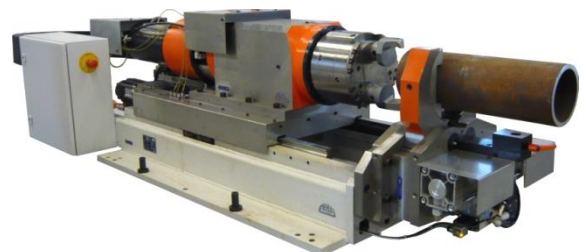




ARLA[®] Endworking Machines

Complete CNC Machines
with High Stiffness and Accuracy
for the SINGLE or DOUBLE Sided Endworking
and Finishing of Shafts, Bars, Tubes, and Pipes

- ◆ **Compact Station EU** for Single Sided Machining
- ◆ **Machine EM 1** for Single Sided Machining
- ◆ **Machine EM 2** for Double Sided Machining
- ◆ **Customized Solutions and Options**



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ARLA® Endworking Machines

... Do you look for flexible endworking solutions for shape cutting of tubes, pipes, and shafts?

... We offer you a suitable modular machine concept!

Usually customers look for the well-matched solution first before discussing details of the machinery. And such solutions are really available as offered by our **ARLA® Endworking Solutions**. The reasonable combination of ARLA's modular machine tool units like machining (spindle and slide) units in connection with the centric clamping system leads to the **ARLA® Endworking Machine** as a result of an ideal problem-solving approach. ARLA's machine tool corresponds to a numerically controlled turning machine (CNC lathe) with "sign reversal":



The workpiece is fixed. & The tool rotates.

And if such an equipment is able to machine two sides of a workpiece simultaneously, we basically have a double machining (double head) system with parallel but independent CNC operations (2-channel-operation). The integration of further CNC axes or optionally of a tool changing system stands for an extended machinery concept which is a real **ARLA® Endworking Center**. With our cooperative partners we also offer advanced machine solutions and system solutions including workpiece handling.

You have the application ...

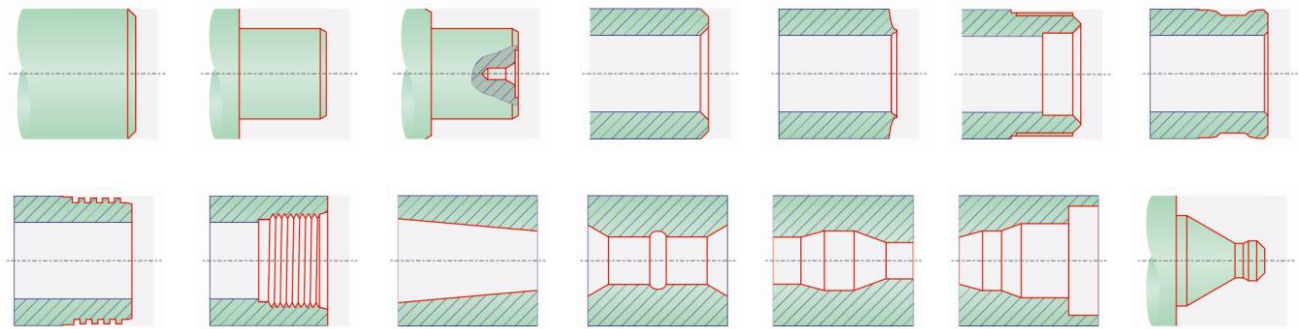
... and we offer the optimized machine solution.

The term endworking comprises more than "just supplementary finishing works". There are numerous machining steps within shape cutting applications, which can only be machined on conventional turning machines with a huge effort, and oftentimes even cannot be handled at all. In addition to that, ARLA offers machine tool stiffness, accuracy, and solidity, which differ from the generally known machine concepts. ARLA's concept is appreciated by many of our customers worldwide.

The main task always is to realize even better machining outcome under the scope of highest possible productivity while considering the ideal price-performance ratio at the same time. Everybody who understands the technical process and implements it optimally can create the foundation for a reliable and above all economic and cost-effective production.



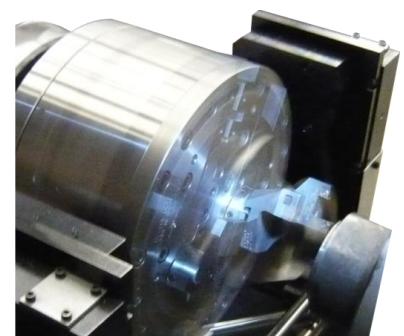
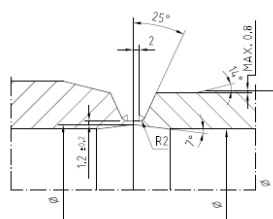
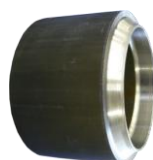
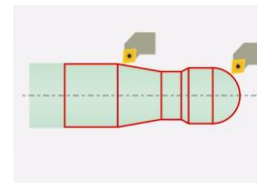
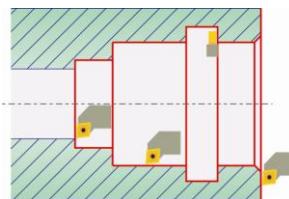
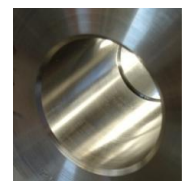
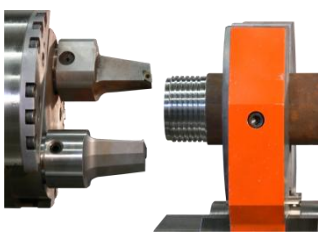
Typical applications of the inside and outside machining (OD & ID machining)



