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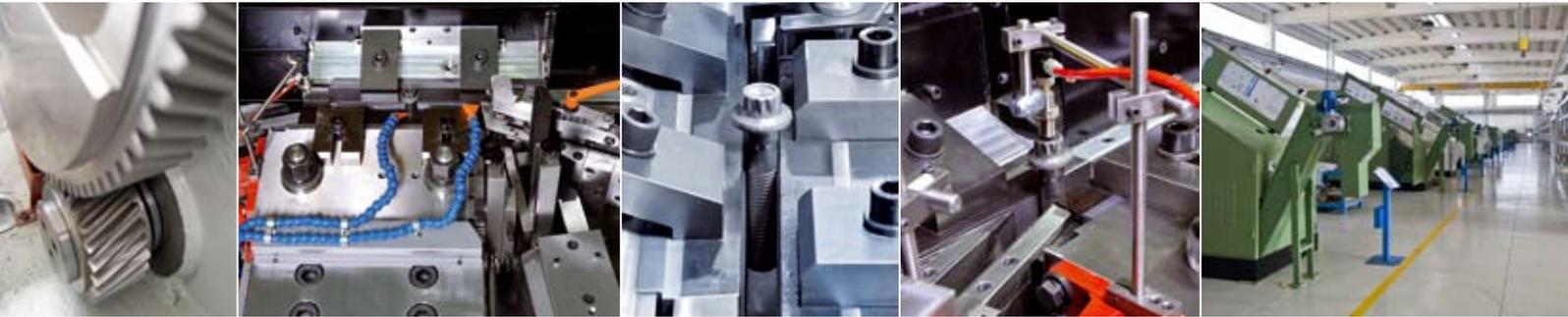
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Ingramatic

SACMA GROUP



the WINNING TECHNOLOGIES®



INGRAMATIC is a company with many years of experience in the production of machines for the thread rolling of screws and bolts. It started business in 1966 and has since then produced and distributed over 3000 thread rolling machines worldwide becoming a market leader not only in Italy but around the World.

INGRAMATIC has been part of the SACMA Group since 2004 creating a unique technical, productive and commercial alliance.

The **INGRAMATIC Thread Rollers** and products complement the SACMA production range and can be used along with progressive headers for the thread rolling of high-strength screws, bolts and special fasteners.

In 2006, a new 20.000 m² plant was built in Castelnuovo Scrivia. This new facility marked a turning point in terms of logistics, organization and efficiency towards meeting new goals and markets.

All the mechanical components for the threaders are manufactured at the SACMA plants in Limbiate and Vimercate, home to OBM, another company within the group. The assembly, testing, warehouse and technical departments are all completed at the Castelnuovo Scrivia plant.

Offering a wide range of thread rolling machines suitable for small or large components for the automotive, building and general industries, **INGRAMATIC** products represent unrivalled **reliability, productivity, safety and innovation**.

INGRAMATIC does not just manufacture machines, it offers complete production systems. **INGRAMATIC** has used its experience to expand the standard machine versatility with washer assembly units, pointing units, with special customized versions available upon request. To complete the system, automatic feeders for blanks and washers, load monitoring and rejection control devices are also available. Due to the modular design of the machine these additional units are easily integrated with Ingramatic thread rolling machines.



ULTRA
PRECISION



SPECIAL GUIDES
WITH INSERTS



SPEED
ADJUSTMENT



WASHER
ASSEMBLY



MAIN FRAME



SINGLE
STARTER



SC-MATIC



WASHER AND BLANK
PORTER UNIT



MODULAR
SYSTEM



DOUBLE
STARTER



MOTORIZATION



TYPE P THREAD
ROLLING
MACHINES



VIBRATORY
FEEDER



FIXED
DIE HOLDER



LOAD CONTROL
SYSTEM



POINTING UNIT



VERTICAL
FEEDER



SLIDE
WITH HYDROSTATIC
GUIDES



DISCHARGING GUIDES
WITH PARTS REJECTION



THREAD
ROLLING CENTRE



MOTORIZED
GUIDES



ELECTRONIC
HANDWHEEL



ERGONOMICS
AND SAFETY



TOOL DESIGN

Products in today's markets require very precise and repeatable threaders that can only be manufactured with **ultra precise** machining of the components.

Only the highest quality of the materials, design and manufacturing can provide highly efficient and reliable threaders.



