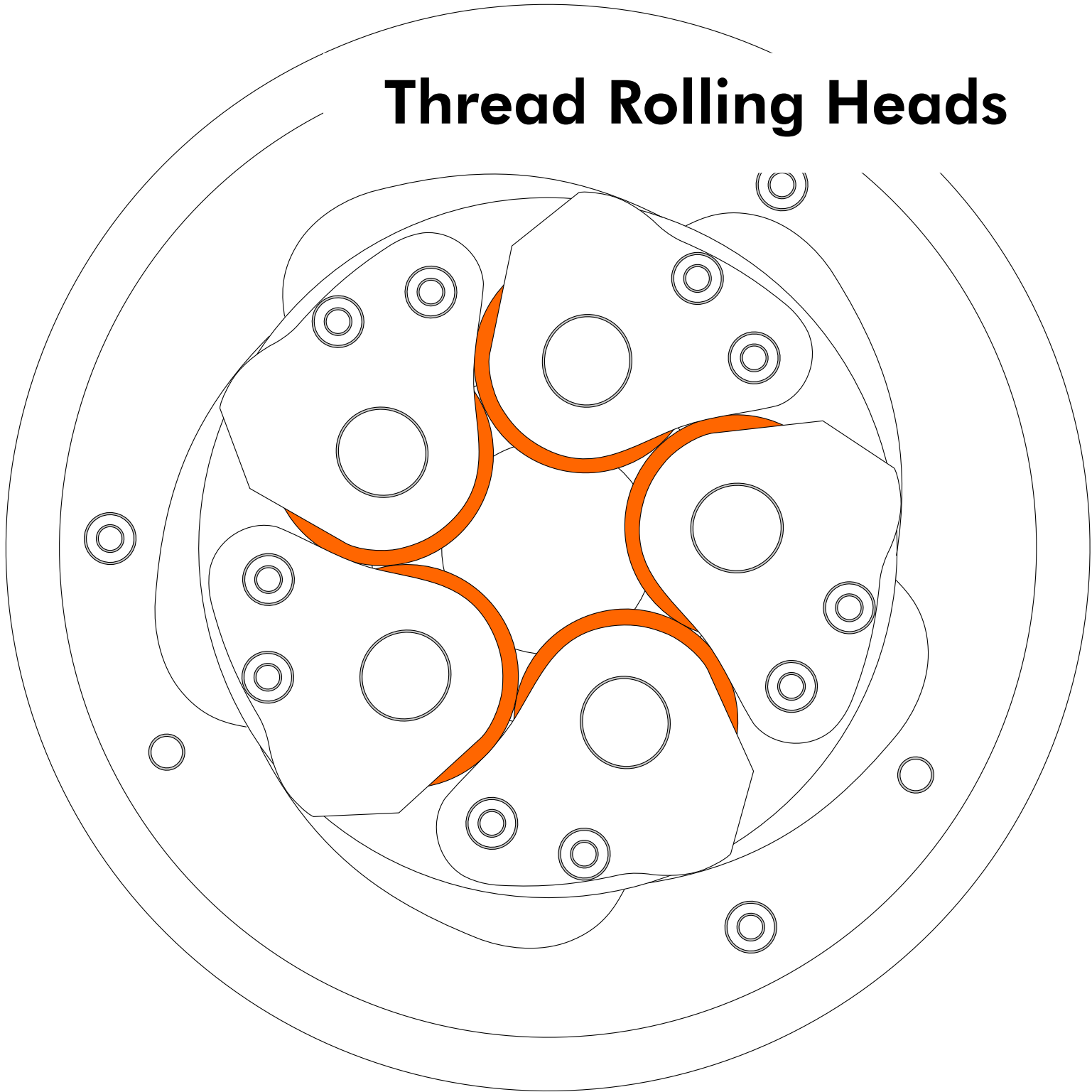


# Thread Rolling Heads



## Focussing on your success

### We claim:

- Only WAGNER® offers you all processes of producing **external threads**:
- Only the best is good enough for us! **Top Quality** has its origin in Pliezhausen:
- With our thread rolling head you **save** both time and money:
- Many **types of threads** can be rolled with our thread rolling head:
- A wide range of **workpieces** can be rolled with the thread rolling head
- Various rolling jobs **broaden** the rolling tasks of the thread rolling head and make your work easier:

### We prove:

Rolling – cutting – reducing diameters

Complying with our consequent quality system, only first class materials are processed to high quality tools

You only need one thread rolling head. Rolls and roll-holder may be changed without removing the head from the machine.

Right-, left- handed threads, regular type- and fine threads, conical threads or threads against the collar as well as tube-, trapezoid-, and special threads.

All cold-moulded workpieces can be rolled with the WAGNER® - thread rolling head.

WAGNER® -thread rolling heads process all jobs around metal forming such as flanging, flaring, rolling, expanding turning pieces in tubes, reducing, knurling and a lot more.





Thread Cutting Head



Multi-Cutter Turning Head



Thread Rolling Attachment

Dear reader,

we are a company specialised on the machining of external thread tools.