- ◆ Turning
- ◆ Boring
- ◆ Chamfering & Beveling
- ◆ Facing
- ◆ Thread Cutting
- ◆ Tapping
- ◆ Deburring
- ◆ Grooving
- ◆ Turning any Contours & Shapes (Tapers, Curves, Roundings)
Example: Weld End Preparation
- ◆ Drilling
- ◆ Milling
- ◆ Centering, Center Boring incl. Threading



Do you find your application inside the following figures? The examples show, which applications can typically be realized with an ARLA® Endworking Machine. Also complex contours can be machined economically – generally in terms of dry machining, but on request also using metalworking fluids (coolants).



Presenting the ARLA® Machine Program in terms of the design

ARLA offers different machine concepts and performance categories.

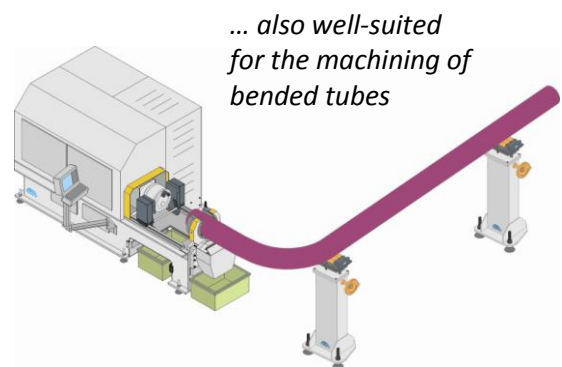
◆ **CNC Endworking Station EU ...**

- single sided endworking up to ODmax = 325 mm
- workpiece is clamped centrally by 1 fixed clamping system
- compact design with a short machine frame layout
- easily to be integrated into existing installations
- optional machine frame extension including a workpiece support (**Model EU+**) for the following lengths: 1000, 2000, 3000, 4000 mm
- workpiece length is not limited; workpiece must be externally supported; extremely solid design, external workpiece supports available as an extra
- also suitable for bended workpieces (the workpiece is clamped on the straight section)
- swivel-type workpiece stop
- complete with chip conveyor
- CNC control: SIEMENS, FANUC, Bosch Rexroth



