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Press Release

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A system of versatility – intelligent basic functions as a key for success of the Building Kit

Where the task is to create special purpose machinery and workplaces, System Building Kits represent the state-of-the-art, all-round solution. Sophisticated modular designs of standard elements combine with a wide range of accessories to produce exactly the right tailor-made solution for a particular application. It is the fastener technology that provides the user with this tremendous versatility in implementing his design.

The objective of a Building Kit System is to make it possible to create as many applications as possible using standard components. These components must be applicable to a wide range of functions and, at the same time, be so versatile that they can be combined with other components to enable special solutions to be implemented. This apparent paradox is often difficult to put into practice. In order to be both functional and economical, such Building Kits have to provide not only a range of universally applicable components but also some special-purpose units with dedicated functions.

One crucial feature of a Building Kit System are the basic elements. These form the basis of every construction and determine the versatility of the possible applications. In this respect, the fastening elements are of key importance. They decide how quickly and how securely the application is constructed and how sturdy the overall construction is.

One of the first companies to notice this was item Industrietechnik und Maschinenbau GmbH in Solingen, Germany, and it became a fundamental basis of the MB System. As a result, item's MB Building Kit System is based around fastener technology whose physical properties and broad spectrum of applications leave nothing to be desired.

The basic elements: fundamental to machines

As a rule, the tasks expected of a machine construction are defined in advance and recorded in the specifications. Although the individual machine elements may be able to perform numerous functions, the designer must be able to compile the functions required to meet the specifications for that application – irrespective of how complex the machine is and in the shortest possible time.

The machine's basic framework has to be able to absorb the loads generated and incorporate the required machine functions. At the same time, it is important to

reduce the required planning time by the designer to a minimum and present him with all the options for possible design modifications at a later date. The result: the basic framework has to be designed to be adaptable for preferences and adaptations that may only become apparent later. The basic requirements expected of such a framework are rigidity, versatility, rapid (and as a result, time and cost saving) construction and, finally, the overall visual appearance of the machine were the starting points of the development of a modular building kit. The item MB Building Kit System was developed according to these guidelines.

Frameworks made of aluminium system profiles are most suited to meet the requirements of such a framework. This principal of "open architecture" is, on the one hand, in keeping with the essential principal of attachability of as many different functional units (e.g. linear guides, drives, pneumatic devices etc.) as possible and on the other hand guarantees tremendous versatility in integrating the machine in the work flow of a process, for instance in the material handling. Additionally the framework, made up of basic elements, needs an easy way to be adapted to suit the foundations or other components of existing production machinery. Where the rapid erection of sturdy and load-resistant constructions using profiles is required, the fastener technology plays a crucial role. Where the rapid erection of sturdy and load-resistant constructions using profiles is required, the fastener technology plays a crucial role. Its functionality, i.e. reliable physical operation of the components, coupled with simple assembly and minimum machining, will determine in the end how successful the entire construction is, that is, how efficiently and economically the machine or workplace functions. A "successful" construction is one in which the user learns quickly and easily to make use of the functions he needs but where he is unaware of the complexity and sophistication of the technology. The main thing is that the construction holds firm. Aluminium Building Kits, although already proved, still have to fight against an old prejudice: the screwed fastening of two profiles might not have the same stability and durability like weld joints. It is true that there exist systems of fastening for aluminium profiles which are only determined by the postulation of time-saving assembly but not by a safe active principle for strong fastening.

Standard fasteners. Minimal fitting work required

The patented item standard fastener combines in ideal manner the postulation of minimal fitting work and remarkable stability: A single screw locks two profiles at right angles to each other with a minimum amount of machining. The Standard Fasteners are designed to apply maximum screw force to the joint. They simultaneously provide positioning help and guard against twisting. As with all item Profile Fasteners, the Standard Fastener is based on the principal of power-lock connections. Due to the law of friction $F_N = \mu \times F_R$ follows the urgent demand for an as high as possible perpendicular force on the joint with which the face of one profile is pressed on the groove side of the other profile. As a result the frictional force acts against any shear force acting on the joined profiles.

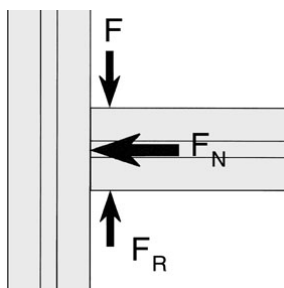


Fig. I.tif: The principle of power-lock profile connection

The normal force in the case of item Standard Fasteners is equivalent to the entire screw force since this is applied by the fitter directly during the tightening up operation. This principle has the great advantage that frictional losses are minimised and, as a consequence, all the power is channelled into producing a profile construction that is highly load-resistant.