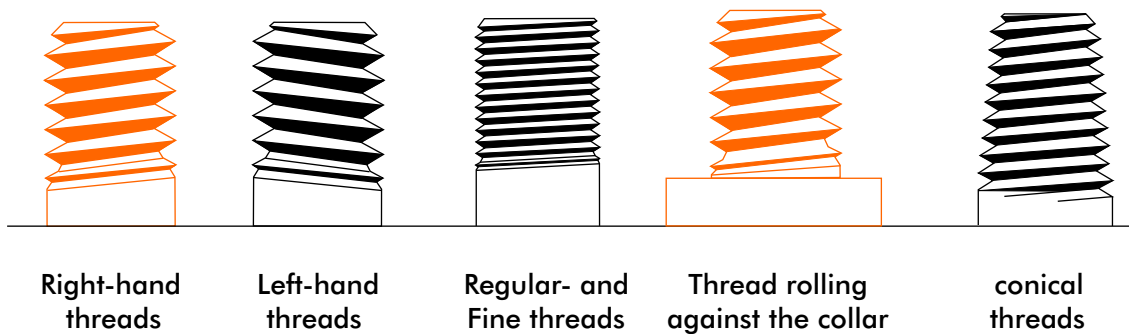
With our **thread cutting heads** one does cut threads on different materials, in various sizes and to an enormous good price all over the world for more than 100 years.

The **multi-cutter turning head** was developed for cutting precise diameters, and our **thread rolling attachment** is used in firms dealing with metal-machining for thread cutting, where besides speed and good value an enormous load bearing capacity of the threads is necessary. Apart from the tangential method, WAGNER® also offers **thread rolling heads** for the axial rolling of cold-moulded workpieces.

On the following pages you will find more information about its wide range of application.

Yours sincerely,





## The Flexible Tool System

The WAGNER® thread rolling head is an axial rolling precision tool for rolling threads true to size in high quality for enormous load bearing.

A rolling head size rolls threads in an unrivalled work field as well as the different types of threads.

The use of workpieces manufactured for the non-cutting metal forming process allows high rolling speeds. The size accuracy of the rolled threads is even with workpieces of more than 1000 N/m<sup>2</sup> guaranteed. Since the roll holders of the WAGNER®-rolling head support themselves in the closed cam ring. The holders take up the forces arising from cold forming.

### Workpieces

All cold-moulded workpieces can be rolled with the WAGNER®-thread rolling head.

The required strain of the workpiece depends on the forming size.

Workpieces up to 800N/mm<sup>2</sup> of tensile strength require

for pointy threads  $\delta_5$  at the minimum 7%

for trapezoid  $\delta_5$  at the minimum 12% of an ultimate strain.

To allow a profitable thread rolling, the strain has to be higher according to the tensile strength.

### Use

By using various roll holders and thread rolls, you can roll all kind of threads with different profile shapes right- and left handed.

Besides metal forming tasks such as knurling, flanging, flaring and smoothing can be performed.

Should you require these kinds of tasks, please don't hesitate to contact us!

### Thread rolling against the collar

By supporting the thread rolls in the roll holders, it is possible to perform rolling tasks very close to wide collar diameters.

In special cases it is even possible to considerably enlarge the collar diameter by grinding off the roll holders (maximally to the midst of the cap bearing bolt).

However, carbide nuts have to be used for the wheel bearing assembly.

Even special heads with pre-manufactured rolls are available.



## The Method

### The Thread Rolls

The rolling thread is the actual moulding tool. The rolling profile is worked in as a parallel peripheral chamfer.

Thus having the same flank lead, various thread diameters either left-hand or right-hand threads can be rolled with the same assembling.

Needle bearings or carbide nuts bear the threads. Carbide nuts prove as the more profitable choice when dealing with a thread length  $\leq 4d$ .

To tackle the numerous tasks, various types and qualities of rolls are at your disposal.

### The Roll Holders

They support the thread rolls and fit at the inside of the cam ring. They differ according to the range of diameters and the worked in lead angles of the thread to roll.

Few roll holder sets cover the whole work range of a thread rolling head.

It is very easy to replace the regular- and fine threads, trapezoid- and special threads as well as for right- hand as for left-hand threads.

### The Thread Rolling Head

It supports the roll holders, opens up after the thread rolling and can be positioned precisely according to the rolling diameter.

Constructing of the head is dedicatedly easy. It facilitates controlling of the energies of cold moulding.

The size accuracy and permanent operation of the rolled threads even with workpieces up to maximally 1700N/mm<sup>2</sup> of tensile strength is therefore guaranteed.

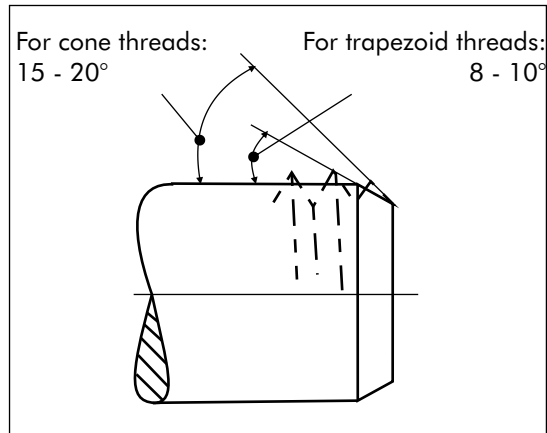
### The Shank

As connecting element to the machine, the shank isn't fitted with operational elements of the rolling head mechanism. Thus, it can be replaced very easily by thread connections. Various kinds of shanks for almost every tool fitting of the different kinds of machines are available.

Additionally, the shank serves as a die of a stop should it be needed.



WAGNER® Thread Rolling Head stationary



Chamfer on the premachined workpiece

## Non-Cutting Cold Forming Technology

The WAGNER® - thread rolling head is safely and easily to operate.

### Preparation of the workpiece

The necessary roll diameter approximately corresponds with the flange diameter of the thread. The exact premachining diameter can only be determined by testing. It has to be such that the external diameter of the thread with the appropriate flange diameter won't be rolled down, but just slightly rolled. The necessary precision while preparing it amounts to approximately 1/6 of the external diameter-tolerance of the thread.