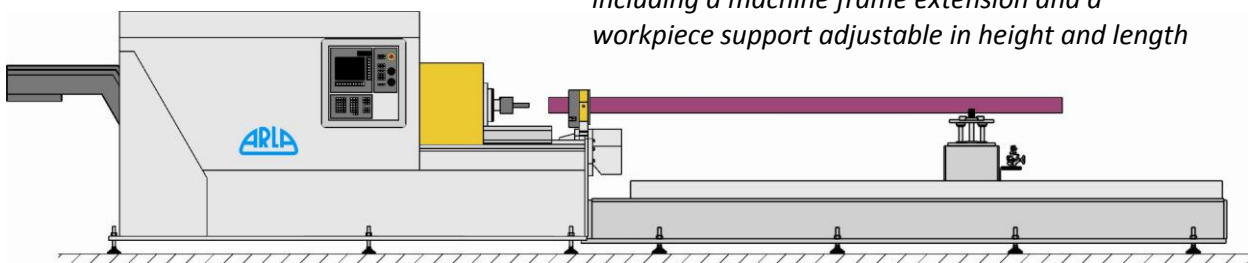
Model EU

here: with solid external, movable workpiece support including height adjustment



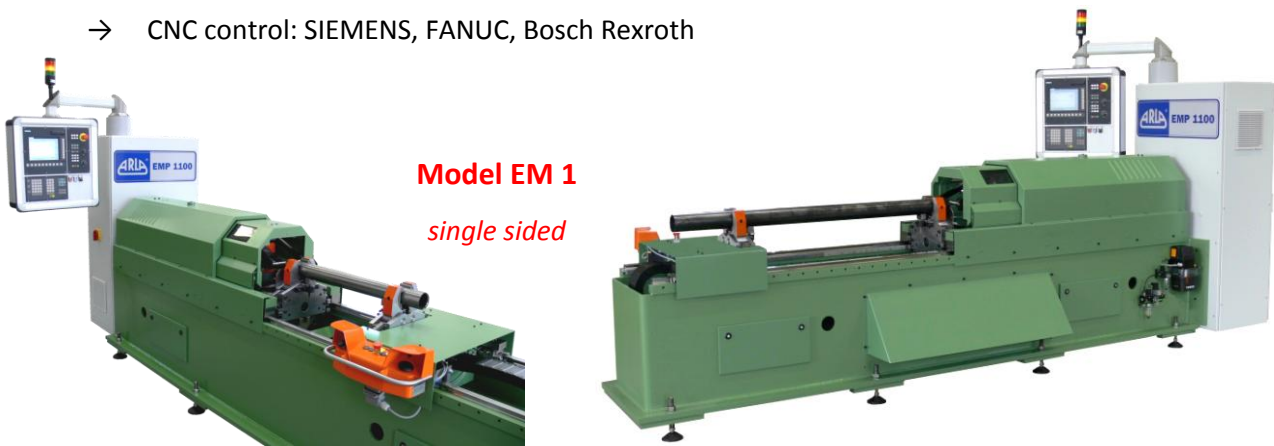
Model EU+

including a machine frame extension and a workpiece support adjustable in height and length



◆ **CNC Endworking Machine EM ...**

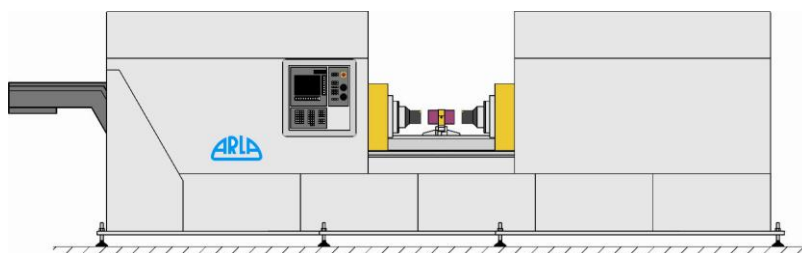
- single sided endworking (Model EM 1) or double sided endworking (Model EM 2) up to ODmax = 325 mm
- workpiece is clamped centrally by 2 clamping systems (1 fixed station, 1 manual or motor driven station for the different workpiece lengths)
- Machine with extended machine frame for the precise workpiece alignment on a shared guidance system (i.e. in alignment with the spindle)
- max. workpiece length and/or clamping length 1000 mm (standard); optionally greater lengths of 1500, 2000, 3000 mm available; for short workpieces a machine with only 1 clamping system and double sided machining capability is available (**Model EM 2.1**)
- swivel-type workpiece stop
- complete with chip conveyor
- CNC control: SIEMENS, FANUC, Bosch Rexroth



The **Models EM 1** have 2 clamping stations and a limited clamping length; longer workpieces can also be supported externally by simple workpiece supports.



The **Models EM 2** are limited to the maximum workpiece lengths of 1000, 1500, 2000 or 3000 mm depending on the model.



Model EM 2.1
double sided

The **Models EM 2.1** support a double sided endworking with only one clamping system. Therefore short workpieces (e.g. pipe couplings, sleeves, bushings) can also be machined on both sides simultaneously.

Presenting the ARLA® Machine Program in terms of the applied technologies

Depending on the customer's requirements different machine and spindle technologies are installed inside the ARLA® Endworking Machines. These technologies can be combined with the already presented basic machine models **EU**, **EM 1**, and **EM 2**. The standard equipment of the **A**, **B** and **X Machines** is summarized hereafter. The main differences are primarily based on the different spindle technologies.

The A Machine ...

- CNC controlled 1-axis machine (1 axis per side); in case of the double sided machine **EMA 2** both sides will each be controlled as a 1-axis machine (2-channel principle)
- **ARLA® Spindle Unit DA** with direct drive (direct servo drive via coupling)
- servo drive with constant torque within the whole speed range from zero to operating speed
- precise and stiff spindle with 5-fold bearing support, concentricity (true-running accuracy) < 2 µm
- spindle protection through sealing air
- **ARLA® Slide Unit** with high precise guideways including central lubrication
- **ARLA® Clamping System** for the repeatable, centric workpiece clamping (pneumatically actuated) including a steady rest function
- for **EMA 1** or **EMA 2**: second clamping system movable manually or motor driven
- process designed for dry machining
- manual tool clamp; tool clamp interfaces: HSK B 63, 100 (depending on the model)
- swivel-type workpiece stop
- protective cover and internal chip protection devices
- chip conveying system
- **CNC control:**
 - SIEMENS 802D sl (single sided) or 840D sl (double sided)
 - FANUC Oi-TD
 - Bosch Rexroth MTX Micro