To take advantage of the most innovative manufacturing technology and advanced machine tools available, all **INGRAMATIC** mechanical components are machined within the **SACMA Group** plants. This not only provides **ultra precise** machining of the components but also gives **INGRAMATIC** total quality control over its products.

A systematic, stringent final inspection of all parts prior to delivery and inventory ensures the best **guarantee of conformity and interchangeability**.

The choice of **high strength materials** combined with the use of sophisticated heat treatments and extreme precision of surface grinding and lapping finishes make **INGRAMATIC thread rolling machines fast and reliable with the lowest operating costs**.

Like any machine tool, the design, material and manufacturing of the main frame is critical to the overall **precision and reliability** of a thread rolling machine.

A reliable main frame is created from years of experience and research using extremely sophisticated simulation systems and experimental deformation analysis.



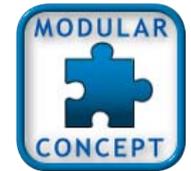
INGRAMATIC frames are made of **electrowelded steel** that has undergone **thermal stress relieving** before machining. For machines up to the RP32, the frame is a cast monoblock made from **pearlitic spheroidal cast iron** that guarantees good damping of the vibrations generated by the high production speeds.

The frame is fixed to **a platform that supports it and serves as a collection tank for the coolant**. From a structural point of view, it results in an extremely **rigid** system with optimum management of technical fluids without the risk of contamination into the work environment.

The **new design frame is optimized by using FEM software** to identify and counter the stresses caused by thread rolling of heat treated parts and special profiles.

The **concept of modularity** in the design and construction of machines has significant advantages for the users.

It facilitates system **customization** based on customer needs and requirements, while providing the most efficient method of parts inventory and assembly. Even retrofitting of existing systems becomes much simpler.



In collaboration with SACMA, **INGRAMATIC** is the only threader manufacturer that builds its machines using the **modular system** concept, assuring all **INGRAMATIC machine parts always available in the warehouse.**

The thread rolling machines have been designed to incorporate accessories including:

- **single washer assembly units;**
- **double washer assembly units;**
- **pointing units;**
- **feeding systems** for stud bolts and special headless screws;
- **knurling devices** for special works on the screw shank or head.

The blank feeding system is a very important part of the thread rolling machine and therefore must be perfectly integrated with the rest of the machine.

System efficiency depends on the feeding system functionality which must guarantee a constant flow properly positioned parts.



INGRAMATIC machines have been designed to receive different types of feeding systems.

Small-sized thread rolling machines, up to series 3, normally used for manufacturing screws, are equipped with a **vibratory feeder**. Vibratory feeders with digital vision systems are available for special parts that require highly complex selection with maximum flexibility.

A vibratory feeder or a vertical feeding system are available on the medium-large thread rolling machines.

During the initial design stage, the **INGRAMATIC** technical department performs a preliminary study to define the best feeding solution for the customer.

To assure efficient production, thread rolling machines must be equipped with feeding units specifically designed for the type of part to be threaded.

The **vertical feeding** system is available for heavy-duty screws, bolts and special parts with various lengths or for the large thread rolling machines with high loading heights.



The **INGRAMATIC vertical feeder** consists of:

- a **controlled vibration loading hopper** that always supplies the correct quantity of parts to the vertical lifting device without overloading the container;
- a **vertical lifting device with flights** (working width 1200 mm) with speed control;
- a **rotating roller unit with linear vibration** for selection and positioning of parts before their introduction into the feed guides.

This system guarantees **perfect alignment** with the thread rolling machine guides as it has **motorized height adjustment** to match the threader feed guides.

The feed guides receive the blanks from the feeder and transfer them, **perfectly aligned and correctly positioned**, to the feed unit and then to the roll tooling.

This type of component must be easy to adjust, stable and resistant to wear and tear.



The **INGRAMATIC** guides are made of **special hardened steel** in the feed area to guarantee improved durability and life.

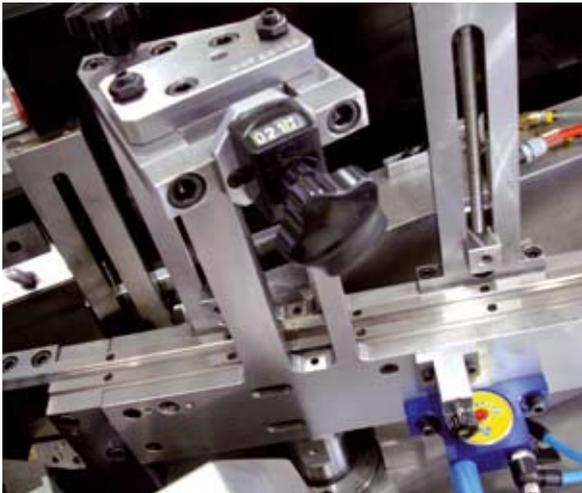
The guides are connected to each other at the top and with their **large height adjustment range**, they can also load very long parts easily.