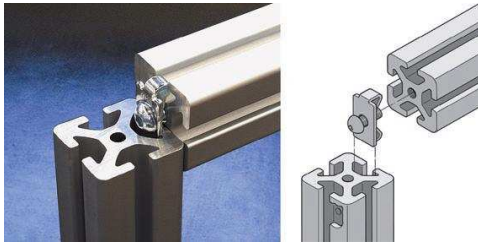


Fig. II.tif: Standard Fastening Sets – introduction of the attractive force into the core of the Profile

Where larger profile cross-sections are used, the arrangement of the Standard Fasteners in each bore of the profile automatically increases the load-bearing capacity of the construction. The strength of the connection increases with the rigidity of the profile elements used.

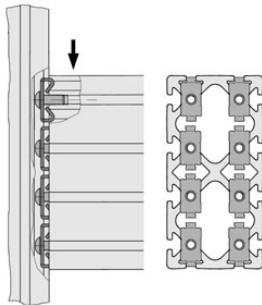


Fig. III.tif: Large cross sections make stronger connections possible

The position of the Standard Fasteners has to be determined by the designer since the screw has to be accessible for tightening through a hole in the profile. Sometimes it is impracticable to determine the position of the hole in advance. In such cases, the item MB Building Kit System also provides suitable solutions: Universal Fastening Sets.

Universal Fastening Sets: Unbeatable versatility

A Universal Fastening Set attaches a vertical strut to a T-Slot Nut in the longitudinal Profile Groove. This enables connections to be made at any point along the length of a profile. The T-Slot Nut can also be retrofitted into the groove and positioned to suit. With this element, however, the designer gets hold on a maximum of versatility so that he can react to any modification of existing construction without any problems.

The Universal Fastening Set also makes full use of the screw tightening force as perpendicular force. It is particularly suitable for paired use. When combined with M8 size screws, the Universal Fastening Set becomes a true power connector and

is ideally suited for use with applications requiring extreme load resistance. The patented Universal Fastening Set is fitted into a circular recess which itself acts as a force distributor at the ends of the Profile section.



Fig. IV.tif: Universal Fastening Sets – variability in the fastening position

This makes item Standard and Universal Fastening Sets both versatile, cost and time saving components, allowing machine designers to implement a whole range of high load bearing joints. And as if that were not enough: the Automatic Fastening Sets even make the machining of the profile ends superfluous.

Automatic Fastening Sets: Sturdy profile connections without machining

The fitter uses the sleeve of the Fastener to cut a self-tapping thread in the face of the aluminium Profile Groove. This patented solution for locking the screw anchorage point has been specially designed to form a perfect fit inside the Profile Groove. And that's not all: No additional tools (such as screw taps) are required. This working process combines cutting a thread and installing a fastening element. The position of the Automatic Fastening Set in the centre of the groove has a favourable effect: the force of clamping on the sleeve has uniformly effect of three directions, each shifted 120°.

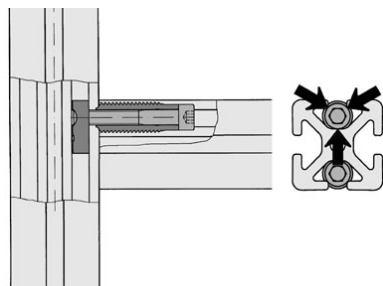


Fig. V.tif: Automatic Fastening Sets is screwed frontally in the Profile Groove

The Automatic Fastening Sets works, from the Universal Fastening Sets before, as a thrust bearing for the screw: also here a screw is pre-tensioned which acts in the direction of the forces of the perpendicular force F_N .



Fig. VI.tif: with use of the Automatic Fastening Set no machinery is required

Outline of Profiles: secure bearing of Vibrations

A machine base made from basic elements is subjected to static loads under normal industrial conditions as experience teaches us. The functions of machinery produce vibrations which superimpose static loads. Sophisticated fastener technology takes this into account these not wished but inevitable factors and does not run the risk losing itself subjected to rough operating conditions. It is only by such forward-planning on the part of the manufacturer that the user can be sure of a long-term investment, designed for rigidity and security, highest grade functionality and productivity.

The profiles in the item MB Building Kit System have a number of features that support the functions of the fastening elements. The flanks of the profiles, for example, are deliberately designed so that they taper inwards towards the centre of the groove when unstressed. The use of fastening elements generates an elastic strain until the flank of the profile comes to rest in contact with the face of the profile.