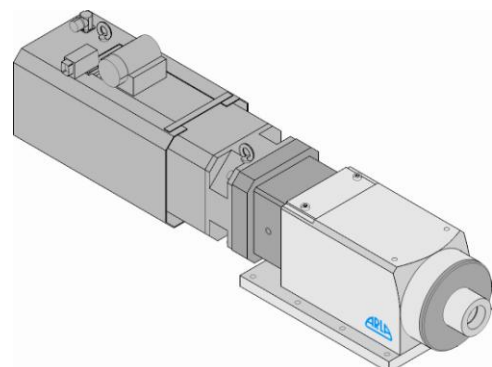
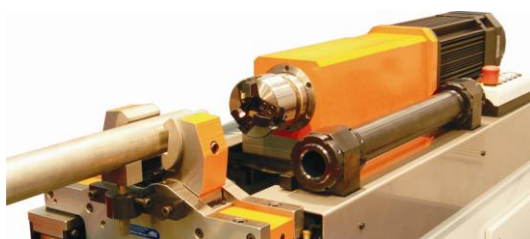
Options:

- wet machining: coolant system including aggregate, extended machine housing
- minimum quantity lubrication
- hydraulic workpiece clamping system (instead of the pneumatic version) for higher clamping forces
- alternative spindle units for higher speeds (up to 5000 rpm)
- specific customer requirements on request

Extras:

- HSK B tools (preset)
- clamping jaws (for each diameter and every clamping station 1 pair of clamping jaws is required)
- clamping jaws with integrated workpiece support for the purpose of the fast changeover onto another workpiece diameter without any further adjustments
- external, movable and very solid workpiece support

ARLA® Spindle Unit DA
as the central element of the **A Machine**



The B Machine ...

In comparison to the A Machine the **B Machine** offers special advantages, which primarily refer to the solid and high-torque spindle technology. Especially in case of increased production demands (as e.g. in terms of optimized cutting parameters, increased productivity, an extra stiff spindle design) the B Machine achieves maximum capacities and corresponding accuracies under stable process conditions.

The **B Machine** is characterized by the following increased efficiencies in comparison to the A Machine:

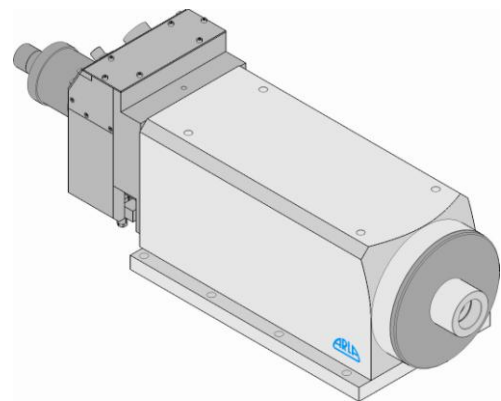
- **ARLA® Spindle Unit DB** with integrated direct drive (water-cooled motor spindle)
- internal motor/spindle cooling including a recirculating chiller inside the aggregates cabinet
- compact design of the spindle unit with outstanding high radial and axial stiffness
- manual tool clamp; tool clamp interfaces: HSK B 63, 100 (depending on the model)
- spindle drive with increased torques
- **ARLA® Clamping System** with steady rest function
- **CNC control:**
 - SIEMENS 802D *sl* (single sided) or 840D *sl* (double sided)
 - FANUC Oi-TD
 - Bosch Rexroth *MTX Compact*

Options:

- wet machining using internal coolant supply
- minimum quantity lubrication
- **ARLA® Spindle Unit DB+** with automatic tool clamping (pneumatic / hydraulic)
- enhanced spindle units for higher torques (up to 425 Nm)
- alternative spindle units for higher speeds (up to 5000 rpm)
- specific customer requirements on request

Extras:

- HSK B tools (preset)

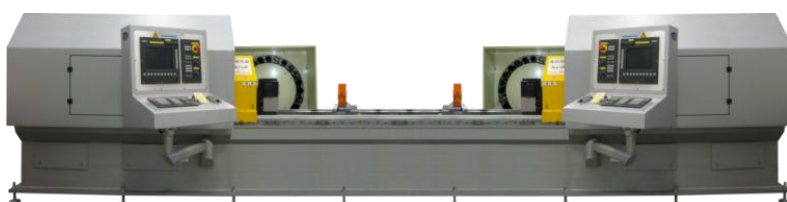


ARLA® Spindle Unit DB / DB+

The BC Machine ...

In comparison to the B Machine the **BC Machine** additionally offers an automatic tool changer for 12 HSK tools (more tools on request) for the single sided as well as the double sided machine version. By default the spindle units of the model type **DB+** have an integrated automatic tool clamp and can be equipped with internal coolant supply as a further option.

Special application fields can be found inside the multi-stage, (exactly) aligned endworking applications of shafts, as e.g. the chamfering as well as the manufacturing of a center hole with thread. All machining steps are realized in a single centric workpiece clamp operation.



The X Machine ...

