item

Press-information

Released for publication

© item Industrietechnik und Maschinenbau GmbH
Friedenstrasse 107-109   D-42699 Solingen
Tel.: (0212) 65 80 300 / Fax: (0212) 65 80 310
✉ info@item-international.com
www.item-international.com

item Industrietechnik und Maschinenbau GmbH

From a manufacturer of special-purpose machines to the supplier of the *item MB Building Kit System*

I. The Building Kit System

A. Definitions

Generally speaking, a building kit is understood to be a collection of components that can be used to build objects or functioning units. The most basic form of building kit is a child's set of wooden building bricks, that can be used to build towers and other geometrical and simple functional objects. In this form of kit, however, the individual components cannot be connected to each other. In more complex systems, the components can indeed be connected to each more or less firmly using a specific technology. These can be used to construct geometrical structures with simple static functions. A well-known example is the "SYSTEM" series manufactured by a famous Danish manufacturer of children's toys. If additional functional elements are added to the basic components, e.g. hinges, gearwheels or drive units, it is possible to construct functional systems: vehicles, machines, models etc. These are now termed Technical Kits. Anyone who has ever "worked" with one of these kit systems will know that the components that make up the system can be used over and over again to construct various different objects. These constructions may perform completely different functions. If one has a number of kits belonging to the same series, one finds that the components from one kit can be combined with those of the other kits.

The idea of standardised basic units, a corresponding linking technique and components with specific functions also forms the basis of ***item's MB Building Kit System***.

B. Development of the *item* MB Building Kit System

item was founded in 1974 as an engineering design office and manufacturer of special-purpose machines. The company designed and built special-purpose machines on behalf of industrial firms, drafted drawings and built complete production lines.
The proportion of work done for special-purpose machine engineering rapidly overshadowed the purely design-oriented work. At around this time, the fields of assembly and grinding technology had become key competence areas.

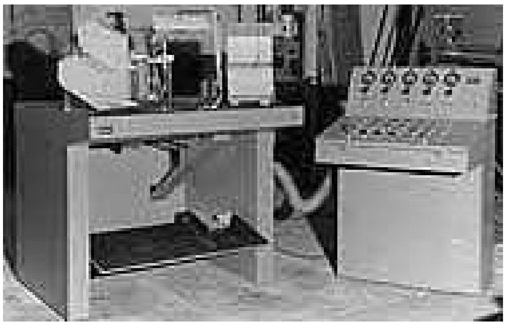

Fig. 1 Automated assembly system for fittings, built in 1976.
(Name of graphical metafile: Foto_1.tif)

In due course, the fields of assembly machinery, in-process testing equipment and the interlinking of automated and manual work stations became key areas.
At ***item,*** it was soon noticed that designing and constructing special-purpose machinery using the conventional steel constructions usual at that time went hand-in-hand with considerable risks. The complex one-off machining of each individual component, the welding, milling, grinding, cleaning or painting operations meant, on the one hand, large investment in machinery and, on the other hand, immense personnel overheads. Since the manufacturing and assembly phases were also highly complex, construction and delivery periods resulted in a long-term commitment of capital. Subsequent modifications of such designs were either impossible or prohibitively expensive.

Special-machine users were by now also demanding shorter delivery times and more flexibility. It was only by meeting these demands that suppliers could hope to stay in the market. In addition, staffing overheads were continuing to rise. (Fig. 2)

Starting with the idea for designing machinery modules so versatile that individually tailor-made machines could be built to suit each application as it arises, item developed the modular steel system for special-purpose machines.
First designs involved machine bases as containers, which allowed not only the functional elements but also all the necessary safety guards to be integrated.