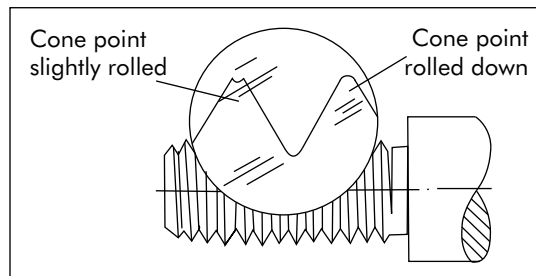
Modifications of the premachining diameter affecting the external diameter of the rolled thread by the amount 3 to 5.

### Chamfering

At the start of the thread, the workpiece has to be equipped with a phase for starting the thread rolls. The phase angular of cone threads should be 15 to 20°, of trapezoid threads 8 to 10°. The diameter at the beginning of the phase should be smaller than the thread core diameter.

### Rolling speed

The rolling speed shouldn't be less than 30 m/min. From experience the best results may be achieved at 50 - 80 m/min. Due to this high speeds, thread rolling is a very profitable manufacturing method.

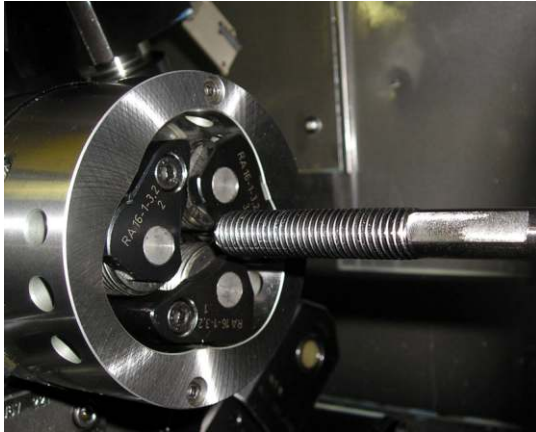


### Cooling - Lubrication

Ample supply of the coolant-lubricant is needed. Emulsions with the proportions 1:10 - 1:20 and low viscosity oils used for chip-removing work have proven to be worth. The filtering of the coolant lubricant is essential.

### Thread Run Out

Should you use regular rolls; the thread run out will be approximately 2.3 x flank lead. A clearance milled is not required.



Thread rolling with WAGNER® - RS 16



Rolling on pipes with WAGNER® RS 60-5

## Working with the Thread Rolling Head

### Power Requirement

The performance depends on the rolling speed, the workpiece, the profile shape and the coating of the thread. The power requirement can be established by using the following approximation formula:

$$N = C \cdot P \cdot \sigma_B \cdot v \cdot 0,000056 \text{ [kW]}$$

Pressing force =  $N \cdot 120$  [N]

C: for cone threads = 1,  
for trapezoid- and round threads = 2

P = thread lead in mm

$\sigma_B$  = tensile strength [N/mm<sup>2</sup>]

v = rolling speed [m/min.]

### Mode Of Operation- Rolling Process

#### Infeed

The infeed on the first 3 to 4 thread turns should be according to the lead.

During the further rolling process, the infeed speed should be adjusted without coercive infeed in accordance with the deformation behaviour of the workpiece and the speed level.

With positively controlled infeeds such as NC-machines, the workpiece elongation is to be calculated in the rate of the feed. It will be determined through testing.

### Opening of the head

At the thread end the rolling head will be opened and pulled back without direct contact.

### Tool Life Quantity

- Conditions for favourable and profitable tool life quantities:
- accurate compliance of the premachining tolerances
- compliance with the exact infeed speed
- equal, central chamfering
- central accuracy from the rolling head to the workpiece's shaft
- ample supply of the coolant
- rolling degree of the thread

### Service And Maintenance

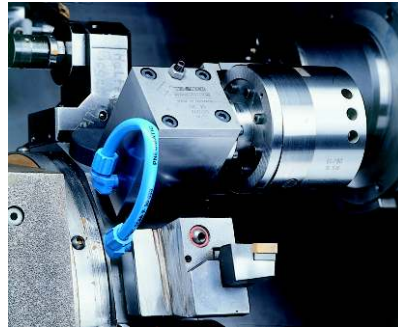
To assure the functional capability and- reliability of the thread rolling head, it is essential to maintain it properly. Thus, the head has to be cleaned and to be checked on possible abrasion in certain intervals depending on the operation conditions.

We recommend checking it for the first time after approximately 200, 000 threads.





WAGNER® Thread Rolling Head, stationary



WAGNER® - Closing device



WAGNER® Thread Rolling Head, rotary

## The Building Types Stationary And Rotary

### The building type stationary:

The WAGNER®- thread rolling head of the type stationary is manufactured for operating with rotary workpieces. This type is for instance used on a revolver of an automatic lathe of a turning lathe.

The opening at the end of the thread may be done via stop of the infeed of the machine or via limitation of the infeed via inner stop.

The closing process may be carried out either manually by the control or automatically by starting of a catch or a cam.

Additionally, we supply you with the fitting closing attachments for an automatic closing for regular CNC- turning lathes.

The closing impulse takes place before rolling during a regular turning- or drilling job.

Thus, cooling water is taken from a steep tool holder during its working cycle in order to supply the closing attachment with it. Due to changeable shanks, the rolling head is adaptable for all machine tool fittings.

On machining centres, the type stationary can be used even rotary.

Please do not hesitate to ask us, should you have any special needs.

### Type rotary:

The WAGNER®- thread rolling head of the type rotary is designed for stationary workpieces. It is used on a sleeve of a machining device or on a mandrel of a sliding carriage. Concerning operation, one does distinguish between RAR- and RR-types.