Height adjustment of the guides is motorized with the option of memorizing the height position for the part that can be quickly repeated when needed.

Motorization can also be used to **automatically** align the guides with the vibratory feeder. On larger machines, the width opening of the motorized **guides can also be regulated using presetting**.

The **feed guides** are components that are subject to wear especially when feeding hardened, heat-treated parts or using guide profiles with reduced contact surfaces for special shaped parts feeding.

For this type of application, guides must be made of **special steel** and they must be designed to simplify maintenance work.



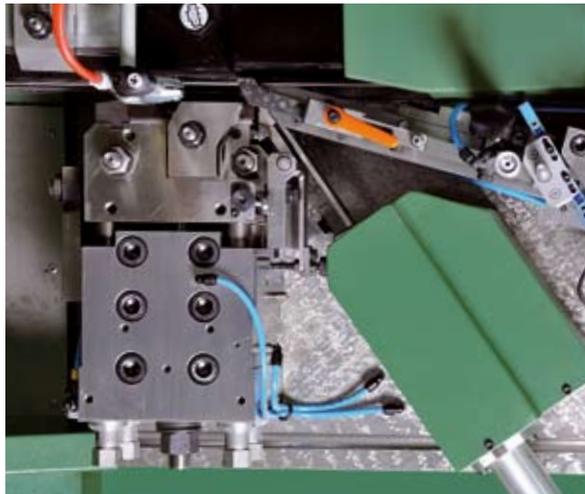
To solve this problem, **INGRAMATIC** manufactures special guides with high speed steel inserts (M2) hardened to a high level of hardness increasing the **resistance to wear** caused by feeding.

This solution is particularly suitable for **high-strength bolts**, screws and **special parts** like wheel bolts with conical underheads.

Another advantage of the guide inserts is the ability to **replace worn** inserts quickly and easily, without having to change the guides.

The starter device that inserts the part into the threading dies is very important to achieve excellent machine **efficiency and productivity**.

An important requirement for users is **easy set up and adjustment** of this device which must be **perfectly synchronized** with slide movement.



On machines up to size 4 **INGRAMATIC** uses a **single starter** system which is very straightforward and efficient for light, relatively short parts. The starter blade is operated by a kinematic chain driven by the main shaft.

The system has a **pneumatic cylinder** that allows the starter to **move backwards** when operating, preventing damage if a part is inserted incorrectly.

A **stop plate** separates the blanks that descend from the guides. This ensures that the blanks are positioned correctly before the starter blade places them between the dies, avoiding the risk of double introduction.

The introduction system for larger parts requires special measures to guarantee **constant** product **quality** even at **high speed**.

The wide product range that undergo thread rolling requires a **versatile, efficient** introduction system.



INGRAMATIC has developed an exclusive **double starter** device to transfer the parts from the guides to the dies in three different phases: separation, transfer and introduction.

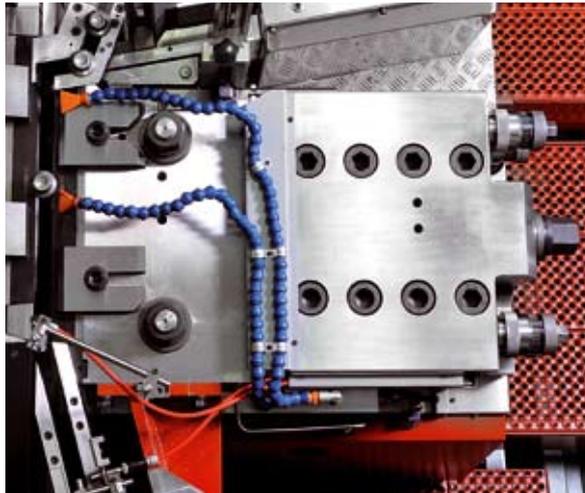
Each phase has its own unique mechanism:

- the **separator** guarantees that only one part passes at a time for each insertion;
- the **first starter** moves the part into the work area and places it in front of the moving die;
- the **second starter** is timed with the slide to place the part at an exact right angle to the dies.