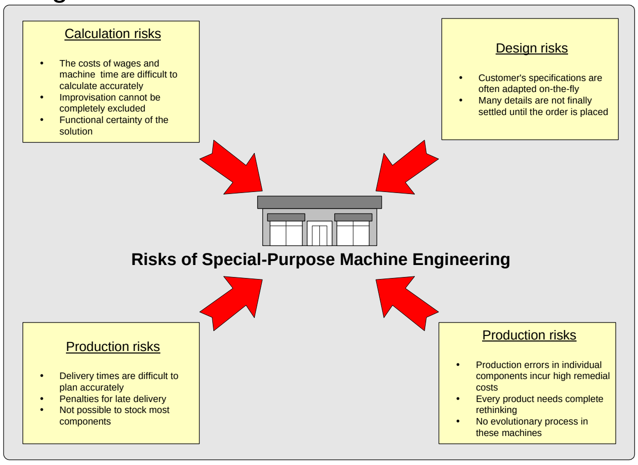

Fig. 2 Risks involved in special-purpose machinery manufacture
(Name of graphical metafile: RISIKEN.vsd)

Fig. 3 Lathe for electrical armatures, 1978
(Name of graphical metafile: Foto_2.tif)

The individual functional modules could, on the one hand, be easily interlinked to suit requirements, and, on the other hand, they were also much easier and cheaper to manufacture. It was, however, perceived that still too many machining operations were required, which were still costly and time-consuming. The container & module system had clearly proved to be a success, but further optimisation was required with a view to reducing costs and increasing flexibility.

For feed and transport systems, the solution presented itself in the form of aluminium profiles that were specially designed to meet the requirements and loads typically encountered in this field. Since the elements were already in existence and ready for fitting, only minimal machining, such as cutting to length, drilling, milling grooves etc. was necessary, leading to considerable reductions in construction time and machining work compared to the conventional steel constructions used in transport systems. This again reduced machining and personnel expenditure.

These existing profile systems did not, however, always meet the requirements of universal special-purpose machine concepts because of the fastening systems and their limited application to specialised tasks. For this reason, the container concept could not completely do away with steel constructions. In addition, the available fasteners still involved too much machining. And so ***item*** developed its own universally applicable Profile System and combined this with a much improved, sturdy but simple fastener system.
The aim was to meet the requirements of machine builders as regards rigidity, but, at the same time, retain its modular nature so that a relatively small number of standard components could be used to respond to any specific application.

This Profile System in conjunction with the Fastening Systems thus reduced the machining activities in the design and construction of frames to cutting to length, drilling, thread tapping, and assembly. As a result, costs per machine for special machinery dropped still further.
Figures 4 and 5 show examples of constructional solutions using the Profile System.

Fig. 4 Fully automatic in-process testing system for electrical equipment, linked to the conveyor system, interchangeable modules allow rapid change-over from one product line to the next. 1984
(Name of graphical metafile: Foto_3.tif)

Fig. 5 Work station, 1989
(Name of graphical metafile: Foto_4.tif)

By using this Profile System in constructing the company's own special-purpose machines, first-hand experience was gained that accelerated the designers' work in advancing to the next stage of development. In this way, new components were rapidly developed. The fairly basic Profile System began to take shape as the ***item*** MB Building Kit System known today, consisting of aluminium profiles, fasteners and function elements.

Putting the ideas referred to here into practice in such an uncompromising manner had serious consequences for ***item***. The development and manufacture of the system components demanded a high level of investment.
One method for covering these high costs and generating profit was to expand the existing business area, special-purpose machine engineering.

The following aspects:

- increased risks in special-purpose machinery
- difficulty in gaining more market share in special-purpose machinery
- increasing competition, and fluctuating fortunes
- increase in local demand for the system components already developed
- implementation of the Building Kit System in the company's own production facilities could not recoup the additional costs of further development and manufacture any more

led to a completely different approach: that is, to make these components available to a far broader field of customers.

In 1984 the company began a direct marketing campaign to sell the ***item*** MB System in Germany. The entire range of components at that time could be displayed in a four-sided A4 brochure (see Fig. 6). The current catalogue has around 290 pages.