The opening of the thread end of the RAR-types is done by stopping the steering ring with the help of stops.

The rolling head is closed by moving the steering ring towards the front of the rolling head.

The RR-types will be opened via infeed stop of the head. They are closed by moving the steering ring towards the back of the rolling head. Afterwards, the head will be moved back into the operating position.





## The technical data of the thread rolling heads

### Types stationary and rotary

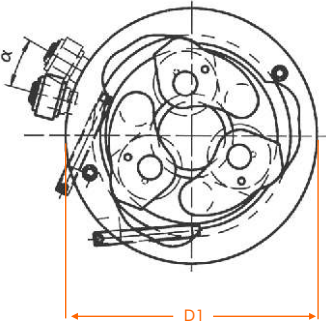
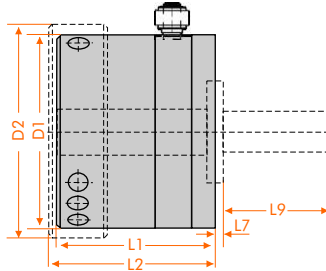
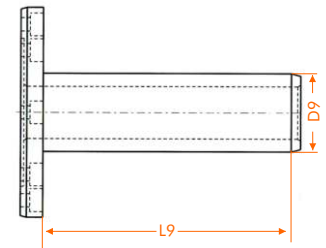
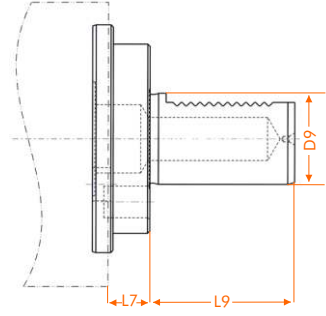
Type	Metric Regular thread mm	Metric Fine thread mm	Whitworth thread inch	Whitworth pipe thread inch		UNC- thread inch	UNF-UNEF- thread inch	NPT- thread inch	Trapezoid thread mm	Length of thread	
				G	R					Ø mm	max. length mm
RS 10 RAR 10-2	2.5 - 10	2.5 - 10	1/8 - 3/8	G 1/8	R 1/8	Nr. 5 - 40 3/8 - 20	Nr. 5 - 44 3/8 - 32	1/16 - 27 1/8 - 27	-		
RS 16 RAR 16-2	3 - 16	3 - 27	7/32 - 5/8	G 1/8 G 1/2	R 1/8 R 1/4	Nr. 8 - 32 3/8 - 11	Nr. 8 - 36 7/8 - 14 1 - 20	1/16 - 27 3/8 - 18	8 x 1.5 12 x 1.5	>16 - 22 >22 - 25	27 19
RS 16-VB RAR 16-VB	6 - 12	6 - 23	7/32 - 5/8 1/4 - 3/8	G 1/8 G 1/4	R 1/8 R 1/4	1/4 - 20 3/16 - 18 3/8 - 16	1/4 - 20 7/8 - 20	1/16 - 27 3/8 - 18	-	>16 - 22 >22 - 25	27 19
RS 22-2 RR 22-2	5 - 24	5 - 36	1/4 - 1/2	G 1/8 G 1	R 1/8 R 3/4	Nr.12 - 24 1 - 8	Nr.12 - 28 1 1/8 - 12	1/16 - 27 3/4 - 14	8 x 1.5 24 x 3	>27 - 32 >32 - 36	50 26
RS 27/56 RR 27/56	8 - 27	8 - 56	1/4 - 1	G 1/8 G 1 1/4	R 1/8 R 3/4	3/8 - 14 1 - 8	3/8 - 14 1 1/16 - 18	1/8 - 27 3/4 - 14	10 x 1.5 27 x 3	> 52	31
RS 42 RR 42	8 - 45	8 - 42	3/8 - 1 1/2	G 1/8 G 1 1/4	R 1/8 R 1 1/4	5/16 - 18 1 1/2 - 6	5/16 - 24 1 1/2 - 12 1 1/16 - 18	1/16 - 27 1 1/4 - 11.5	10 x 1.5 36 x 4		
RS 42/75 RR 42/75	45 - 52	42 - 75	-	G 1 1/2 G 2 1/2	R 1 1/2 R 2 1/2	1 1/16 - 6 2 3/8 - 20	1 1/13 - 6 2 3/4 - 10	-	-	>45 - 62 >62 - 75	86 49
RS 42/S RR 42/S	12 - 52	12 - 62	1/2 - 1 1/2	G 1/4 G 2	R 1/4 R 2	1/2 - 16 2 3/8 - 20	7/16 - 18 2 1/4 - 18	-	12 x 2 36 x 6 62 x 4	>45 - 62 >62 - 75	86 49
RS 60-5 -	-	32 - 60	-	G 1 G 2	R 1 R 1 1/4	-	-	-	-		

- ▲ Due to replaceable cam rings and roll holder sets, the rolling heads RS 42 and RR 42 are expandable. In addition, they are adaptable to the various working ranges. Three different cam rings and roll holder types are at your disposal:  
 RA 42 for thread diameters 8 - 45 mm  
 RA 42/75 for thread diameters 45 - 75 mm  
 and RA 42/S for thread core diameters 9 - 60 mm for hardly mouldable workpieces and/ or very high gradients. For RS- and RR- rolling heads, cam rings and roll holders are identical!

■ Including the thread outlet. Please note the possible restriction caused by the shank.

