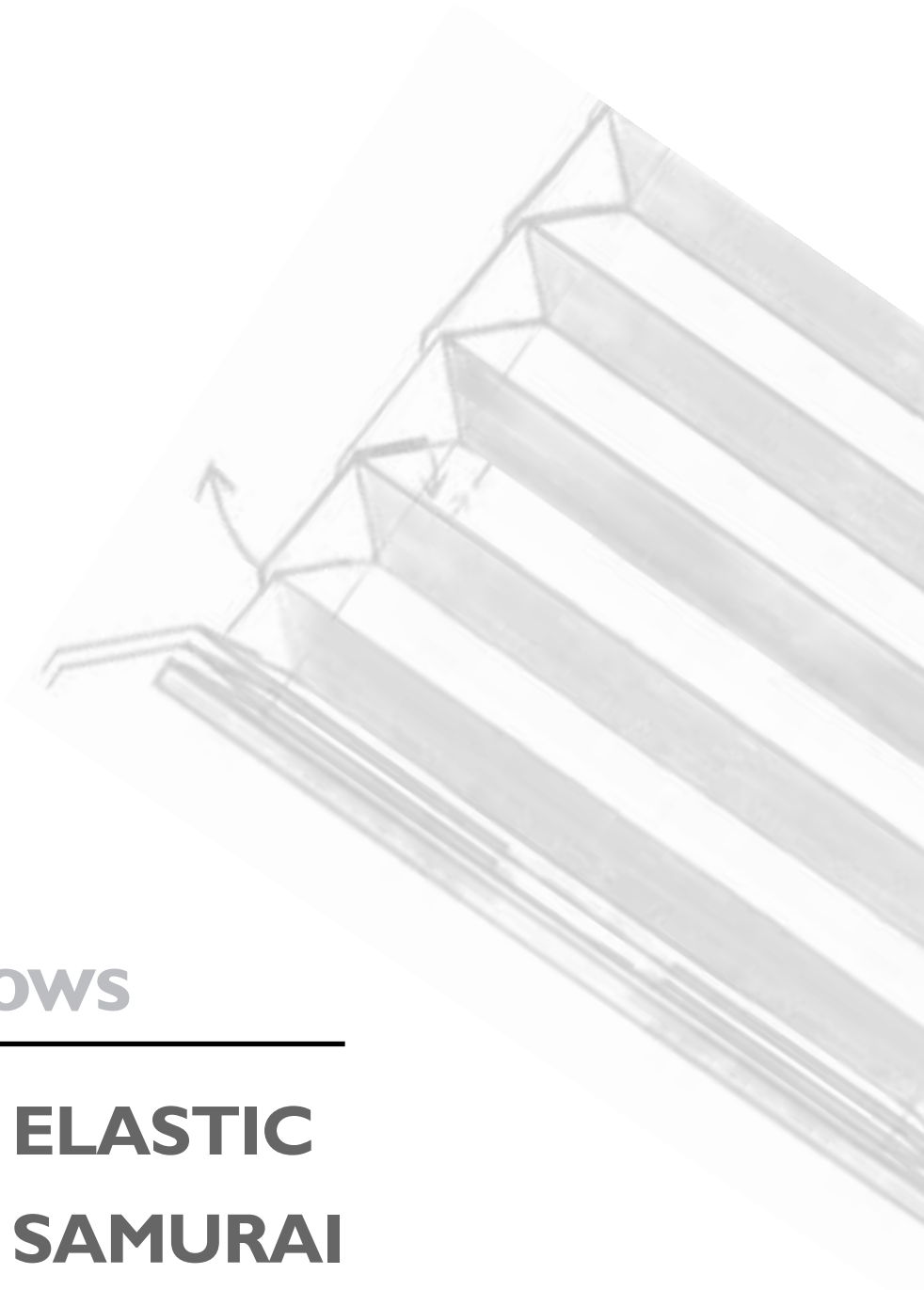


Bellows

ELASTIC SAMURAI

ELASTIC bellows

HEMA has produced for more than two decades bellow protective systems for application in any different fields of industry. The standard production line is the ELASTIC bellow. The production of many thousands of ELASTIC bellows directly flows into consulting work and into the design of new specific customer solutions. New developments and adaptations resulting from customers' orders ensure continuous development and performance and an extension of application areas.

Requirements

Requirements for safety, compactness and speed of machines are constantly rising, demanding new materials and designs of protective covering systems.

We meet market expectations by developing system components and integrated solutions which can be mounted complete.

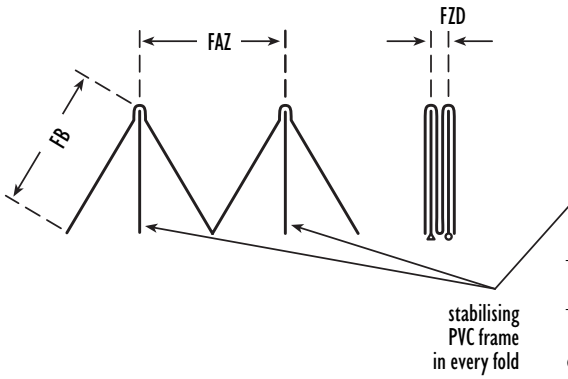
The solutions proposed by HEMA are answers to problems defined as follows:

- no surplus space – reducing the machine size by special materials and space saving designs
- Everything by one provider – bellows integrated into the rear wall covering of the machine, complete with guides and mounting devices
- if it get's hot – high temperature resistant materials up to 600°C for laser, plasma and welding applications
- specialities as requested – dust proof, free from silicone, antistatic surface and compatible to food processing – important for electronics, wood working, medical technology, automotive industry and many other areas
- fast as lightening – efficient chip protection and coolant impermeability at HSC applications by SAMURAI bellows with high contact pressure and protection on several sides
- the new generation – replacement of steel covers by intelligent SAMURAI bellow walls may often be realised

ELASTIC bellows

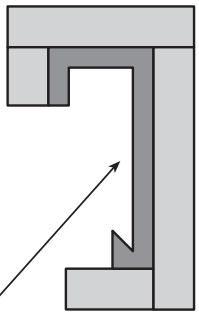
Technical data

ELASTIC bellows comprise a product series with many combination options, the basic component material, form, way of processing, dimensions being easily adaptable.



