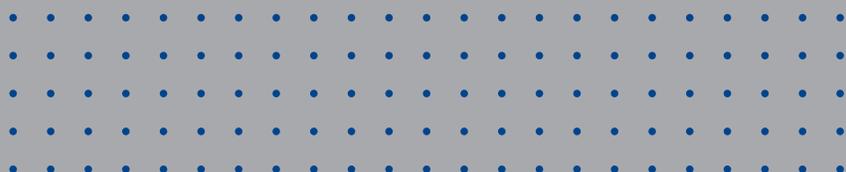
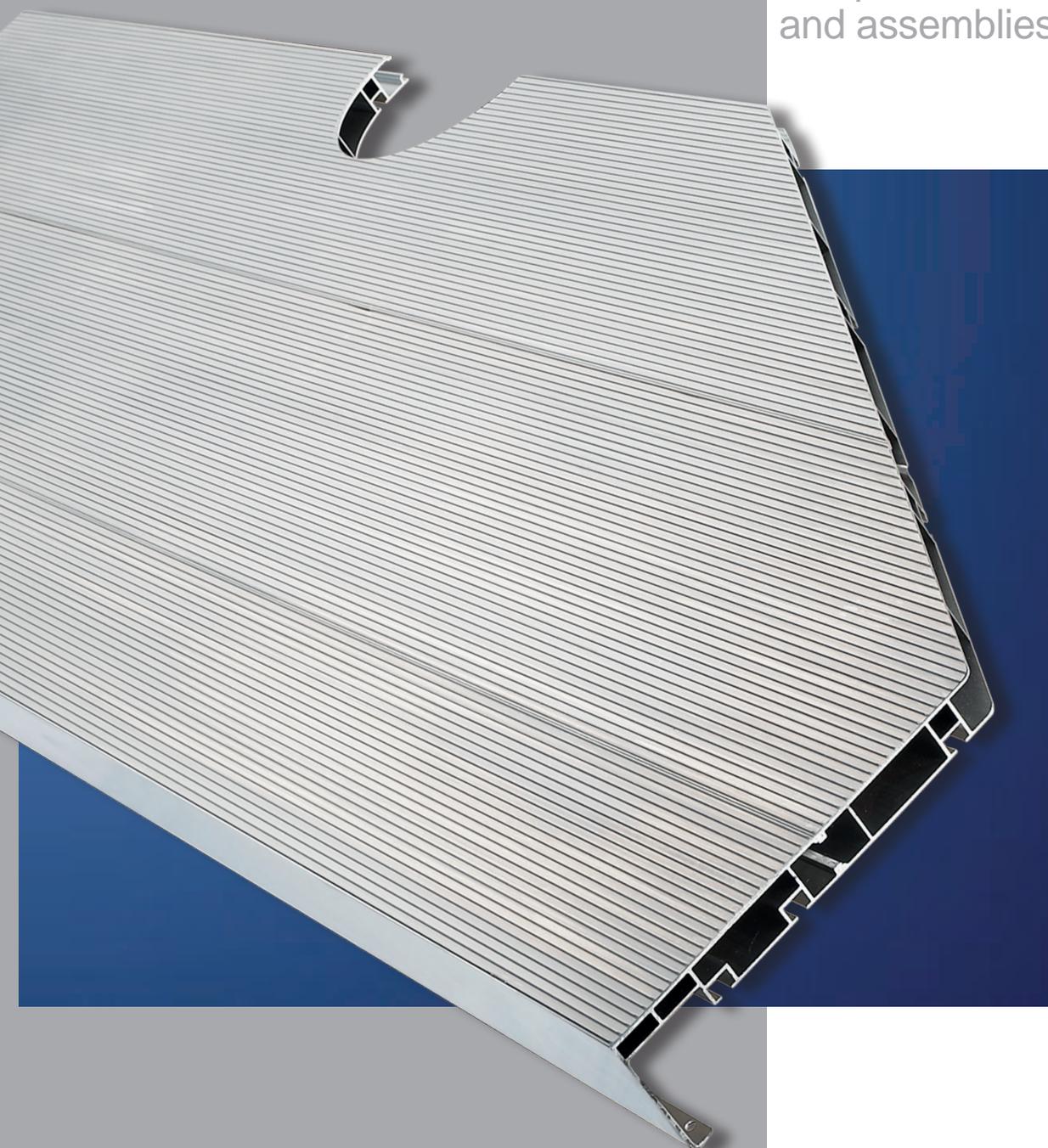


Technical Information

Aluminium extrusion
compounds
and assemblies



OTTO FUCHS KG
Shaping the future of metal forming



The OTTO FUCHS Group

Space flight, the global transportation of people and goods, high-tech in mechanical engineering, the striking architecture of big cities ...