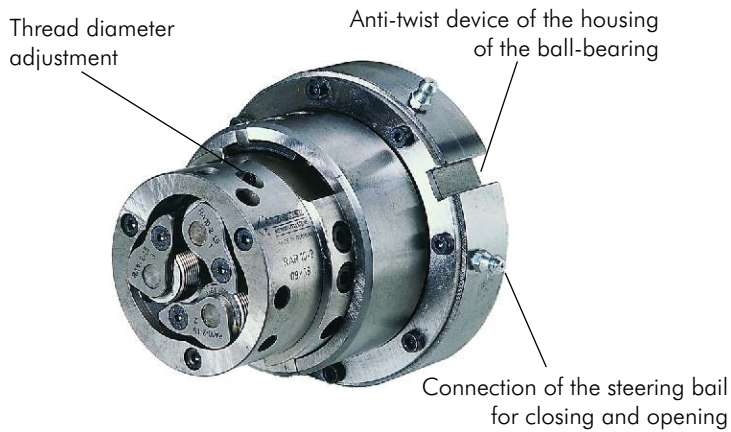
- With the RS 42 up to Ø 45 no limitation by the rolling head  
 With the RR 42 up to Ø 50 no limitation by the rolling head

# Manufacturing Sizes Type Stationary

		Rolling Head					Shank <sup>▲</sup>				
		Type	D1 mm	D2 mm	L1 mm	L2 mm	Weight kg	D9 mm/ inch	L7 mm	L9 mm	
	RS 10							20	1.4	42	
			66		55		1.2	3/4"	1.4	42	
									NC 20	12.8	40
	RS 16								NC 30	18.5	55
									20	0.9	42
									25	0.9	48
									3/4"	0.9	42
			88		72		2.7	1"	0.9	48	
									NC 20	13.4	40
									NC 30	16.7	55
	RS 16-VB							NC 40	16.7	63	
									25	0.2	48
									32	0.2	50
		88		91		5.0	1 1/4"	0.2	48		
									1"	0.2	48
									NC 30	16.2	55
									NC 40	16.2	63
 <p>cylindric shank</p>	RS 22-2							NC 50	16.2	78	
			125		120		10.5	30	1.8	80	
									32	1.8	80
	RS 27/56								40	1.8	80
									50	1.8	120
									NC 30	17.8	55
									NC 40	17.8	63
									NC 50	17.8	78
			150		109		11.0	30	1.8	80	
									32	1.8	80
 <p>NC-shank</p>	RS 42							40	1	120	
			190		154.5		28.0	50	1	120	
									60	1	120
	RS 42/75		190	200		162.5	29.5	3"	1	120	
									NC 40	17	63
	RS 42/S		190	220		165	31.5	NC 50	17	80	
	RS 60-5								40	1	120
									50	1	120
			192		131		28.0	60	1	120	
									3"	1	120
								NC 40	17.8	63	
								NC 50	17.8	80	

▲ For machines with integrated closing attachment we supply the shanks on request.  
 ■ With roll holders and rolls

NC = shank according to DIN 69 880.



WAGNER® - Thread Rolls

## Type Rotary

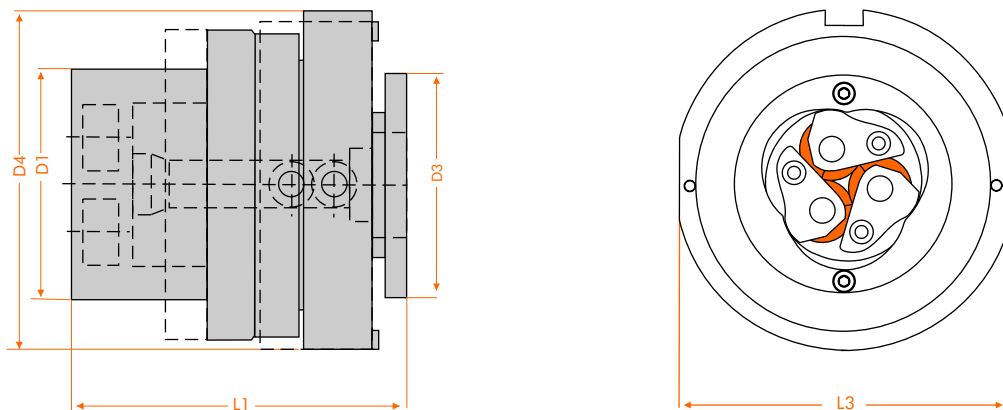
The following table provides you with the manufacturing sizes for the drawings on page 9. The weight indications always relate on the thread rolling head including rolls and roll holders.

Type	D1 mm	D2 mm	D3 mm	D4 mm	L1 mm	L2 mm	L3 mm	Weight kg ▲
RAR 10-2 ■	66		75	106	109.5		108	3.4
RAR 16-2 ■	88		85	134	126		130	5.7
RAR 16-VB	88		85	134	127		130	6.0
RR 22-2	125		125 ▲	184	180		180	18.9
RR 27/56	150			162	175		165	14.5
RR 42	190		105 ●	240	217.5		238	45.0
RR 42/75	190	200	105 ●	240		225.5	238	46.5
RR 42/S	190	220	105 ●	240		228	238	48.5
RR 60-5	192					210	238	