The double introduction system is available on **INGRAMATIC** thread rolling machines from size 5 upwards.

The **stability** of the fixed die holder block is crucial to guarantee the dimensional tolerances of the parts during production.

This important feature must also be able to perform necessary adjustments with **high repeatability** when setting up the tools.



On its medium-large machines, **INGRAMATIC** has adopted **double hydraulic clamping**, both vertical and horizontal, of the die holder block. This applies the correct clamping force and is extremely user-friendly and practical to use.

The following adjustments can be made on the die holder block:

- **height** adjustment by way of a tapered gib on the lower support surface;
- **distance** and angular **adjustment** of the rear support surface by way of four graduated adjusting screws on the operator side.

The frame in the die holder block fastening area is strengthened with reinforcing **ribs** that guarantee the necessary stiffness.

In the **automotive sector** and industry in general, there is increasing demand for screws and fasteners that are threaded after hardening and tempering to improve **threading precision** and **fatigue resistance** of the components.

The **high rolling stresses** these parts create require specially designed threaders and options.



From size 5 upwards, **INGRAMATIC** uses a **hydrostatic guide system** that features a high **load-carrying capacity** with **significant damping**.

The **pressurized lubricant** is sent by a **distributor** to the **special bronze guides** fixed to the main frame. Due to the hydrostatic pockets in the guides, a layer of oil is formed that **evenly** distributes the **work load** and **absorbs any impact** created when the part is placed between the dies.

The **slide, made of high-strength light alloy**, with **hardened steel plates** in the feed areas and moving die housing, reduces the weight of the alternating masses and delivers high production speed.

A **closed circuit** recirculates the guide lubricant after it has been **cooled and filtered**. This assures that coolant is not contaminated, extending the coolant life and providing **lower operational costs**.

When setting up a thread rolling machine it is very important to be able to check the **introduction unit operation and correct thread rolling**.

Operators need an instrument **easy to use**, that allows them to work in conditions of maximum **safety** and avoid any possibility of damaging tools or the machine.



INGRAMATIC equips its thread rolling machines with an **electronic handwheel** that allows several easily performed set up operations:

- the slide can be **moved and controlled** at very low speed without the use of the brake-clutch unit, eliminating unnecessary wear and extending the life of the unit;
- checking the **die match** can be carried out very easily by making the part complete a half-turn and then reversing the slide, returning the blank to the starting position;
- visual inspection of the blank introduction at a controlled speed allows the movement to be analyzed and the **rotation can be reversed** at any point in the slide travel;
- thread rolling product at a reduced speed allows **the complete operating cycle to be viewed and verified** before starting continuous production.

In today's production environment of short batch runs and frequent changeovers, the operators have to handle an increasingly large amount of data for machine setups that must be completed quickly.



The **touch screen** control panel installed on **INGRAMATIC** machines allows to control the machine and its accessories simply and intuitively. The system provides information on **production**, preventive and routine **maintenance** and **continuous diagnosis** of the thread rolling machine operation.

The **SC-MATIC** system can store **a large number of product codes**. There is an **Ethernet port for data transfer** and a **modem** for activating on-line customer support.

The **SC-MATIC** software has been developed by **SACMA** on a Siemens platform with the Windows-CE operating system to make **the operation** of the thread rolling machines simpler and user-friendly.

For **high quality production**, the advantages and contributions from a load monitoring system on modern thread rolling machines is of fundamental importance.

As well as protecting the tools and moving parts of the thread rolling machine, load monitoring system also provides effective checking of the dimensional compliance of the parts being threaded.



The **SC600** device has been developed by SACMA to control thread rolling stresses and is also available on all **INGRAMATIC** machines.

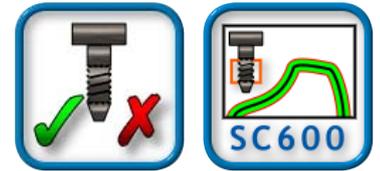
The system provides several **points of strain sensors application**, which results are shown on the display integrated in the machine control panel. The control system is either **absolute** (pre-calibrated sensors) or **relative** (self-calibration while operating).

Each machine can also be equipped for the installation of **other load control systems** according to customer requirements.

The detected stress signal can also be used to activate the NC parts **rejecting device**.

The industry's need of defect-free products requires machine features that provide final control of the products to **assure high quality** and **eliminate defective products**.

