless steel, or other exotic hard metal. Increases the torque, enabling the machine to generate a thick chip while reducing the cutting time tool wear or burn during the weld removal.

## RATCHET FEED

Feed system allowing to work in narrow and tight locations, eg. in water walls.



## EXAMPLE TOOL APPLICATION



MiniMill 101FF-JPREP allows for convenient servicing FinFan gas coolers even in the toughest conditions. Machine locks securely both to the tube and the plug thread of the water box.

## WORK EXAMPLES



The machine is designed for work on gas coolers: an elongated special head and a nut fixing the tool in the socket.



The bit edge covers the entire weld to be removed



Removal of the weld ends with a visible groove between the tube and the tube sheet.



# FINMILL

## Fin removing machine

KRAIS FinMill is a air powered tool designed for removing fin from the outside diameter of a tube. The tool is based on the same quality drive and housing as our other PrepMill series tools. Thanks to heavy duty locking system The FinMill fin tube removal tool clamps reliably in the tube and offers chatter-free work at any position.



### STANDARD SET UP



#### DOUBLE SIDE HEAD

Special shaped head, allows to remove left- and right-handed fins.



#### SHAFT25

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

Reversible motor allow to work and remove left and right hand fins.

STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	POWER	TORQUE
APPLICATION RANGE (ID-OD)	LOCKING RANGE (ID)				
31,75 - 63,50 mm	25 - 122 mm	100 mm	100 Rpm	2,2 Hp	370 Nm
1-1/4" - 2-1/2"	0,984 - 4,803"	4"			277 Ft.Lbs
AIR USE		BODY WIDTH		BODY HEIGHT	
75 cfm	2,2 m <sup>3</sup> /min	2,59"	66 mm	14,5"	370 mm
				19 Lbs	9 kg

### HEAD NUMBERS

RANGE		HEAD
[INCH]	[MM]	
1-1/4	31,75	FMRH-317
1-1/2	38,10	FMRH-381
1-3/4	44,45	FMRH-444
2	50,80	FMRH-501
2-1/4	57,15	FMRH-571
2-1/2	63,50	FMRH-635

### LOCKING RANGES WITH SHAFT25

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
25	30	0,984	1,181	NS-1	-	SP-24	1
30	35	1,181	1,378	NS-2	-	SP-24	1
35	40	1,378	1,575	NS-3	-	SP-25	2
40	45	1,575	1,772	NS-4	-	SP-25	2
45	50	1,772	1,969	NS-5	-	SP-25	2
50	55	1,969	2,165	NS-6	-	SP-25	2
55	60	2,165	2,362	NS-7	-	SP-25	2
60	65	2,362	2,559	NS-8	-	SP-25	2

**OPTIONAL****STAR WHEEL**

The most precise feed system. Used in many basic and demanding applications.

**FINMILL E**

FinMill E is electric version of FinMill. A standard machine cover the same pipe sizes and comes with the same cutting head. The electric motor made by Makita with 3 stage planetary gear box made by KRAIS has variable speed control and produce enormous torque. Is interchangeable with pneumatic drive and can be purchased separately at any time. FinMill E works only with right hand fins.

Free Speed..... 115 RPM  
Power..... 750 W  
Torque..... 366 NM (280 Ft.Lbs)  
Feed Stroke ..... 20 mm (0,787")

**WORK EXAMPLES**

Removes 4.0" (101 mm) depth of fin from the tube OD in less than 2 minutes

# T\_APPL

## Tube plugs for fin fan applications

The KRAIS T\_appl FFP series tube plugs is a specialized, mechanical plug engineered for use in air-cooled fin fan heat exchangers. Designed for high-pressure environments, it offers secure sealing without damaging the tube wall, even under severe thermal stress or vibration.

Unlike general-purpose plugs, the T\_appl is optimized for difficult-to-reach tubesheet locations, especially where compact water box openings and restricted visibility are common.



TOOL NR	TUBE ID		EXPANSION RANGE				TUBE OD AND WALL THICKNESS			
			[INCH]		[MM]					
	[INCH]	[MM]	MIN	MAX	MIN	MAX	TUBE OD	BWG	TUBE OD	BWG
FFP-1853-XX	0,731	18,57	0,730	0,750	18,54	19,05	7/8"	15	1"	10
FFP-1892-XX	0,745	18,92	0,750	0,770	19,05	19,56	7/8"	16	1"	11
FFP-1927-XX	0,759	19,28	0,750	0,770	19,05	19,56	7/8"	17	1"	11
FFP-1973-XX	0,777	19,74	0,780	0,800	19,81	20,32	7/8"	18	1"	12
FFP-2000-XX	0,791	20,09	0,780	0,800	19,81	20,32	7/8"	19	1"	12
FFP-2044-XX	0,805	20,45	0,800	0,820	20,32	20,83	7/8"	20	1"	13
FFP-2080-XX	0,819	20,80	0,820	0,840	20,83	21,34	7/8"	22	1"	14
FFP-2184-XX	0,834	21,18	0,840	0,860	21,34	21,84			1"	14
FFP-2174-XX	0,856	21,74	0,860	0,880	21,84	22,35			1"	15
FFP-2209-XX	0,870	22,10	0,860	0,880	21,84	22,35			1"	16
FFP-2245-XX	0,884	22,45	0,880	0,900	22,35	22,86			1"	17
FFP-2236-XX	0,920	23,37	0,900	0,920	22,86	23,37			1"	18

**XX** -> Choose your material: **CS** for Carbon Steel, **BR** for Admiralty Brass, **SS** for Stainless Steel, **CN** for Cu Nicel

Please measure your tube ID before order!

### KEY ADVANTAGES

- Torque-controlled installation - ensures repeatable, consistent radial expansion with no tube deformation.
- Installation requires only a manual torque wrench. No high pressure pumps, no hydraulic breakers.
- The long-reach Push-in Spanner enables easy access in deep or narrow configurations in fin fan systems.
- A dedicated slide hammer, connected to the threaded part of the plug, allows safe extraction of the plug for tube inspection or replacement
- Engineered expansion delivers a reliable mechanical seal, even under high thermal cycling and vibration.

### PUSH-IN SPANNER

A specially designed installation tool precisely positions the T\_appl plug and presses it into the tube to ensure proper sealing. This solution is tailored for fin fan heat exchangers, where access is limited, visibility is poor, and tool reach must exceed standard dimensions. The KRAIS T\_appl plug is engineered to meet these challenges reliably and efficiently.



Complete tooling for easy plug installation and removal: Push-in Spanner and slide hammer.