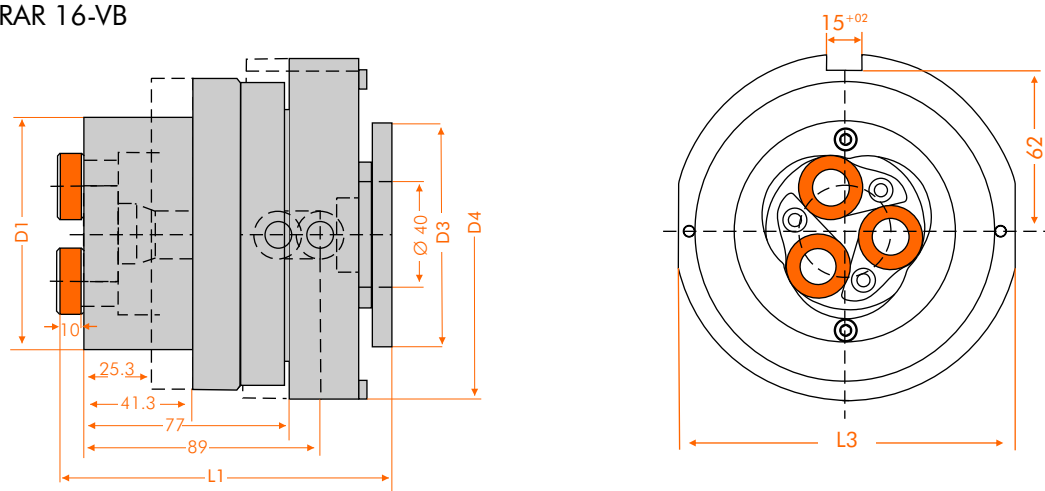
- ▲ With roll holders and rolls
- Smallest possible diameter, support as per operator's selection.
- Normal size including ball bearing self-locking collar.

# Construction Drawings Of The Type Rotary

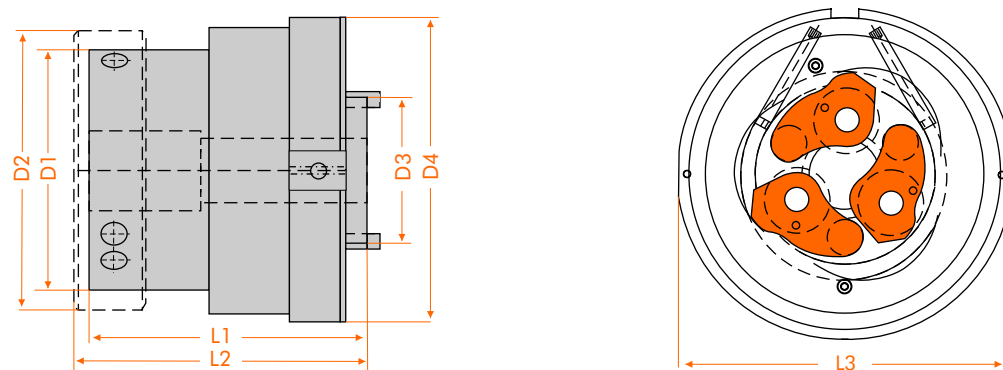
For thread rolling heads of the types  
 RAR 10-2 | RAR 16-2 | RR 22-2 | RR 27/56

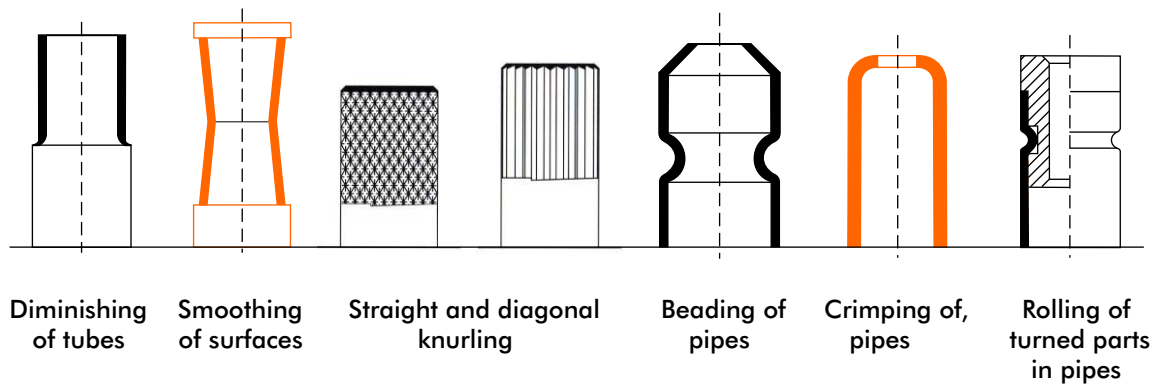


For thread rolling heads of the type  
 RAR 16-VB



For thread rolling heads of the types  
 RR 42 | RR 42-75 | RR 42-S





## The Operation Range

### Manufacturing task:

Right- and left-hand threads:	Thread rolling heads for a broad working range. Only the roll holders have to be replaced, when using the <b>same</b> rolling head. The rolls can be used for right- and left-hand threads.
Standard and fine threads:	Thread rolling heads for a broad working range. Only the roll holders have to be replaced, when using the same rolling head.
Rolling against the collar:	Thread rolling heads with <b>pre-machined</b> rolls up to a collar of optional size. The range of the collar diameter of the standard-rolling heads may be expanded by modifying the roll holders.
Rolling tapered threads:	Thread rolling heads based on the width of the rolls.
Diminishing of tubes:	Thread rolling heads axial without limitation of length.
Smoothing of surfaces and transition points, straight & diagonal knurling:	Thread rolling heads axial without limitation of length, or plunge cutting process based on the width of the rolls.
Beading of pipes, taper forming, rolling of turned parts in pipes:	Thread rolling heads in the plunge cutting process
Flanging, crimping of pipes:	Thread rolling heads (rotary or stationary)