Controlling the parts movement is also crucial for reducing the damage on finished parts from hitting the machine components or each other during discharge.



INGRAMATIC has invented and developed a **patented system of finished parts discharge guides** combined with a **part rejection device**.

A fault detected by the load control system activates the **reject flap** and **separates** the defective rolled parts from the conformed parts.

At the tool exit, the correct parts are transferred to the **discharge guides** which **reduce the discharge** speed ensuring that impact damage with the conveyor belt and the correctly rolled parts is significantly reduced.

Modern machine tools must be designed to guarantee the **best working conditions** for operators with focus on their **safety** and protection of the **environment**.

On thread rolling machines, the cabin provides **sound-proofing** (noise level below 80dB) and **protection** for the operator from the moving parts.



INGRAMATIC thread rolling machine cabins are designed with **features that help:**

- **the operators**, by wide stairs and platforms, a well designed control panel mounted on a rotating support, convenient access doors hatches and efficient lighting within the work area;
- **the maintenance technicians**, by panels that are easily removed for accessing the mechanical parts and service systems.

The platform, that the machine frame is fixed on, also contains the **technical fluids** preventing accidental spillage and seepage into the work environment.

The increasing demand from the industry for screws with **preassembled washers** has led machine manufacturers to offer special **automatic assembly devices**.

These devices insert **one or two washers** onto the blank before threading so that they become integral with the screw.



INGRAMATIC equips its machines with **assembly units for one or two washers** which are compact in size and extremely **flexible**.

Without compromising thread rolling machine reliability and productivity, these devices can be used to assemble **different types of washers** (flat, chamfered, conical, waved, toothed, split, etc.) with a wide range of blank diameters and lengths.

The **SC-MATIC software** allows the PLC to control washer assembly unit operating **easily and intuitively**. The sensor control system ensures that all the screws sent to the thread rolling machine have washers and ensures that those without washers continue circulating until they are properly assembled.

For **small screws**, produced at **high speed**, a special unit is used where cam-operated levers exert pressure on the screw head to counter the effect of the centrifugal force.

The value of an automatic production system is measured by its **operating autonomy**, i.e. the operating time without operator intervention.

High production efficiency can be achieved in this way which is a pre-requisite for **system profitability**.



INGRAMATIC thread rolling machines can be equipped with the **Porter**, a transport unit for automatic loading of washers and blanks into the respective feed vibrators.

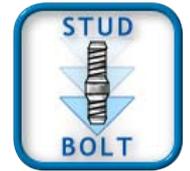
The Porter consists of a vibrating **hopper** and a **lifting system** with a fixed column and moving pot. The hopper loads the parts into the pot which lifts on request and transfer the parts into the vibratory bowl feeder.

The loading unit is controlled by the machine PLC which permits to load according to the level of parts in the vibratory bowl feeder and signals to the operator when the hopper needs to be reloaded.



The thread rolling of **stud bolts** and headless parts on flat die threading machines is extremely advantageous as far as **quality** and **productivity** are concerned.

To obtain this result, a **reliable** feed system that has been tried and tested is necessary.



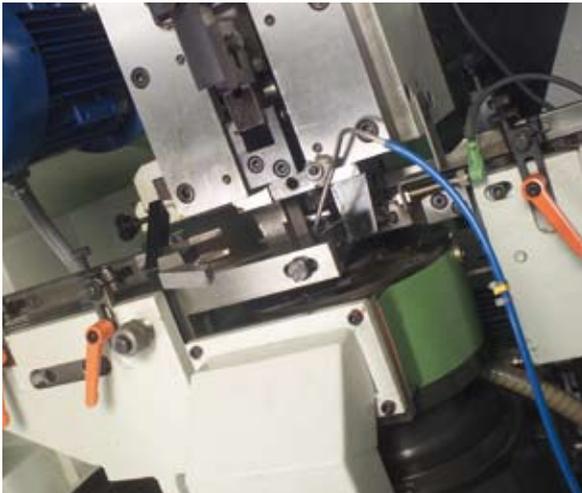
INGRAMATIC can supply **P versions** of the entire machine range from size 1 to size 7. The parts for thread rolling are placed in-line with the pusher via a **tube**. A pneumatic separating device ensures the correct feeding of parts in the work area.

There are two **possible solutions** for feeding correctly positioned parts.

The thread rolling machine is directly **connected to the progressive header** by the connection tube. The formed part is sent from the last station directly to the thread rolling machine.