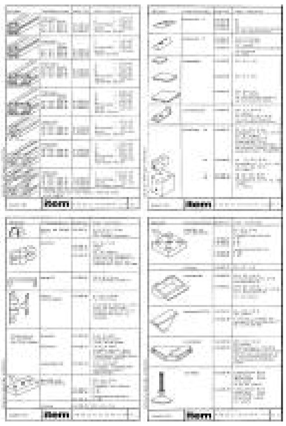

Fig. 6 Presentation of the whole item product range in 1984
(Name of graphical metafile: Pro-Info1-4.tif)

The success of this strategy soon became apparent and with it the decision at the company to continue to expand the system, resulting on the ***item MB Building Kit System***, and to concentrate on extending the customer base and consistently developing the customer-driven approach.

In order to signal to customers the clear direction the company was taking, the development and sale of the ***MB Building Kit System*** and the special-purpose machine engineering section were organisationally separated from each other in 1998.

It is through uncompromising commitment to continued development of the existing system, both in the past and into the future, that the System will find a steadily increasing application in more and more fields. What started as a simple frame-based solution in the early days is now to be encountered in its modern form in innumerable industrial applications. Using the products of the ***item MB Building Kit Systems,*** thousands of users around the world are using successfully implemented production and laboratory systems from simple workbenches to sophisticated, automated handling systems.

The basic idea of the Building Kit Systems for special-purpose machinery, coupled with the company's logical and uncompromising approach to the practical aspects and supported by our close co-operation with customers have made ***item*** a successful, expanding globally active company.

Figures 7 to 12 show state-of-the-art solutions in the fields of engineering, enclosure and guard systems and workbench systems, all constructed using the ***item MB Building Kit System***.

Fig. 7
(Graphical metafile: at007.tif)

Fig. 8
(Graphical metafile: at011-kl.tif)

Fig. 9
(Graphical metafile: at006.tif)

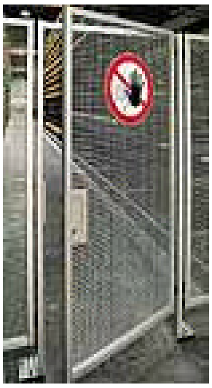

Fig. 10
(Graphical metafile: Schutz2b.tif)

Fig. 11
(Graphical metafile: 21b2.tif)

Fig. 12
(Graphical metafile: Handlng1.tif)

II. The application and limitations of a Building Kit System

Below, we discuss the points already mentioned above, such as cost reduction, decreasing planning times, and the limitations of the Building Kit Systems and the loads on the constructions.

A. Reduction in manufacturing costs

Tradition special-purpose machine engineering, where each machine is built out of steel as a one-off to suit the customer's requirements, demands extremely high levels of activity and expenditure. Use of non-standard components makes it essential to manufacture machine-specific components every time. These parts can hardly be used for other applications and is seldom carried over to new projects. An example is the machine base shown in Fig. 1. In this case, metal sheets are cut to size, bent and welded or bolted in position. The base thus constructed has to be prepared for painting before the "insides" and control systems are fitted. Weld seams need grinding, machining marks and blemishes need removing, the surface has to be cleaned and primed. The painting process requires a high level of technical skill and considerable investment, e.g. painting booths and equipment and waste disposal systems. The process of fitting the "insides" and control systems has to be performed with the utmost care as any damage to the paintwork would involve costly rework. If, during manufacture of commissioning, the customer expresses an afterthought, even if it is minor, such as an additional switch, the effort involved in fulfilling that wish can be considerable. With welded constructions, it may even be necessary to break open a weld, make the alterations and re-weld. All this means that customer wishes are inevitably linked to high levels of expense and are time-consuming.

The use of the Container principle using components from the ***item MB Building Kit Systems*** results in a cost-saving solution. The Container base forms the underlying load-bearing substructure. It is manufactured from standard aluminium profiles cut to size and fastened using the corresponding fastening system. Such operations as cleaning, welding, painting or grinding are not necessary. The only machining operations required are cutting to length, drilling and tapping threads. No cost-intensive special machinery is required.

Thanks to the consistent development of the Building Kit Systems, it is now possible to design all manner of constructions ranging from a simple workbench through to a complex assembly system or 3-axis handling machinery with a large number of dynamic elements. These constructions are designed so that the drive or power units can be fitted subsequently, making full use of the uninterrupted longitudinal grooves and the corresponding T-slot nuts, ensuring a high degree of versatility. Here, standard components from the ***item MB Building Kit Systems*** are used that require no further machining. During assembly, the hard ceramic anodised surfaces of the Profiles prevent minor mechanical damage.