Thread M 12



Thread M 10 x 1

## Examples Of Production- And Performance (1)

Workpiece:	1	3
Thread:	M 12	M 10 x 1
Tolerance:	6 g	6 g
Length of thread:	58 mm	27 mm
Material:	C 45	31 CrMo V9V (1000 - 1150 N/ mm <sup>2</sup> )
Rolling head:	RS 16	RS 16
Roll holder:	RA 16 - 2 - 3.5	RA 16 - 1 - 2.0
Rolls:	R 25 M 1.75	R 25 M 1.0
Roll bearing:	HM-socket	HM-socket
Rolling speed:	50 m/ min	47 m/ min
Rolling time:	1.53 sec	1.08 sec
Coolant:	Emulsion	Oil
Roll tool life quantity:	25,000 pieces	5,000 pieces
Type of machine:	CNC-long automatic lathe	CNC-automatic lathe
Manufacturer:	Traub	Miyano
Type:	TNL 32	BNE 51
Location of the mandrel/ bearer of workpiece:	Revolver	Revolver
Driving power:		
Tension of workpiece:	3.67 KW Chuck/ guide bushing	3.02 KW Chuck



Thread M 16 x 1.5 LH

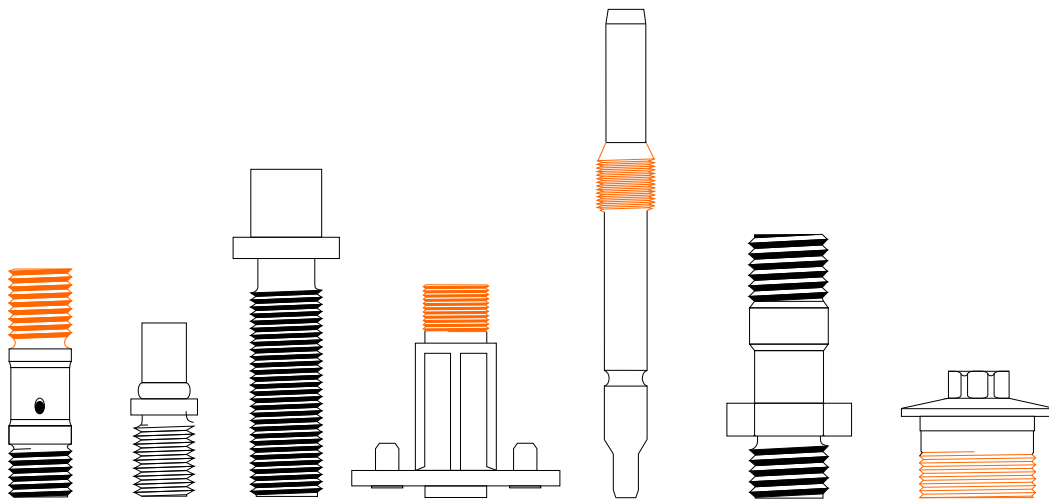


Thread Tr 16 x 4

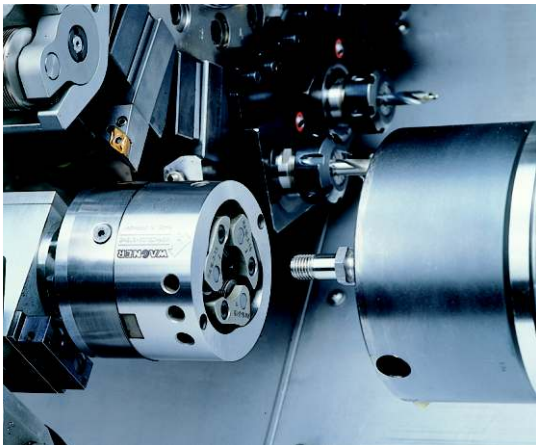
## Examples Of Production And Performance (2)

Workpiece:	2	4
Thread:	M 16 x 1.5 LH	Tr 16 x 4
Tolerance:	6 g	7 e
Length of thread:	16 mm	70 mm
Material:	41 Cr 4 (1150 N/ mm <sup>2</sup> )	X 20 Cr 13
Rolling head:	RS 22-2	RS 27/56
Roll holders:	RA 22-1L-2.0	RA 27/56-1-5.5-22
Rolls:	R 27 M 1.5	R 27-22 Tr 4
Roll bearing:	HM-socket	Bearing needles
Rolling speed:	40 m/ min	45 m/ min
Rolling time:	1.2 sec.	1.16 sec.
Coolant:	Oil	Emulsion
Roll tool life quantity:	16,000 pieces	8,000 pieces
Type of machine:	Special purpose machine	CNC-automatic lathe
Manufacturer:	Retco	Gildemeister
Type:	-	TWIN
Location of mandrel/ bearer of workpiece:	Mandrel device with HSK-support	Revolver
Driving power:	3.86 KW	16 KW
Tension of workpiece:	Special tension (clamp jaws)	Chuck