The second solution involves a feeding system with a **vibrator bowl feeder or elevator** depending on the part length, and an orientation system which is either mechanical or uses a **digital camera**.

Many screws or bolts require a **chamfer** or a **point shape** before thread rolling. There are many different types of points that can be made easily and at low cost by **cutting** rather than using complex, higher cost forming tooling.



The **INGRAMATIC** pointing unit spindle is mounted on a **motorized slide** so that it can easily be set to the correct position for the different lengths of blanks. This position can be **memorized** to speed up set up times.

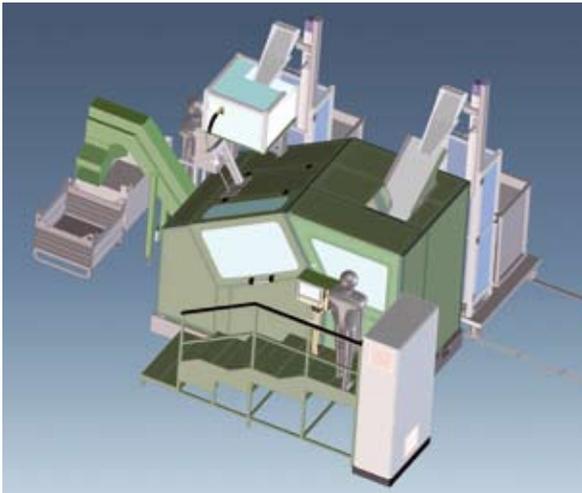
The blank is first placed between **two fingers** which clamp the part and lower it to the pointing tools, where the point is cut.

The **scraps** are ejected with the coolant and collected in a special container where the **liquid is filtered and recirculated**.

According to customer preferences, the pointing unit can be a **standalone machine** or a **work unit integrated with the thread rolling machine** to point the parts before thread rolling using the same assembly unit.

Since **flexible production** has become vitally important for penetrating **new markets**, machines must be customized according to the customer requirements and strategies.

Using machine **design** on **CAD 3D** work stations, **customized solutions** can be developed extremely quickly with a high level of precision.



Based on its standard machines, **INGRAMATIC** offers solutions that can meet the **most complex requirements**.

For example, both screws and stud bolts can be produced by applying **different feed systems** to the same machine.

Some customers want to dedicate the machine for **only one type of product** at high speed cutting down on machine shut-down time. To meet this need, we offer solutions with continuous and automatic loading of blanks.

Special attention is paid to the **feed parts** of the machine (HSS guides, control sensors, discharge guides, conveyors, etc.) which must guarantee maximum reliability and durability.

The changing world of thread rolling encourages designers and technicians to develop **increasingly complex products** using the cutting-edge technology available.

When planning new investments, it is very important to be able to count on a **reliable partner who is skilled** in designing and developing equipment that can satisfy special requests.



INGRAMATIC's consolidated experience in thread rolling and search for technological solutions in close collaboration with customers make it an ideal partner at this critical stage who will help to **accelerate project development times**.

A **team of engineers**, using highly innovative simulation and design software, works together with customers to identify the **best product manufacturing solutions**.

By collaborating with leading companies in the field, **INGRAMATIC** can also offer **efficient "turnkey" production systems**.