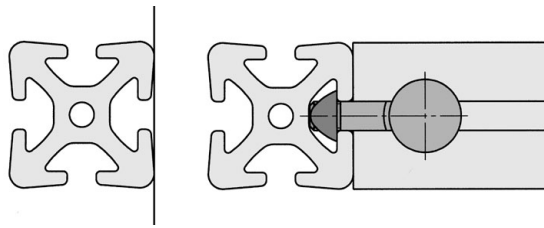


Fig. VII.tif: the pretension of the profile flanks is balancing vibration loads

Loss of pretension here would result in loss of the power-lock effect which, in turn, would have a catastrophic effect on the connection, which would then, by necessity, fail. This elastic deformation actually contributes to the rigidity of the connection, since load on the joint as a result of vibrations or a short lasting overstrain will allow a reserve of pretension of the connecting force to survive.

This example shows: a simple, sturdy base construction copes easily with the loads produced and forms the base for the various functional units. A sophisticated, secure fastener technology has a long-term minimising effect on assembly and fitting work and actively combats all vibrations generated. Because of the possibility of retrofitting fastening elements one can easily and quickly modify the construction at a later date.

Dynamic elements: secure fasteners for shafts

Various functional elements can be integrated in the basic elements to customise the machine or jig, as mentioned before. Especially for handling tasks or linear movements, the Roller Guides from the item MB Building Kit System, themselves mounted on Guide Shafts, were designed.



Fig. VIII.tif: two roller guides for z-axis robots

By using a special fastener system, the profiles of the basic elements can be used directly as support profiles for these shafts. It is, therefore, not necessary to use any special profiles or to subject the shafts to complicated machining processes. The Shaft Clamp Profiles serve as fastening elements which are fitted into free Profile Grooves of the frame made of basic elements. The dual effected shaft clamping mechanism is patented for item: as the shaft is pressed into the Shaft Clamp Profile, it is itself firmly held and, in addition, locks the Clamp Profile in position in the groove of the support profile. In this way, a power-lock connection is created that, as a result of the shape of the Shaft Clamp Profile, is additionally secured due to the undercut inside the grooves.

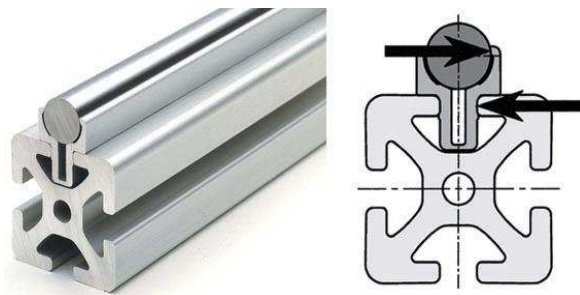


Fig. IX.tif: the patented effective principle of the Shaft Clamp Profiles

An advantage is the use of the existing profile grooves as fastening and guide elements, which allows besides saving of additional components a reducing of fitting work. According to the centering effect of the Shaft-Clamping joint offset to each other is possible: the Linear Guides can be made in any length!

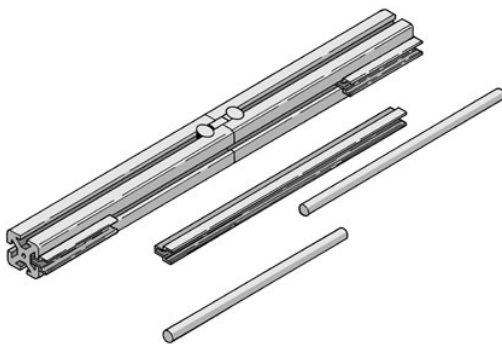


Fig. X.tif: by shifted joints of basic profiles and Shaft Clamp Profiles the linear guide can be made in any length

he MB Building Kit System provides the user with Roller Guides in various sizes,

designed to take various different loads. The shape of the Shaft Clamp Profiles has been specially designed to ensure that the strength of the Shaft Clamp matches the permissible load ratings of the Guides. In this manner, best use is made of the space available and material usage reduced to an absolute minimum.

For the item Building Kit System the requirement of stability must be matched with the requirement of ease of use. The prejudice of a non adequate stability is refuted: consistent application of physical principles one can assume that the basic material limits the range of use, not the fastening forces of the components. The item fasteners prevents anyway the loss of stability because of its intelligent design.

Text and picture data are available for download in the internet :

“www.item-international.com; “Press report”

or on CD-ROM, to be ordered at:

item international, Phone +49 / 212 / 65 80 300, Fax +49 / 212 / 65 80 310.