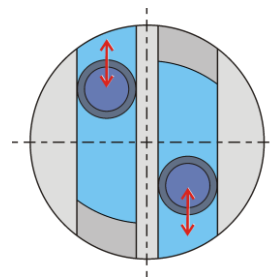
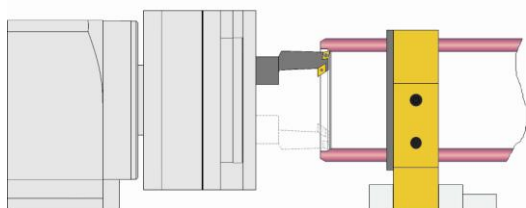
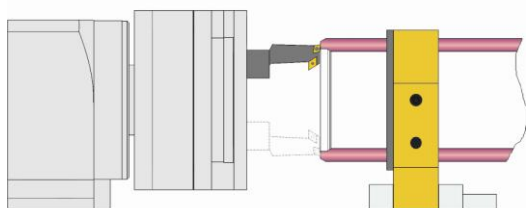
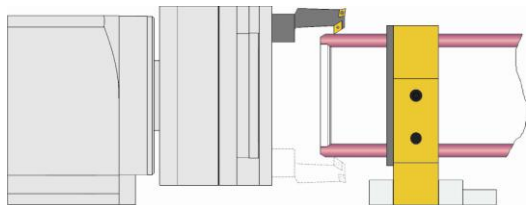
An alternative production technology is introduced with the **X Machine**. Instead of fixed and preset HSK tools, tool holders with integrated cutting insert carriers are used on facing heads, which can perform – depending on the machining application – useful cut distributions. Due to the additional radial tool axis, which is dedicated to the separately controllable facing head slides, an interpolating CNC 2-axis machining application can be realized.

Compared to the A and B Machine, the **X Machine** offers a considerably advantage in regard to the lifecycle costs: This technology uses standard cutting inserts inside the insert carriers instead of customary expensive preset special tools.

The application examples are versatile, since using the **X Machine** any complex contours can be machined CNC aided on the inside (ID) and outside (OD) surfaces, as the following examples show:

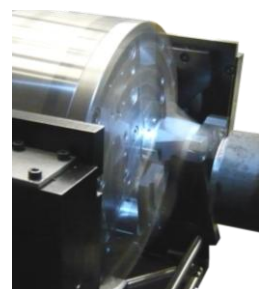
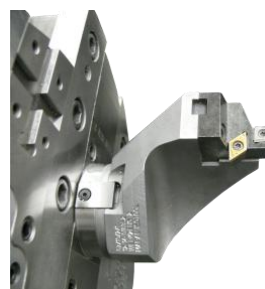
- straight or tapered steps
- grooves
- threads
- convexities, roundings, curves
- combined contours including cut distribution
(as e.g. in case of welding end preparation at tubes, see also the example below)

One of the outstanding features of the **X Machine** is the machining of tapered contours, special grooves, as well as standard or special threads on the inside and outside surface. Due to the NC depending cut distribution, the rough machining and finishing can be optimized, while the workpiece remains clamped. This is a particular advantage also in case of challenging material qualities with unusual cutting parameters.



Facing head with 2 numerically controlled slides; mechanical interfaces for application-specific tool holders and (optionally) counterweights

Example for the inside (ID) and outside (OD) contour machining of tubes



The **X Machine** is characterized by the following increased efficiencies in comparison to the A & B Machine:

- CNC controlled 2-axis machine (on each side); in case of the double sided machine **EMX 2** both sides can be operated independently as stand-alone 2-axis machines (2-channel principle)
- **ARLA® Spindle Unit DX** with integrated direct drive (water-cooled motor spindle) as well as a second drive for the realization of the facing travel (with differential drive)
- compact design of the spindle unit **DX** with outstanding high radial and axial stiffness in compliance with highest accuracy
- spindle drive with an integrated facing head system

Options:

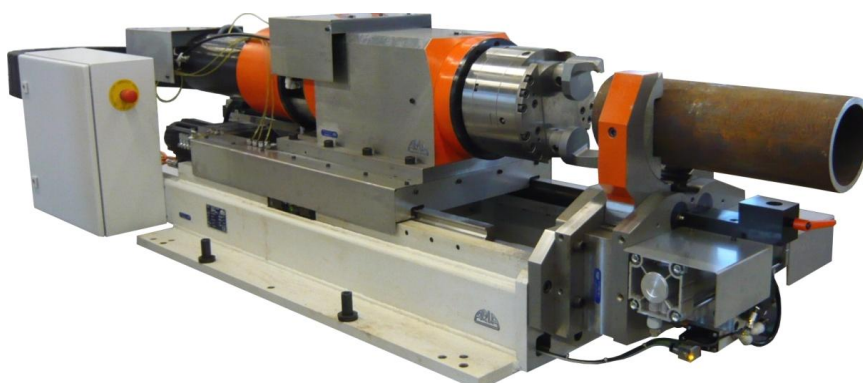
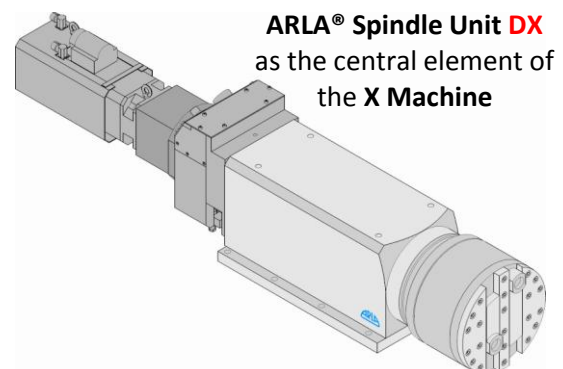
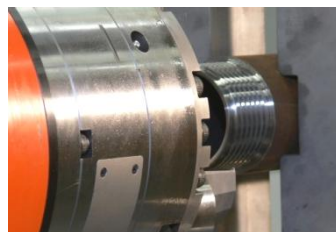
- wet machining: minimum quantity lubrication; internal coolant supply
- specific customer requirements on request (particularly, if a special or increased facing head size is needed in accordance with the required machining travels)