... OTTO FUCHS is represented in all these with its ideas, products and solutions. Our business relationships are established all over the world, with many of our clients in the aerospace industry, the automotive and construction industries as well as the general engineering industry.

Over the years, a company that began over 100 years ago as a brass foundry has evolved into a group operating on an international basis with over 9,000 committed staff.

OTTO FUCHS KG is the nucleus and powerhouse of the group. Prudent internationalisation on the one hand along with an eye on maintaining the company's competitiveness are the underlying principles of the family business in its endeavour to achieve sustainability.

OTTO FUCHS
DÜLKEN GMBH & CO. KG
Viersen, Germany

OTTO FUCHS KG
Meinerzhagen, Germany

WEBER METALS, INC.
Los Angeles, USA

OTTO FUCHS
TECHNOLOGY (SHENYANG) CO., LTD
Shenyang, P.R. China

SCHÜCO INTERNATIONAL KG
Bielefeld, Germany

OTTO FUCHS HUNGARY KFT.
Tatabánya, Hungary

OTTO FUCHS
OBERFLÄCHENTECHNIK GMBH
Leonberg, Germany

FOXTEC-IKHWEZI (PTY) LTD.
East London, South Africa





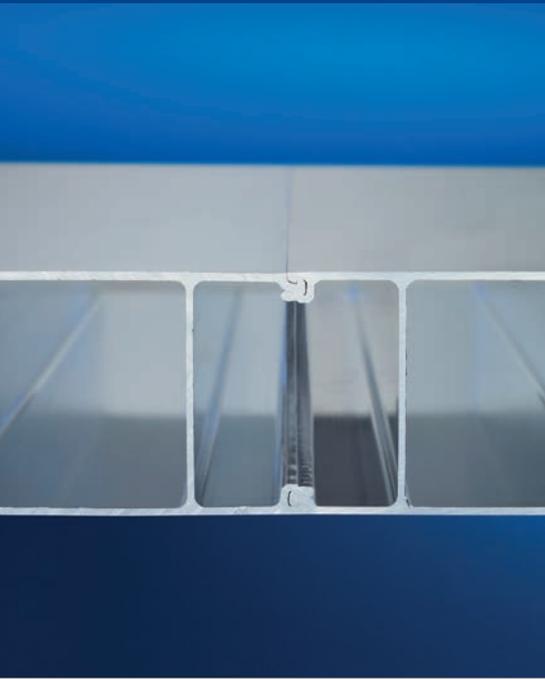
Aluminium profiles are frequently the key technology used in forward-looking lightweight constructions. All manner of innovative and successful solutions in all areas of our everyday technical activities would not be possible without these well thought-out aluminium profile construction methods. Whether in modern building facades, general or electrical engineering, aerospace, ship or vehicle construction, our lightweight construction concepts are put to use wherever there are masses that need to be moved.

The rule of thumb in modern logistics and transport operations is: bigger volumes, bigger payloads, smaller consumptions, smaller pollutant emission rates. The future belongs to efficient commercial vehicles. When it comes to reducing weight and saving costs, our innovative concepts are placed at the forefront of all the suppliers.

We can also optimise your constructions taking into consideration all due economic and ecological factors.

Challenge us!





The OTTO FUCHS cold joining process

Defined properties – to guarantee a long service life

The use of profiles in modern lightweight constructions is frequently subject to limitations due to the size of the available individual profiles. Minimum wall thicknesses increase in line with a profile's circumscribed circle. This frequently makes large-format profiles heavier than would be required to comply with structural requirements.

Our solution: to combine several small, light, joined profiles into an integral structure.

The cold joining method developed and patented by OTTO FUCHS (OFCJ) provides a unique means of creating a sturdy

and permanent profile joint. It allows light, thin-walled extrusion aluminium compounds to be created instead of using large, thick and heavy profiles. This results in lower tool costs in comparison with large profiles and also makes it possible to create an individually configured overall construction that matches the structural requirements.