Beside PVC we offer PP, Nomex and polyamid as an alternative material for the support frames.

All ELASTIC bellows may be deployed horizontally or vertically (mixed positions possible). By deploying efficient glider profiles, roller and ball bearings improved quiet running, long life cycles and low friction movement are achieved with HSC applications as well.



At high start accelerations, a reduction of the load to the first folds, an even extension and the stability of the travel movement is achieved by extension limiters.

The essential component of the ELASTIC bellow is a stabilising PVC frame within every fold. This frame is joined unsolvable to the outer fold material by two basically different processes.

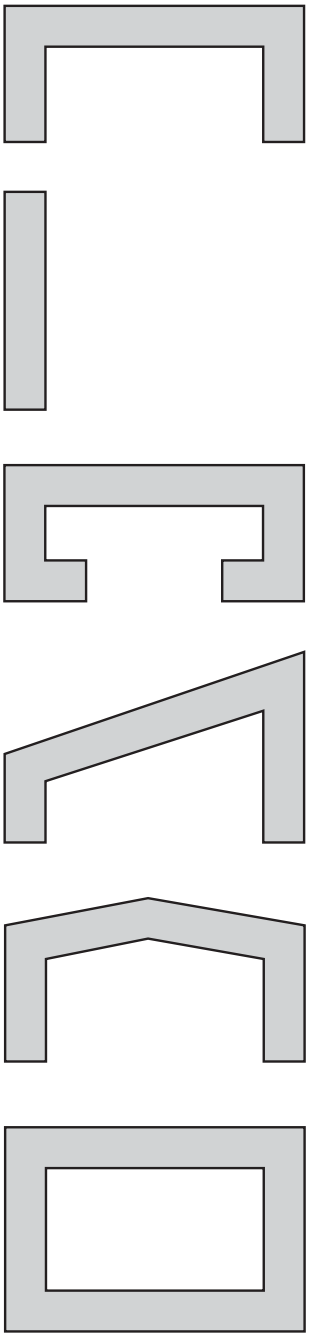
For more than 80 % of the bellows the thermal bonding process is applied. By the influence of heat and with the help of a specially developed flux a permanent bonding is reached between the inner PVC frame and the outer fold material. Thermal bonded ELSASTIC bellows are maintenance free, water and dust proof as well as oil resistant and conditionally acid resistant.

The "sewn" version is mainly applied for high temperature materials. By strong fabrics (i.e. Kevlar) a long lasting solution will be achieved even under extreme loads. The PVC frames are fixed to every fold by sewing, stabilising the bellow as well.

The ELASTIC bellows show high dimensional stability due to the built-in PVC frame. With direct impacts to the bellow reversion to the original shape is guaranteed.

ELASTIC bellow
with pantograph systems

Standard types



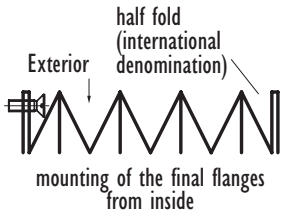
ELASTIC bellows

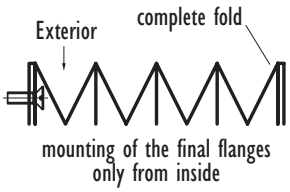
Even surface properties, regularity of the contours and availability of various colours of the ELASTIC bellows provide an attractive visual over all appearance for your machine.

The basic geometrical shapes of the ELASTIC bellows are the venetian and the U-shaped type. Additional stability may be achieved by using overlapping structures maintaining a grip on the guiding ways. The draining of liquids may be facilitated by using inclined or roof-shaped designs. The rectangular shape is used mainly for platform applications (elevating platform, medical equipment). It may be retrofitted as well by using bonding tape, Velcro tape or other adhesives.

Mounting

Mounting of the ELASTIC bellows to the machines is easily achieved by components usually supplied ex works. Normally a frame made from metal or synthetic material, designed according to customer's specifications, is attached to both ends, and is used for fixing. The mounting by Velcro tape is even easier, providing fast and efficient maintenance work. Further alternatives are clip fasteners and fixing straps.





Technical design information

Abbreviations:

FB	=	width of the fold
FZ	=	number of folds
FZD	=	compression per fold
FAZ	=	extension per fold
BE	=	width of the terminal fixture
Lmax	=	maximum extension
Lmin	=	minimum compression

Formulae for calculation:

$$Lmin = Lmax - stroke$$

$$FZ = \frac{Lmax}{FAZ}$$

$$Lmin = \left(\frac{Lmax}{FAZ} \times FZD\right) + BE$$

$$Lmax = \frac{(Lmin - BE) \times FAZ}{FZD}$$

Dimensions:

FB (mm)	FAZ (mm)	FZD* (mm)
15	20	3–5
17,5	24	3–5
20	30	3–5
25	38	3–5
30	48	3–5
35	55	3–5
40	65	3–5
45	75	3–5
50	85	3–5

* depending on the material

ELASTIC bellow
for travelling support columns,
WALLCONCEPT

The SAMURAI concept

SAMURAI – one of the world's most complete product ranges in the area of lamella bellows.