Extras:

- tool holders and – if applicable – corresponding balancers (counterweights) for the machining tasks

Furthermore we offer an additional option **to align the spindle axis with reference to the ID of the workpiece** (correction of the spindle center line).

Applications of the **X Machine**:



The XC Machine ...

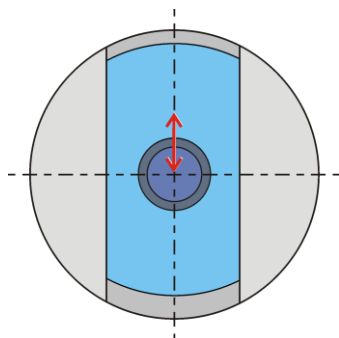
In comparison to the X Machine the **XC Machine** additionally offers an automatic tool changer for 12 HSK tools (more tools on request) for the single sided as well as the double sided machine version. By default the spindle units of the model type **DX+** have an integrated automatic tool clamp and can be equipped with internal coolant supply as a further option. The models of the **XC Machine** family are – by analogy with the X Machine versions – offered as **EUXC, EMXC 1, EMXC 2**.

Special application fields can be found inside the multi-stage, (exactly) aligned endworking applications of shafts, as e.g. contour machining, facing and chamfering as well as the manufacturing of center holes with threads. All machining steps are realized in a single centric workpiece clamp operation. These combined machining steps are of importance for the endworking of shafts and axles.

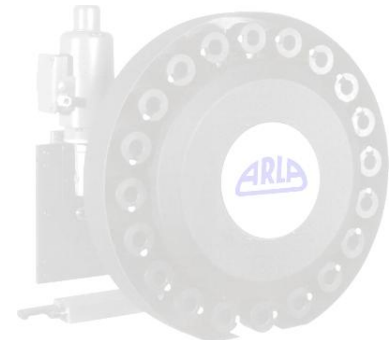
Compared with the X Machine, the **XC Machine** is equipped with a facing head which has just one slide on top.

Special features of the **XC Machines**:

- flexible production process due to the combination of various, tool-dependent machining steps
- possibility of redundant tool management to minimize non-productive times in case of tool wear
- facing head equipment with a powerful 1-slide system and an integrated balancer
- optionally: internal coolant supply or minimum quantity lubrication

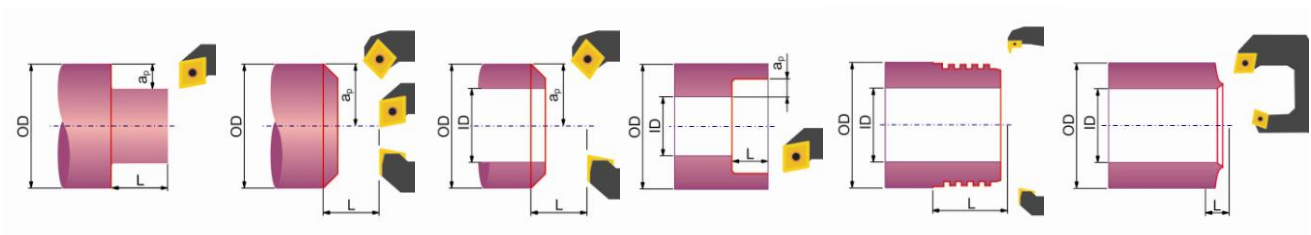


Example of a 1-slide system



More economic with the ARLA® Endworking Concept

Do product quality and production time play a role for you? Convince yourself that complex machining processes in one clamping procedure can be realized with highest accuracy in very short machining times. That is why ARLA offers the presented different machine technologies, which lead to the optimized complete machine concept (**A, B, X Machine**). Machining times are – depending on the model – within a few seconds for most applications. The detailed summary of all technical data of the available machines is presented in the tables on the following pages.



Criteria for the selection of the appropriate ARLA® Endworking Machine

Which ARLA machine satisfies your requirements best? By means of the following table the different features of the available models are compared. Please tell us about your specific application, so we can help you to find your best machining solution and machine configuration.