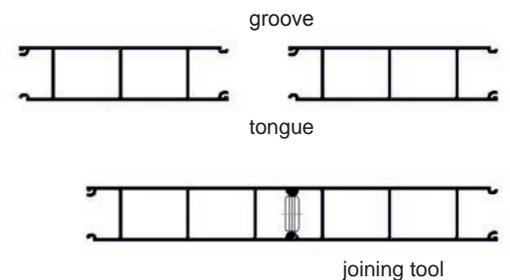
Their outstanding static and dynamic load capacity are daily proof of the reliability of these aluminium extrusion compounds.

The OFCJ has already proven itself in thousands of components in a wide range of application areas.

The OTTO FUCHS cold joining method (OFCJ)

The OFCJ is a powerful and cost-effective joining process. It requires that the profiles in question have a form and shape that comply with their envisaged purpose and that a tongue and groove system is accommodated at the edges of the profiles. The joining process itself consists of inserting the profiles into each other, clamping the pieces in place and pressing the indi-

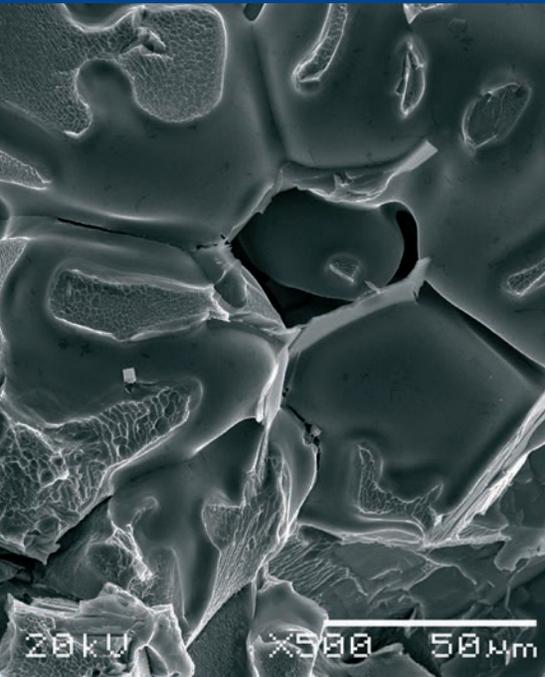
vidual profiles. This squeezes the tongue and groove joints together. The method represents an economic alternative to longitudinal seam welding. Moreover, there is no welding energy that might impact on the material properties and no ensuing delay, nor is there any visual impairment of the surface due to weld beads or other changes brought about by the join.



The OFCJ is an extremely environmentally friendly process. No filler metals are needed, no shielding gases are required, and no emissions are generated (for example smoke, UV or IR radiation). The main advantages are the speed with which the joint is created, the resulting economic benefits, and the durability, which is comparable with that of thin metal.

The form freedom and functional integration offered by our extrusion technology are preserved virtually to their full extent in individual profile layouts.

For instance, screw head grooves for accommodating sliding nuts, sealing grooves for accommodating rubber seals or screw canals for connecting other structural components can be integrated in the individual profiles. Since the profiles can be inserted at any position, it is possible to create highly differing panels from a few profiles, in a modular fashion. The edge profiles of the panels can be fitted with tongue and groove systems to enable individual panels to be joined to form even larger surface elements.



Outstanding properties

Properties of profile joints

Technological benefits

It is the technically outstanding properties and low weight that make the OFCJ stand out from conventional joining techniques. Its main characteristic is its high static and dynamic load-bearing strength, which is not subject to change even under recurring loads. A further advantage is that the cold joining method does not introduce any heat into the component. This means there is no deformation and no need for any complex straightening measures; moreover the material properties of the joining members are not affected.

The use of thin-walled single profiles leads to lower material input and in turn economic benefits to the benefit of the customer. From a visual point of view, our aluminium extrusion compounds have a favourable appearance.

Our joining system is form fitting, free of play, and undetachable, making it a favourable alternative to conventional clip or snap joints, and naturally based on a method that is both economic and environmentally friendly.

Materials

The preferred OF material AS 05.71 lends itself well to processing into structurally com-

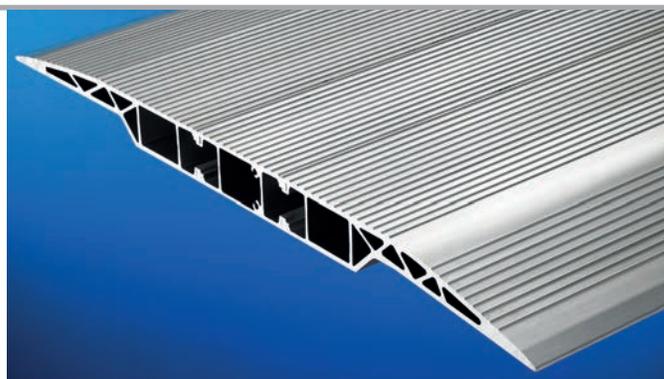
plex profiles and offers optimum cold formability that permits the application of cold joining.