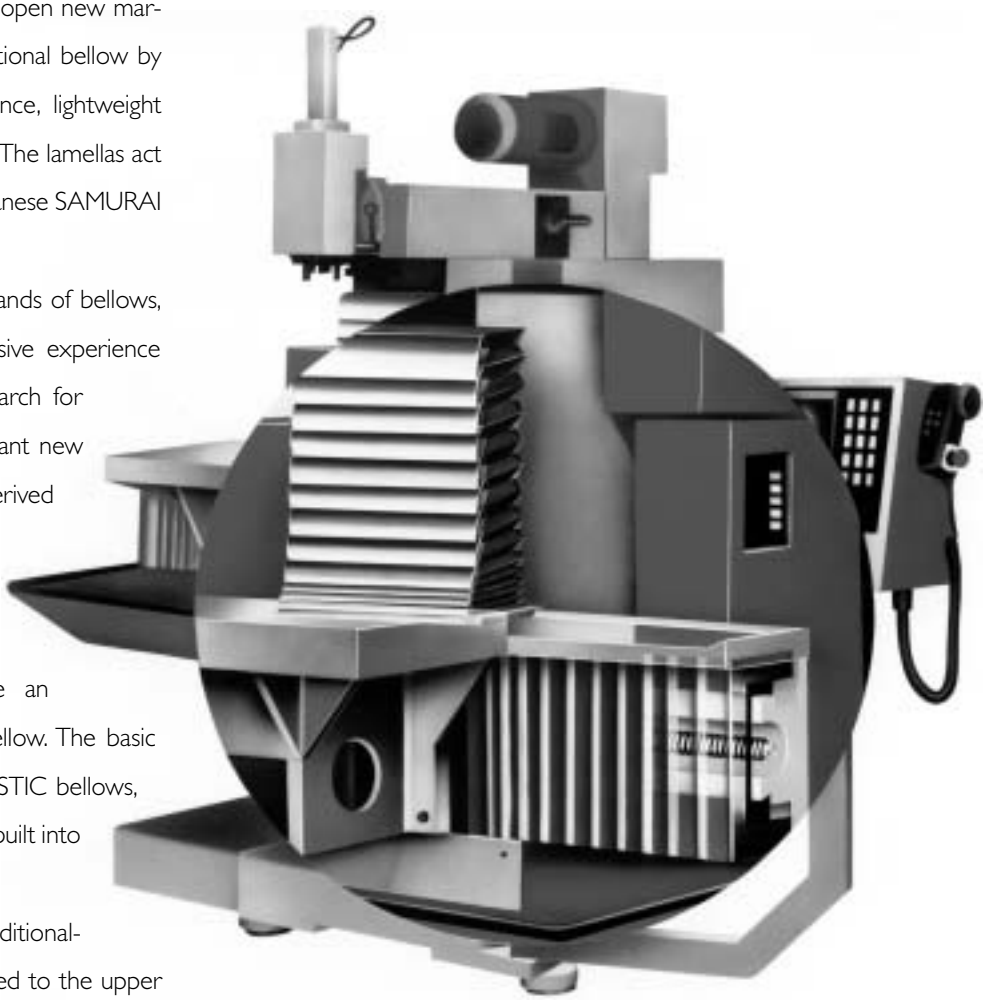
HEMA developed the first SAMURAI bellows in 1980 and had protected this idea in important markets. The concept is aimed to open new markets and applications to the traditional bellow by the addition of a high-performance, lightweight protector in the shape of lamellas. The lamellas act like the armour once worn by Japanese SAMURAI warriors.

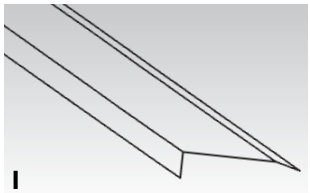
Having produced many thousands of bellows, HEMA has acquired comprehensive experience available to our customers in search for innovative specific solutions. Costant new development and adaptation derived from customer experience facilitate the high performance of the product line.

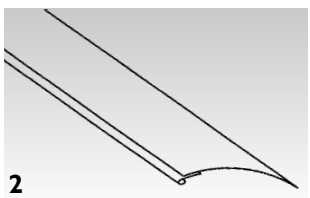
The SAMURAI bellows are an advancement of the ELASTIC bellow. The basic concept corresponds to the ELASTIC bellows, here as well a PVC frame may be built into each fold to guarantee stability.

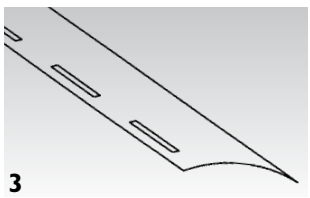
The SAMURAI bellows are additionally reinforced by lamella sheets fixed to the upper edge of the folds. In this way, an efficient protection of the bellows against swift, very hot and sharp edged chips is achieved.

The more simple SAMURAI lamellas aprons are to be considered as a variety of the SAMURAI bellow. The substructure does not consist of an ELASTIC bellow but only a carrier material on which the lamella sheets are fixed. These types are denominated FASTLAP and are deployed in large numbers in machining centres as compact rear wall panelling (z-axis).