Once the machine has been fully fitted out, the external panels are fitted. Here, too, the parts are to be found in the standard Building Kit System: the fasteners and panels. Operations are restricted here to sawing, drilling and bolting in place.

If, at a later date, a modification is required, this is relatively simple thanks to the flexibility of the modular system components.

B. Reducing planning and construction times

As we have already seen, using the System components described above saves numerous time-consuming operations. Time is also saved, however, during the planning stage. The components of the Building Kit Systems are available as a library for various CAD systems and in various data formats. The Quick&Easy module has been especially designed to link up to the popular AutoCAD® system used extensively in machine design. This module enables the components to be viewed in 3D and linked to make up a construction. While the designer is developing his application, the system automatically creates the parts lists so the parts required can be directly ordered and included in the project calculations. The parts list also makes reference to any machining operations required for each element. The system can, therefore, also be used as an aid to the work preparation department.

By combining set system dimensions, and combining these with a range of freely variable dimensions, the entire construction can be designed in a remarkably flexible manner. Compatibility of the components across the lines ensures the degree of improvisation required is minute, and external problem solving can normally be completely eliminated.

C. Special purpose solutions rather than standardisation

The objective of a Building Kit System is to be able to solve as many problems as possible using the standard elements provided. All the standard elements (e.g. profiles or dynamic elements) should, therefore, be so versatile that they have no specific function with regard to the application, but in conjunction with the other elements, they form a practical solution within the application. This requirement is difficult to put into practice because standardisation is only meaningful up to a certain limit, bearing in mind the economic aspects.

A castor is a special solution, within the Building Kit System. If the guiding principle of modular design were to be applied rigidly here, one would have to provide a range of individual component parts for building castors. Here, however, the idea of a special solution and the economical effects have to be weighed off against each other.
From this it can be seen that a Building Kit System cannot be absolutely modular in all cases and that some special-solution components must be included in the overall picture.

D. Limits on loading

The desire of a supplier of a Building Kit System is to provide the ideal solution in every respect for any application. There are, though, physical limits on the load-bearing capacities of the individual components and the resulting overall structure.
It would certainly be possible to design a Building Kit System for all static and dynamic constructions. The result would be that only high-tensile strength materials could be used in conjunction with a corresponding system of fasteners. For many less demanding projects, however, these components would represent a hopeless case of technical overkill. In such cases, investment would be made in performance that is not required. In the same

way, a slim-line, less sturdy Building Kit System could only be used in a few applications. Customers, requiring a sturdy solution would be forced to look for alternative suppliers.

A closer look at the ***item MB Building Kit System*** shows the effect this way of thinking has had. There are three sizes of cross-section and groove geometries, Line 8, Line 6 and Line 5.
Each of these Lines has been designed with different loads and applications in mind, where there are overlaps between the Lines. In order to ensure that products are available that represent the ideal load-bearing and market requirements, Lines 8 and 6 have been supplemented with additional cost-saving, light-weight profiles.
For lower load-bearing requirements, ***item*** developed the ECONOMY Series which is compatible with Line 8.

In contrast to job-related developments of special machines, the frameworks within which components of the ***MB Building Kit System*** are to be used are initially unknown. The developer is not provided with customer specifications and has to use his imagination and experience to perceive as many applications as possible, before writing his own specifications and developing the product in such a way that it will meet as many requirements as possible. The tight-rope act involved in balancing the optimal solution with versatility and economic aspects is apparent.

E. Components and their precision

In the same way that there is a balancing act involved between functionality and economy of the components in the Building Kit System, there is a similar conflict of interests in the search for precision between economy and the striving for the highest level of perfection.
Applications involving chip-removing machining in the field of machine tools and production machines are limited in terms of the precision that can be achieved. The field of workpiece handling and manipulation, such as feed, loading and unloading are typical areas for the application of the ***item MB Building Kit System***.