Material properties

Material	Yield strength	Tensile strength	Elongation to fracture
EN AW 6060/6063* (AS 05.71)	≥ 160 N/mm ²	≥ 215 N/mm ²	≥ 12%

*different materials on enquiry!

Example of use: loading ramp





Resistance to corrosion

The preferred aluminium alloy AS 05.71 (AlMg0,7Si) is highly resistant to corrosion and can be used in many applications with no further surface treatment. The material is also characterised by the fact that even after ten hours in the Kesternich unit at

SF W 2.05 in accordance with DIN 50018 and additionally being subjected to a 240-hour salt spray test in accordance with SS DIN 50021, no corrosive changes were determined, particularly in the area of the joint.

Stability

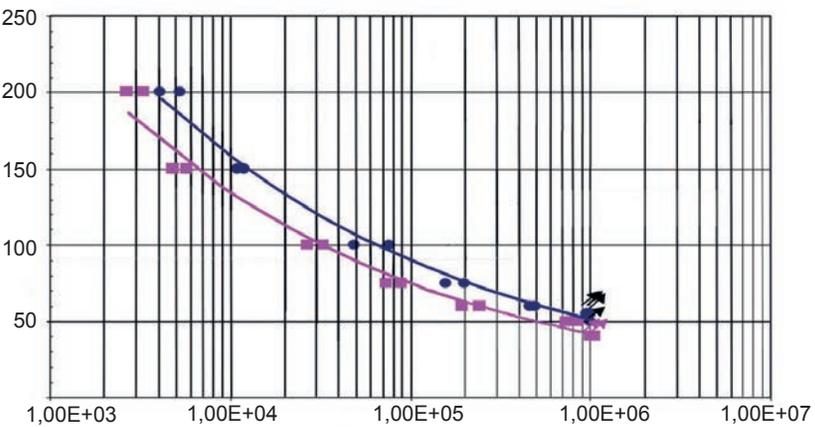
Since the basic strength of the material employed is not fully reached in the joint zone, attention should be given to orienting the greatest tensile stresses such that they

are as far as possible parallel to the joint seam when assembling the profile panels. The following strength values can be assumed for the joint itself:

Transverse strength of the rolled connection	> 200 N/mm**
Longitudinal strength of the rolled connection	> 100 N/mm**

** These values are not material properties but the results of technical tests performed on the rolled joint, with reference to the thickness of the cover plate, and they depend greatly on the geometric form of the sample. The attainable strengths may occasionally be considerably higher. Please contact us if you have any further questions.