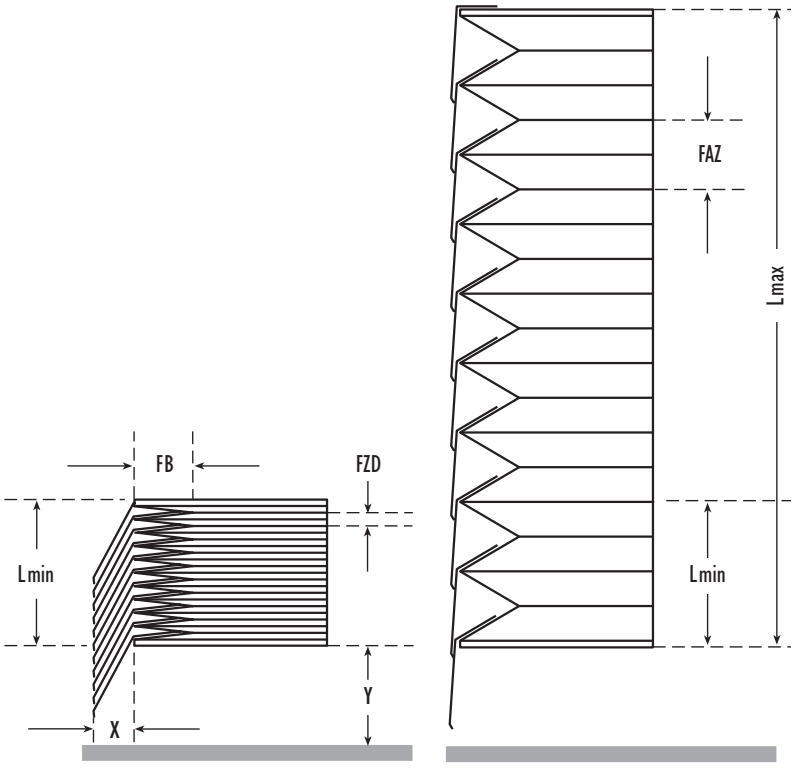
Design of the lamellas

We use three basic ways of fastening the lamellas. From these three basic ways result the different types of products and their denominations. The product types FASTAF/ FASTAC are provided with fixed lamellas **1)**. For the product types FASTAM/ FASTLAP flexible lamellas are deployed. The flexible lamellas are offered in two different versions, either with a hinge **2)** or with clips **3)**, depending on deployment conditions. For the hinge types, you may choose between versions with or without preload.

FASTAF
FASTAC

Technical design information:

Abbreviations:
- FB = width of the fold
- FZD = compression per fold
- FAZ = extension per fold
- 2FAZ = one sheet of lamella is protecting two folds
- FHUB = stroke per fold
- BE = width of the mounting device (flange, Velcro)
- Lmax = maximum extension
- Lmin = minimum compression
- X = horizontal space required for the lamellas
- Y = vertical space required for the lamellas



SAMURAI two-sided protection by lamellas covering the corner

The FASTAC type has fixed lamellas travelling in a telescopic way (boxes), spreading completely across the frontage and the sides, forming a closed surface. The closed lamellas bellows FASTAC usually provide a movable alternative to telescopic steels covers or machine covers, respectively.

For all SAMURAI bellows with fixed lamellas, due to the technical design an overhang has to be taken into account. This can be avoided by the flexible varieties (FASTAM/ FASTLAP).

The lamellas used are produced from stainless steel or aluminium as a standard. There is a large variety of profiles available which are designed according to customer's specifications. The basic versions are available in flat or rounded shape. Usually the final edges of the lamellas are formed in the shape of a wiper, creating a very good closing and sealing on the top side of the SAMURAI bellow.

There is a high contact pressure across the whole lamella contact area. Lamellas guarantee by

FASTAF

FB (mm)	FAZ (mm)	FZD (mm)	X (mm)	Y (mm)
17,5	20	4	20	40
20	25	5	20	45
25	32	5	20	50
30	35	5	20	70
35	45	5	20	75
40	60	5	20	90
45	65	5	20	95
50	75	5	20	110

FASTAC / FASTAF – 2 folds

FB (mm)	2FAZ (mm)	2FZD (mm)	Y (mm)
15	40	5 - 10	65
17,5	45	5 - 10	75
20	55	5 - 10	75
25	70	5 - 10	90
30	85	5 - 10	105
35	100	5 - 10	120
40	125	5 - 10	155

indication: consider the telescopic structure of the X-dimension

SAMURAI: protection by lamellas including roof covering

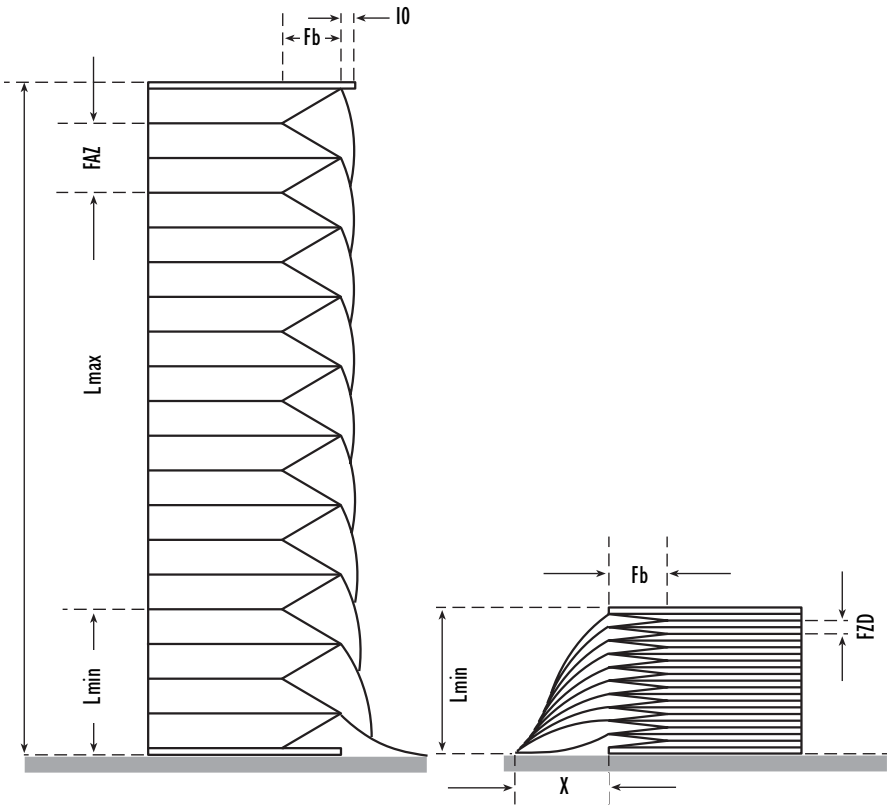
The SAMURAI bellows are very well suited for HSC applications. Solutions for machining centres have been realised at a speed of more than 100 m/min and an acceleration of more than 2 G.