Features	EUA	EMA	EUB	EUBC	EMB	EMBC	EUX	EUXC	EMX	EMXC
max. workpiece diameter (OD) [mm]	170		325	220	325	220	325	220	325	220
max. spindle torque [Nm]	105		425	200	425	200	425	200	425	200
single-sided machining	X	X	X	X	X	X	X	X	X	X
double-sided machining		X			X	X			X	X
high-precise spindle with direct servo drive	X	X								
high-precise water-cooled motor spindle			X	X	X	X	X	X	X	X
manual HSK tool mount	X	X	X		X		X		X	
automatic HSK tool mount				X		X		X		X
facing head unit for contour machining							X	X	X	X
automatic tool changer (12 tools)				X		X		X		X
centric workpiece clamping system	X	X	X	X	X	X	X	X	X	X
chip conveyor for dry machining	X	X	X	X	X	X	X	X	X	X

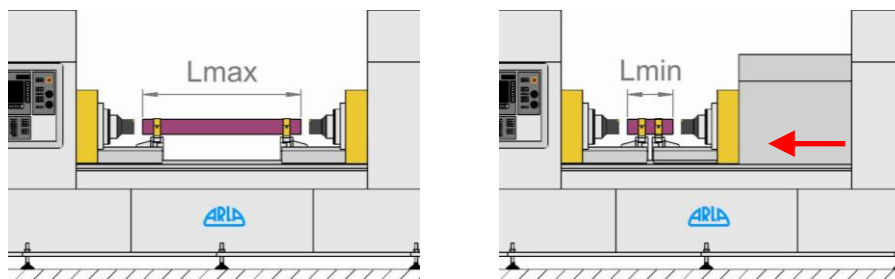
Options	EUA	EMA	EUB	EUBC	EMB	EMBC	EUX	EUXC	EMX	EMXC
internal coolant supply			X	X	X	X		X		X
minimum quantity lubrication			X	X	X	X	X	X	X	X
chip conveyor for wet machining			X	X	X	X	X	X	X	X
extended frame incl. workpiece support	X		X	X			X	X		
external workpiece support (pipe stand)	X		X	X			X	X		

Special Accessories & Tools	EUA	EMA	EUB	EUBC	EMB	EMBC	EUX	EUXC	EMX	EMXC
clamping jaw with integrated support	X	X	X	X	X	X	X	X	X	X
HSK tool as standard design	X	X	X	X	X	X		X		X
presetted HSK tools	X	X	X		X					
HSK tools as special design	X	X	X	X	X	X	X	X	X	X