THREAD ROLLING MACHINES		RP12	RP22	RP22-R1	RP22-R2	RP22-P	RP32	RP32-R1	RP32-R2	RP32-P	RP42	RP42-R1	RP42-R2	RP42-P	RP52	RP52-R1	RP52-R2	RP52-P	RP62	RP62-R1	RP62-R2	RP62-P	RP72	RP72-R1	RP72-P	RP82	RP92
EU DIES																											
Fixed die length	mm	85	115	115	115	115	130		130	130	150	150	150	150	190	190	190	190	230	230	230	230	280	280	280	381	483
Moving die length	mm	95	130	130	130	130	150	150	150	150	170	170	170	170	210	210	210	210	255	255	255	255	305	305	305	406	508
Die thickness	mm	25	30	30	30	30	30	30	30	30	35	35	35	35	43	43	43	43	50	50	50	50	50	50	50	57	62
Die height	mm	62	80	80	80	80	80	80	80	80	100	100	100	100	125	125	125	125	132,5	132,5	132,5	132,5	152,5	152,5	152,5	175	175
US DIES		W1015	W10	W10	W10	W10	-	-	-	-	W20	W20	W20	W20	W30	W30	W30	W30	W40	W40	W40	W40	W50	W50	W50	W60	W70
Fixed die length	mm	88,9	107,95	107,95	107,95	107,95	-	-	-	-	152,4	152,4	152,4	152,4	190,5	190,5	190,5	190,5	228,6	228,6	228,6	228,6	279,4	279,4	279,4	381	482,6
Moving die length	mm	101,6	127	127	127	127	-	-	-	-	171,45	171,45	171,45	171,45	215,9	215,9	215,9	215,9	254	254	254	254	304,8	304,8	304,8	406,4	508
Die thickness	mm	20,64	23,8	23,8	23,8	23,8	-	-	-	-	30,15	30,15	30,15	30,15	36,51	36,51	36,51	36,51	42,86	42,86	42,86	42,86	49,2	49,2	49,2	55,5	61,9
Die height	mm	62	80	80	80	80	-	-	-	-	100	100	100	100	125	125	125	125	132,5	132,5	132,5	132,5	152,5	152,5	152,5	175	175
BLANK																											
Blank diameter	mm	2,5 - 6	3 - 8	3 - 8	3 - 8	3 - 8	4 - 10	4 - 10	4 - 10	4 - 10	5 - 12	5 - 12	5 - 12	5 - 12	8 - 14	8 - 14	8 - 14	8 - 14	10 - 16	10 - 16	10 - 16	10 - 16	12 - 22	12-16(22 ^{**})	12 - 22	14 - 27	20 - 36
Shank length	mm	90	120	100*	100*	-	120	100*	100*	-	135	110*	110*	-	220	130*	130*	-	230	160*	160*	-	230	160*	-	330	330
Thread length	mm	60	78	78	78	78	78	78	78	78	98	98	98	98	123	123	123	123	130	130	130	130	150	150	150	170	170
MACHINE																											
Production speed	Prod./1'	500	410	300 (410 ^{**})	250 (410 ^{**})	300	330	300 (330 ^{**})	250 (330 ^{**})	280	260	250 (260 ^{**})	200 (260 ^{**})	260	200	170 (200 ^{**})	150 (200 ^{**})	150	150	120 (150 ^{**})	100 (150 ^{**})	100	120	90 (120 ^{**})	60	100	80
Motor power	KW	7,5	11	11	11	11	15	15	15	15	18,5	18,5	18,5	18,5	22	22	22	22	30	30	30	30	37	37	37	55	75
Net Mass	Kg	3.800	4.000	5.200	5.800	3.500	4.200	5.400	6.000	3.700	7.500	8.700	9.500	7.000	9.800	12.500	13.500	9.500	10.500	13.200	14.200	10.200	11.000	13.700	10.700	28.000	48.000

CHAMFERING MACHINES		SMP14	SMP20
BLANK			
Chamfering diameter	mm	5 - 14	12 - 20
Maximum shank length	mm	130	180
MACHINE			
Production speed	Prod./1'	180	120
Rotation speed	rpm	0 - 8000	0 - 6000
Electrospindle power	KW	4	8
Cone dimension		ISO30	ISO40
Standard inserts dimension		11x11	14x14
Net Mass	Kg	1.800	2.300



(*) Maximum length can be obtained using optional equipment. (**) Using by-pass guides (screws without washers).
The above specifications are not binding as these could vary on account of technical improvements.