FASTAM

their efficient wiper edge that debris does not access the interior of the bellow.

After use, there is a normal, regular formation of stripes created on the lamellas by the shape of the edges, which have no influence on function or life cycle. The quality of the lamellas is well tried within thousands of applications for many years. The lamellas are stainless and acid proof, but not accessible. All edges of the lamellas are deburred, preventing the risk of injuries while mounting.

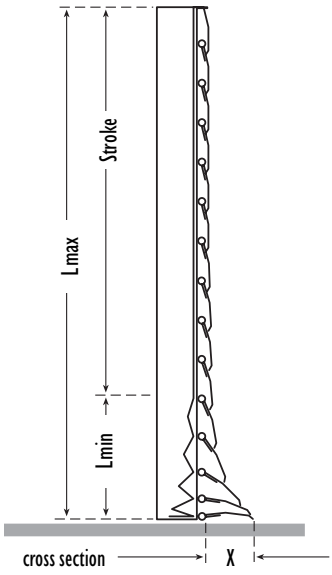
At the SAMURAI bellows, all materials, shapes, types of processing and dimensions of the ELASTIC series may be combined at random. Additionally, the customer is free to choose the position of the lamellas. It is possible to fasten the lamellas at the front side, on each of the side parts as well as in any combination thereof. Furthermore, in-house production of the lamellas ensures all shape designs, i.e. inclined or roof-type shapes, may be realised.

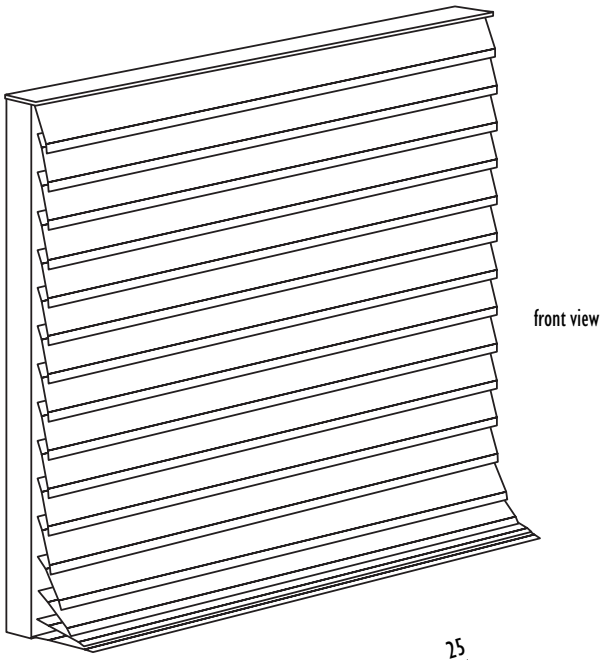


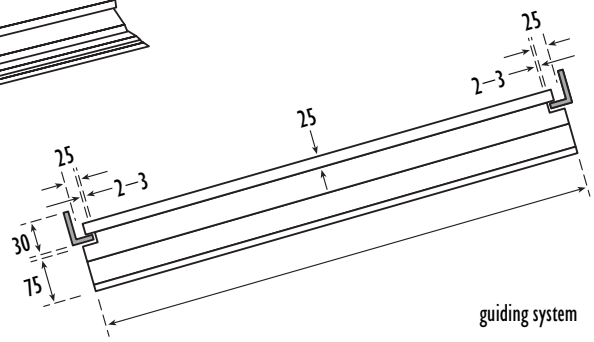
FASTAM

FB (mm)	FAZ (mm)	FZD (mm)	X (mm)
17,5	22	4	50
20	30	5	50
25	38	5	65
30	48	5	75
35	55	5	85
40	65	5	85
45	75	5	100
50	85	5	110