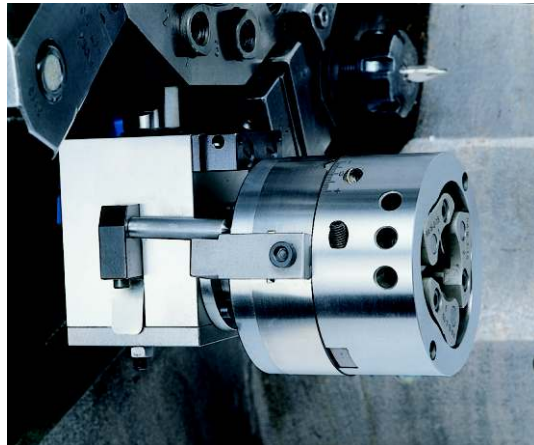




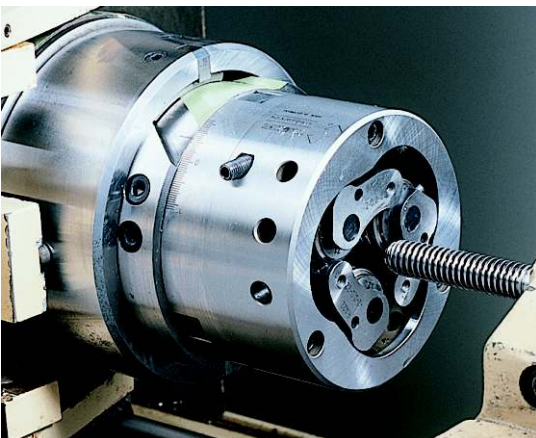
## Machine Control And Mounting



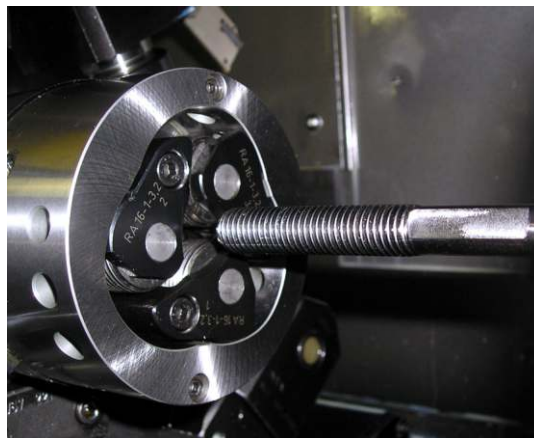
Thread rolling head RS 16



Thread rolling head RS 16 with closing device on a CNC turning lathe



Thread rolling head rotary RR 22-2 on a thread rolling machine



Thread rolling head stationary RS 16: rolling on opposed spindle

# Comparison

## Thread Cutting = chip-removing

### Strength:

lower, as the fibre motion of the workpiece will be interrupted.

Notch effect in the groove of the thread.

### Manufacturing time:

Cutting time: 3 - 40 m/min.

Deep thread profiles have to be cut in several steps.

Higher primary processing times, but shorter set-up time because of tool default.

### Preparation of the moulding blank:

The initial diameter can be of the same size as the external diameter of the thread.

It may also be bigger since an excessive amount can be removed.

The moulding blank need not be chamfered.

### Subsequent machining:

A cut thread can be finished off at anytime.

### Finishing quality of the thread flank:

dependant on the workpiece and the cutting conditions. The rougher the surface the more likely is it to corrode.

### Tool costs:

very low as the chasers can be reground.

### Material:

Non cold-moulded workpieces such as cast iron, annealed cast iron and gun-metal can be cut.

## Thread Rolling = non-cutting

### Strength:

higher, because of strain hardening of the workpiece. Fibre motion of the workpiece won't be destroyed resulting thereof is a higher static and dynamic tensile strength.

### Manufacturing time:

Rolling time: 30 - 100 m/min.

The thread will be rolled in just one step.

Very short primary processing times, higher set-up times when setting the tools.

### Preparation of the moulding blank:

The initial diameter has to be prepared in tight measurements. The processing diameter approximately complies with the effective diameter.

The exact diameter can be obtained through testing. You will need a chamfer with a chamfer angle of 12-30°.

### Subsequent machining:

Subsequent machining is hardly possible owing to the workpiece's hardening of rolled threads.

### Finishing quality of the thread flank:

very high since it is burnished.

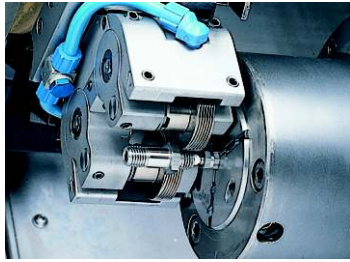
Very low falling gradient.

### Tool costs:

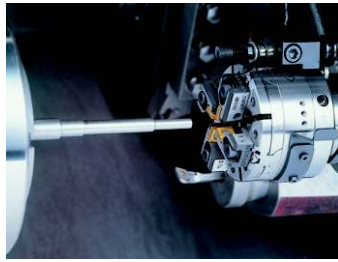
high cost-effectiveness with large-volume because of the very high tool service life.

### Material:

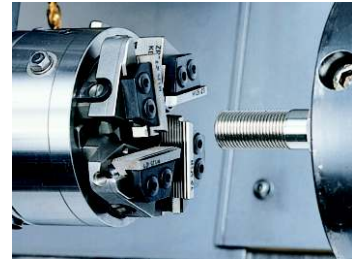
All cold-moulded workpieces owing to the non-cutting moulding can be rolled. Easy to process for long-chipping workpieces.



**Thread Rolling Attachment**



**Multi-Cutter Turning Head**



**Thread Cutting Head**

## **WAGNER® - Tool System**

### **Fulfil All Your Wishes When Dealing With Metal-Machining!**

WAGNER®-thread rolling attachments are used for rolling threads behind a collar, short threads. Besides for threads with short outlets which have to be rolled up to a collar.

Various installation sizes and adapter allow their running on different machines. The patented WAGNER®- Multi-Cutter Turning Head facilitates thread cutting fast and very exact. Four reversing plates, wide diameter range, central fitting as well as lifting of the cutting edges when reversing are just some of the excellent features of the MSD.

Our reliable thread cutting heads cut external threads quickly and with clearance. There is a multitude of installation sizes including graded cutting ranges. High chipping performance and short cutting times guarantee full use of the power of modern machines.



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