THREAD ROLLING MACHINES		RP12	RP22	RP22-R1	RP22-R2	RP22-P	RP32	RP32-R1	RP32-R2	RP32-P	RP42	RP42-R1	RP42-R2	RP42-P	RP52	RP52-R1	RP52-R2	RP52-P	RP62	RP62-R1	RP62-R2	RP62-P	RP72	RP72-R1	RP72-P	RP82	RP92	
EU DIES																												
Fixed die length	inch.	3,35	4,53	4,53	4,53	4,53	5,12		5,12	5,12	5,91	5,91	5,91	5,91	7,48	7,48	7,48	7,48	9,06	9,06	9,06	9,06	11,02	11,02	11,02	15,00	19,02	
Moving die length	inch.	3,74	5,12	5,12	5,12	5,12	5,91	5,91	5,91	5,91	6,69	6,69	6,69	6,69	8,27	8,27	8,27	8,27	10,04	10,04	10,04	10,04	12,01	12,01	12,01	15,98	20,00	
Die thickness	inch.	0,98	1,18	1,18	1,18	1,18	1,18	1,18	1,18	1,18	1,38	1,38	1,38	1,38	1,69	1,69	1,69	1,69	1,97	1,97	1,97	1,97	1,97	1,97	1,97	1,97	2,24	2,44
Die height	inch.	2,44	3,15	3,15	3,15	3,15	3,15	3,15	3,15	3,15	3,94	3,94	3,94	3,94	4,92	4,92	4,92	4,92	5,22	5,22	5,22	5,22	6,00	6,00	6,00	6,89	6,89	
US DIES		W1015	W10	W10	W10	W10	-	-	-	-	W20	W20	W20	W20	W30	W30	W30	W30	W40	W40	W40	W40	W50	W50	W50	W60	W70	
Fixed die length	inch.	3,50	4,25	4,25	4,25	4,25	-	-	-	-	6,00	6,00	6,00	6,00	7,50	7,50	7,50	7,50	9,00	9,00	9,00	9,00	11,00	11,00	11,00	15,00	19,00	
Moving die length	inch.	4,00	5,00	5,00	5,00	5,00	-	-	-	-	6,75	6,75	6,75	6,75	8,50	8,50	8,50	8,50	10,00	10,00	10,00	10,00	12,00	12,00	12,00	16,00	20,00	
Die thickness	inch.	0,81	0,94	0,94	0,94	0,94	-	-	-	-	1,19	1,19	1,19	1,19	1,44	1,44	1,44	1,44	1,69	1,69	1,69	1,69	1,94	1,94	1,94	2,19	2,44	
Die height	inch.	2,44	3,15	3,15	3,15	3,15	-	-	-	-	3,94	3,94	3,94	3,94	4,92	4,92	4,92	4,92	5,22	5,22	5,22	5,22	6,00	6,00	6,00	6,89	6,89	
BLANK																												
Blank diameter	inch.	0,09 - 0,23	0,11 - 0,31	0,11 - 0,31	0,11 - 0,31	0,11 - 0,31	0,15 - 0,39	0,15 - 0,39	0,15 - 0,39	0,15 - 0,39	0,19 - 0,47	0,19 - 0,47	0,19 - 0,47	0,19 - 0,47	0,31 - 0,55	0,31 - 0,55	0,31 - 0,55	0,31 - 0,55	0,39 - 0,62	0,39 - 0,62	0,39 - 0,62	0,39 - 0,62	0,47 - 0,86	0,47 - 0,86	0,47 - 0,86	0,55 - 1,06	0,78 - 1,41	
Shank length	inch.	3,54	4,72	3,93*	3,93*	-	4,72	3,93*	3,93*	-	5,31	4,33*	4,33*	-	8,66	5,11*	5,11*	-	9,06	6,29*	6,29*	-	9,06	6,29*	-	12,99	12,99	
Thread length	inch.	2,36	3,07	3,07	3,07	3,07	3,07	3,07	3,07	3,07	3,86	3,86	3,86	3,86	4,84	4,84	4,84	4,84	5,12	5,12	5,12	5,12	5,91	5,91	5,91	6,69	6,69	
MACHINE																												
Production speed	Prod./1'	500	410	300 (410**)	250 (410**)	300	330	300 (330**)	250 (330**)	280	260	250 (260**)	200 (260**)	260	200	170 (200**)	150 (200**)	150	150	120 (150**)	100 (150**)	100	120	120	90 (120**)	60	100	80
Motor power	KW	7,5	11	11	11	11	15	15	15	15	18,5	18,5	18,5	18,5	22	22	22	22	30	30	30	30	37	37	37	55	75	
Net Mass	lbs.	8.400	8.800	11.450	12.800	7.700	9.250	11.900	13.250	8.150	16.550	19.200	20.950	15.450	21.600	27.550	29.750	20.950	23.150	29.100	31.300	22.500	24.250	30.200	23.600	61.750	105.850	

CHAMFERING MACHINES		SMP14	SMP20
BLANK			
Chamfering diameter	inch.	0,19 - 0,55	0,47 - 0,78
Maximum shank length	inch.	5,11	7,08
MACHINE			
Production speed	Prod./1'	180	120
Rotation speed	rpm	0 - 8000	0 - 6000
Electrospindle power	KW	4	8
Cone dimension		I5030	I5040
Standard inserts dimension		0,43x0,43	0,55x0,55
Net Mass	lbs.	3.950	5.050

(*) Maximum length can be obtained using optional equipment. (**) Using by-pass guides (screws without washers).
The above specifications are not binding as these could vary on account of technical improvements.