FASTLAP







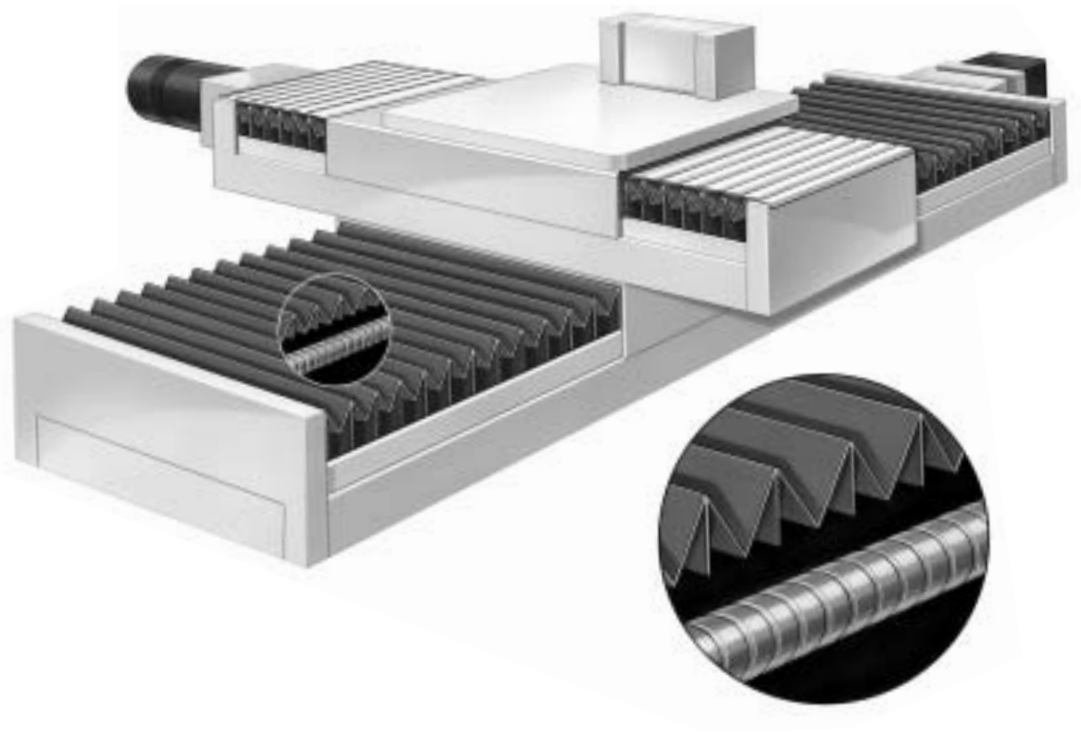
The FASTLAP lamellas aprons require a defined guiding system on both sides by which friction-free movement is possible. The customer should use the standardised system developed by HEMA. The maximum width of the lamellas may be up to 4000 mm. Special sizes can be produced, depending on the circumstances. The lamella plates consist of stainless steel with a thickness up to 1,5 mm.

Application areas

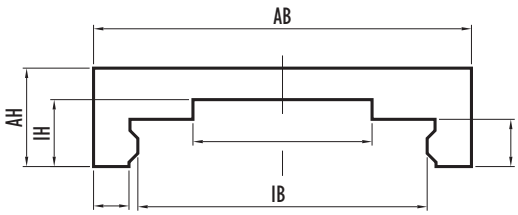
Consultation with our customers in difficult projects is our strength. We will come to your location, bringing along our experience from former projects, working hand in hand with your other suppliers, too, as system leader or as system partner. On the following pages, we chose some application areas as examples.

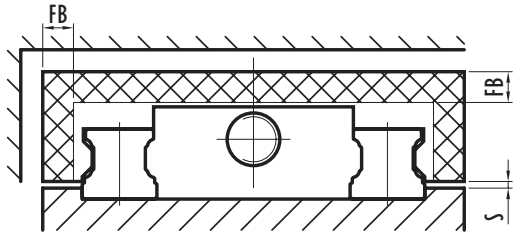
Bellows for linear guides

Linear drives are equipped with bellows as a standard ex factory or can be retrofitted by the final customer. HEMA has specialised in this area and offers bellows customised for the leading international manufacturers (INA, IKO, ISELE, NSK, Schneeberger, SKF, STAR and THK). By the accurate type denomination the parts can be manufactured correctly to size.



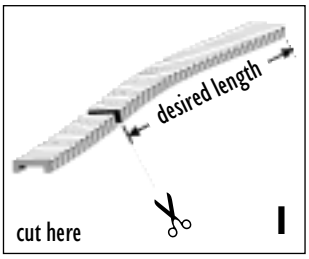
The internal guiding ways, which require accurate production of the guiding components of the bellows, are of special importance during the design and the production of the linear guide covers. Our guiding components consist of high quality synthetics, they are water-jet cut and can be supported by gliding elements. They can be designed for specially quiet running and are characterised by a uniform extension behaviour. By using especially thin and tear resistant materials we achieve excellent compression values. The thermally bonded varieties are also dust- and waterproof.

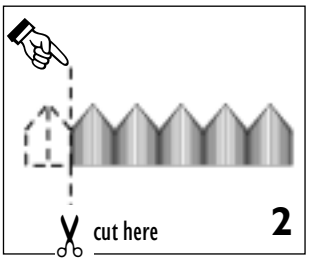


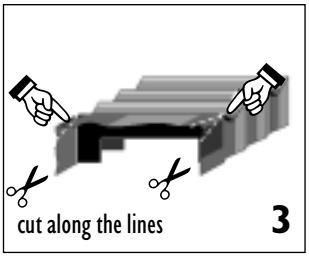


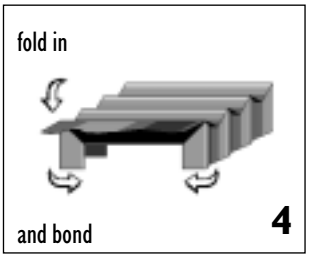
An additional service and cost saving performance consists in delivering the bellows as "endless version" with 200 or more folds al-together. In this way the customer can configure himself the desired extension at any time (see lateral pictures 1 - 4), remaining flexible without delivery time problems. We will be pleased to inform you in detail about this possibility.