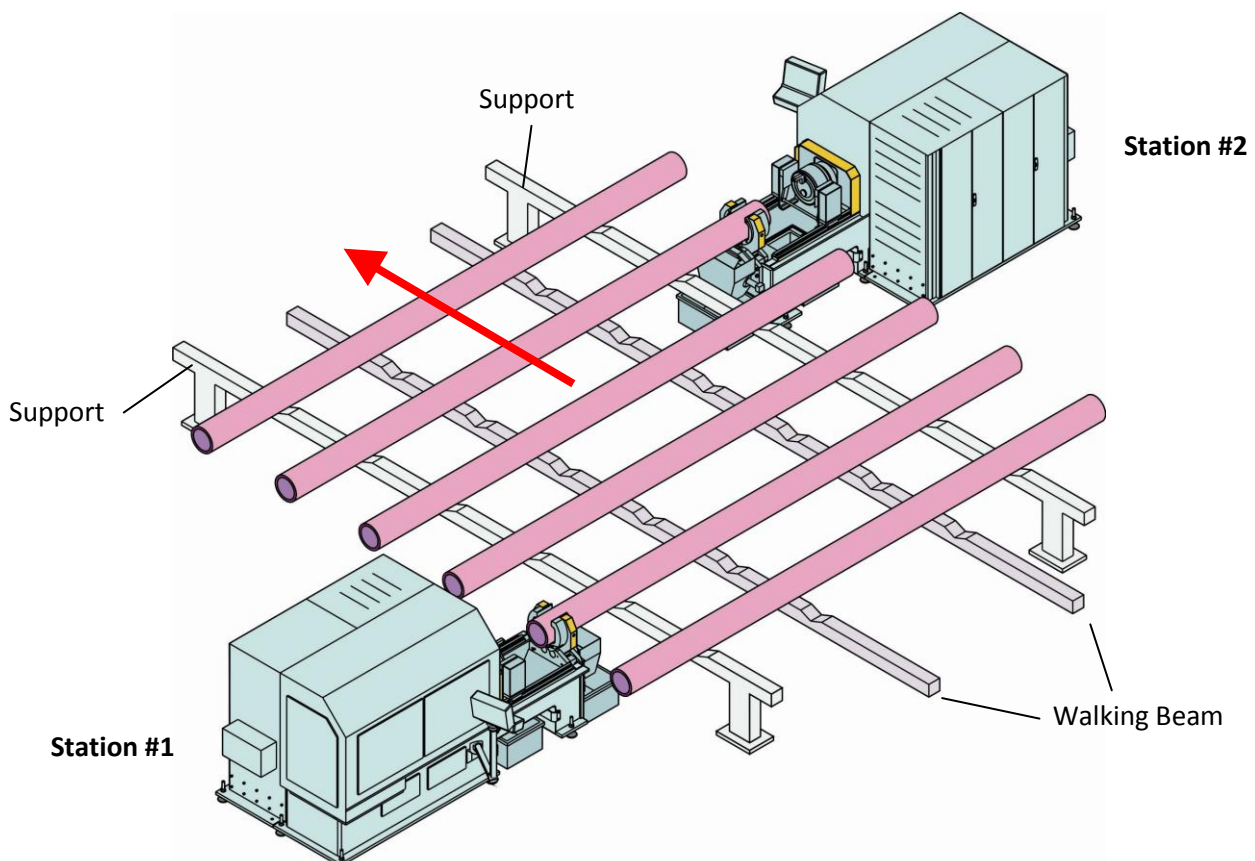


Flexible automatization solutions

In case of the double sided endworking machine (**Model EM 2**) small production batches for **different workpiece lengths** can also be considered. For this purpose one unit of the endworking machine will be moved CNC-controlled on the programmed position by fast traverse so that shorter or longer workpieces can be machined. Due to the block position of the clamping systems a minimum length L_{min} must be regarded (see machine tables). If the workpiece is shorter than the specified minimum length L_{min} the endworking application can still be performed by just machining one side and then rotate the workpiece by 180° to perform the second machining inside the same clamping station 1 or (without rotation) in clamping station 2; this can be done at both clamping stations independently according to the machining task.



ARLA® Endworking Machines can also be easily integrated into **installations with a linked workpiece transportation**. For this purpose oftentimes **single sided endworking machines are positioned with an offset** containing of one station each (**EU or EM 1**) for the machining of the left and right end. The transportation of the workpiece then can be realized by a walking beam for example. A nearby workpiece feeding system including a loading support can also be supplied. ARLA cooperates with special-purpose machine builders to realize such complete systems.



Introducing the Company

From Tradition to Further Progress

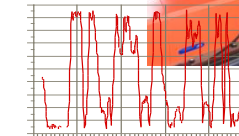
In the year **1918** *Arnold Laschet sen.* set up a company in Essen with the main focus on general mechanical engineering, tool making, fixture design, gear and machine tool manufacturing as well as customer-specific production (job shop). The founder, who has also established his reputation with products from the field of electrical engineering, forwarded the corporate management after the Second World War to his sons *Arnold* and *Günther Laschet*.



In the course of time the machine products, which have always been associated with the name **ARLA** (abbreviation of the founder's name *Arnold Laschet*), were consequently refined and distributed. Due to the further growth of the family-owned business, the company was splitted into two independent legal entities. *Günther Laschet* founded together with his son *Dr.-Ing. Andreas Laschet* **ARLA Maschinentechnik GmbH** in 1984. In 2002 the company moved to the current location in **Wipperfuert**, a nice town 38 km away from Köln/Cologne.



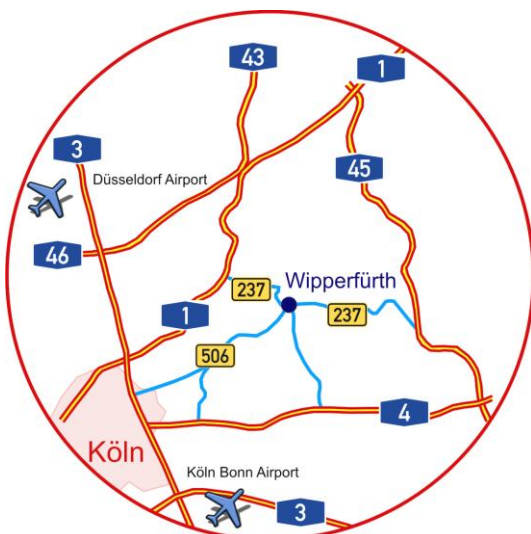
ARLA and its highly qualified staff has always pursued the goal to refine, to test and to sell the own **ARLA® Machine Products** (**Endworking Machines** for shafts and tubes, **Slide, Table, Spindle Units**, complete **Machining Units, Clamping Systems, Shift & Engage Levers**). Due to customer requirements, the R&D activities comprise the usage of state-of-the-art CAD technology right from the beginning. Furthermore practice-proven software packages (own developments) help in case of the computer-aided design as well as the end-of-line control using measurement techniques. There are major applications in the automotive industry and also in the aviation industry worldwide (Airbus A380, A400M).



Another activity of ARLA is the **ARLA® Engineering**. Practice-oriented **Engineering Services, Technical Software Products** as well as the associated **Trainings, Seminars, and Consultancies** are supplied on request. ARLA's engineering is used to optimize the dynamic behavior of complete drivelines in rotating machinery, and vehicle powertrains.



ARLA worldwide...



join the best
26. – 30. März 2012
Düsseldorf, Germany



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