Configuration of the endless type





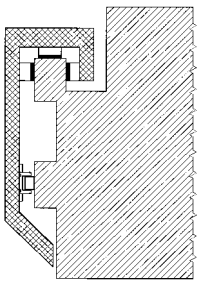


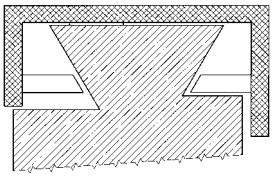


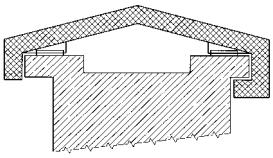
Application areas

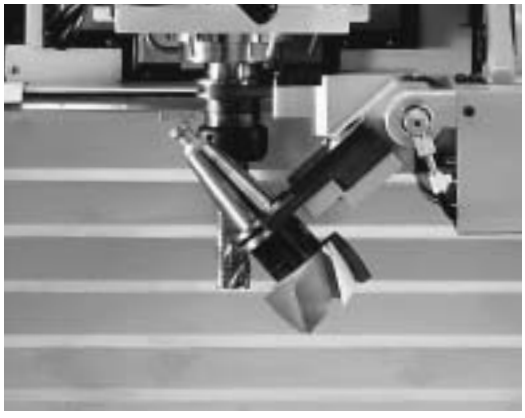
Since the foundation of the company, the core application area for HEMA products has been the machine tool business. Due to increasing machine specifications, higher requirements were also imposed upon the protective covering system.

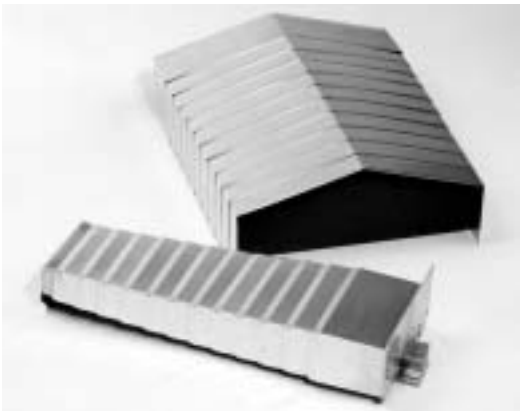
Machining centres require the most demanding protective covers. High performance machining centres work with aggressive emulsions, they cut in a very restricted space sharp-edged chips at high speed and precision. Mainly with our SAMURAI production series, we effectively support the leading suppliers of machining centres. Our products optimally combine costs and benefits both in horizontal and vertical applications. A suitable solution for every application is provided from the most demanding FASTAC types down to the more simple FASTLAP lamella aprons.



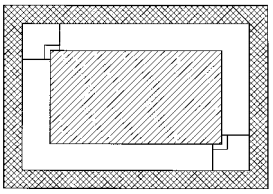








Application areas



Bellows for elevating platforms/ lifting platform units

Within the automotive production and in medical technology comprehensive safety regulations have to be fulfilled. For protecting the mechanical and hydraulic components as well as the working area of the personnel we offer ELASTIC and SAMURAI bellows. They are available for platform dimensions up to 30 sqm in the standard colours light beige or black, optionally as well in RAL colours and with stainless steel lamellas. Usually the mounting is by Velcro tape or by a metal flange. Short delivery times are guaranteed.

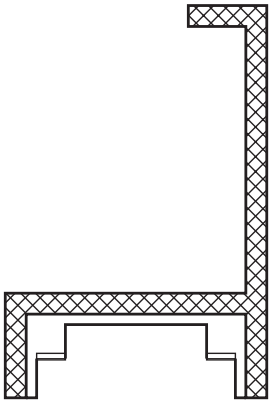
Bellows for jet cutting machines

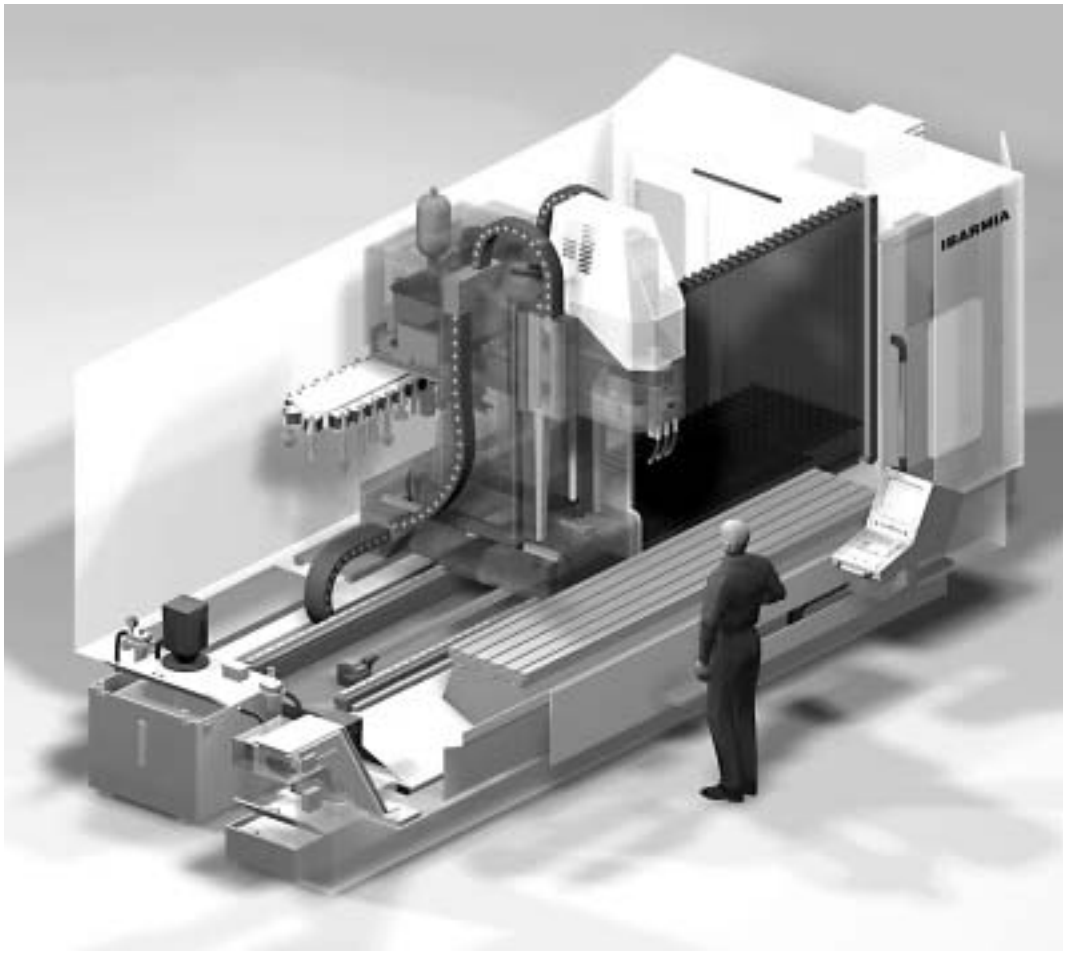
Modern jet cutting machines (powered by laser, plasma or water) use bellows for the protection of the jet canal and the mechanical components (spindle, guides). The jet canal bellows require a high level of guiding, tightness and cleanliness. In the other application areas, resistance to welding spatter, humidity and high bending fatigue is important. The fold material Preotex is suitable for that purpose being permanently resistant up to 600°C, impermeable to fluids and available in different thickness of 0.3, 0.35 and 0.6 mm. Compact assembly dimensions are requested. Use our consulting service in these application areas.

WALLCONCEPT bellows

Bellows for travelling columns

Manufacturers of machine tools with travelling columns trust HEMA to design the rear wall cover. The flexible protective walls are manufactured with extensions of more than five meters (with additional lamellas as well). Despite these dimensions, a speed of more than 100 m/min is achieved by intelligent gliding and pantograph systems. We will consult with you at your premises.



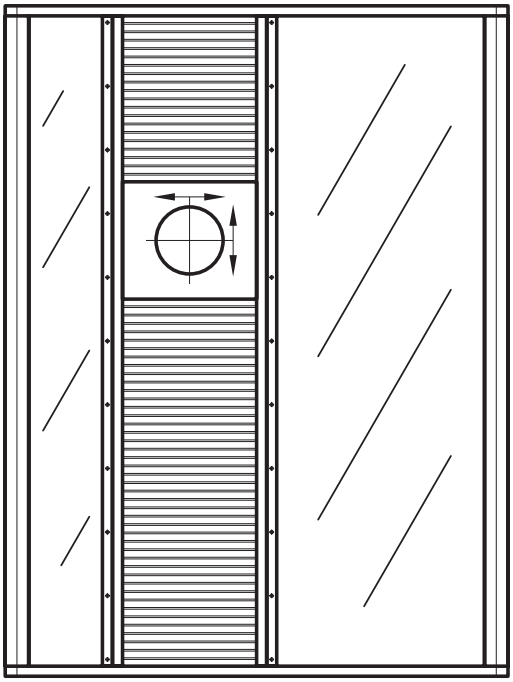


Application areas

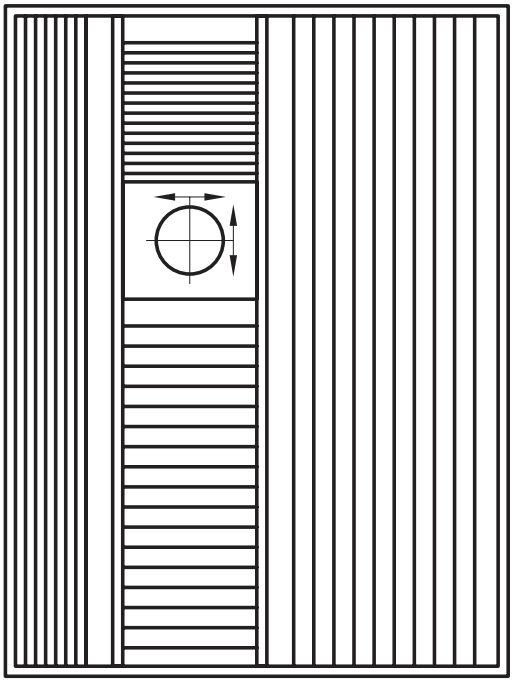
Bellow + Machine Cabin Component = System

The car door is delivered complete (glass, metal plate, electronics) to the assembly line of the car manufacturer by the system supplier, ready to be fitted "just in time". Why not combine this great example of automotive industry to machine building with the right partner?

Nowadays HEMA is already delivering many components (protective systems, guiding, pane, spin windows) altogether – along with advice and service, as reqired, directly into your Kanban system. Tailor-made protective systems – a promise that is kept!



System Roller cover/Apron



System bellow ELASTIC/SAMURAI/LAMINAT

Bellows for HSC applications

Everyone is topping each other with superlatives regarding HSC = high speed cutting. It is essential for the conquering of "speed" to bring "quietness" into the machine design within the area of bellows by

- optimised glider and roller profiles
- damping techniques counteracting the impact of the folds
- high contact pressure of the SAMURAI lamellas
- aligned travel by pantographs and extension limiters

THE RESULT: a functional chip protection under extreme conditions. Many manufacturers already take profit of this insight.