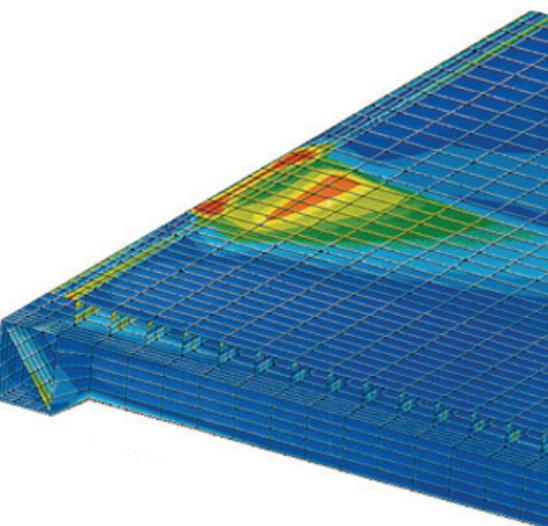
Typical strength values



Woehler diagram



Machined platform element



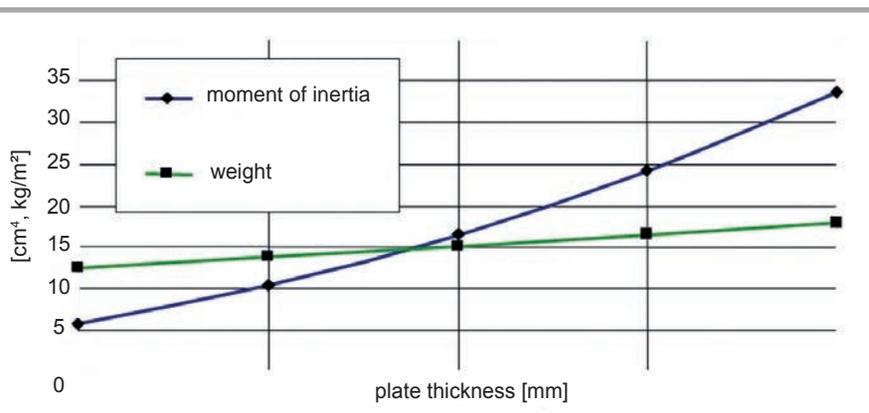
Load capacity

The structural properties of a profile panel are determined by the properties of the extrusions used. When planning to use a profile panel, the requirements as regards rigidity should be clearly defined, and the panel profile should be optimised in line with requirements. Our extrusion technology offers a full range of possibilities for a stress-optimised construction. It should be noted in

particular that as the panel thickness increases, the effective moment of inertia increases strongly, while the weight is only subject to a low level of linear increase.

We offer full support in adjusting profile cross-sections to customer requirements, including a finite element analysis, if required.

Finite element analysis of an extrusion plate

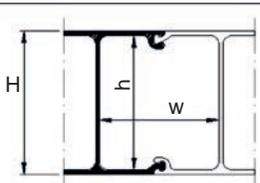


Dependency of the geometric moment of inertia and weight on the panel's thickness

Spectrum of possibilities

By connecting a similar hollow-chamber profile with a rectangular cross-section, it is possible to create profile panels whose

dimensions are determined solely by the limitations of the equipment used.

Type	
	
Parameter	
Extrusion height H [mm]:	≥ 12 - 150
Internal height h [mm]:	≥ 9
Internal width w [mm]:	≥ 48
possible compound dimensions	
Width W_{max} = 3.600 mm	
Length L_{max} = 6.300 mm	

Range of possible dimensions



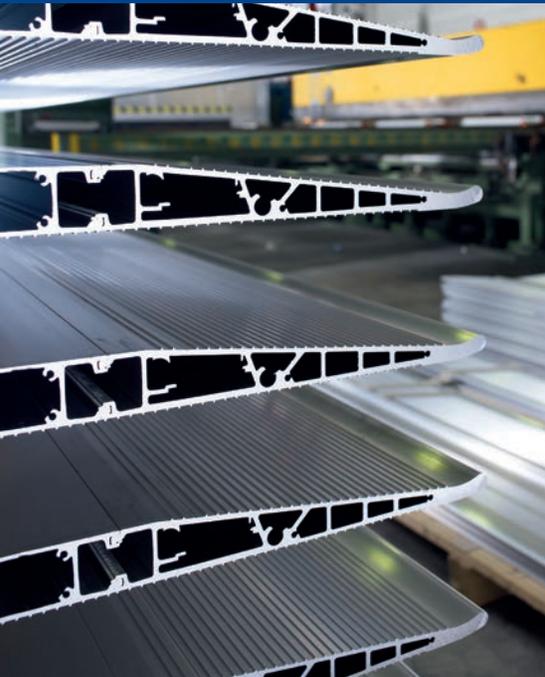
Benefits to you

Technical benefits

- high static and dynamic load capacity
- form fitting joints, free of play, and undetachable
- shear-resistant
- does not affect the material properties of the joint members, and there is no deformation from any welding heat
- pleasant appearance of joints
- low minimum wall thickness and in turn low weight per metre/ unit area
- particularly favourable rigidity and weight ratio
- unproblematic coating of aluminium extrusion compounds
- modular solutions simplify diversity of construction variations
- no particular sealing requirements, virtually impervious to liquids

Economic benefits

- weight advantage = cost advantage
- use of cheap, low-strength materials
- high form freedom with low tool costs
- short production times
- low cost due to economic (fast) joining method
- high availability, small minimum production quantities



Summary

By combining conventional extrusion technology with the OTTO FUCHS cold joining method, it is possible to create extremely light and rigid aluminium extrusion compounds or panels for a wide range of applications.

This allows significantly more favourable rigidity and weight conditions compared with constructions using large welded profiles.

The low tool costs incurred by joining single profiles facilitate the economic and technical optimisation of the construction with respect to the applicable requirements.

By doing away with the hitherto standard longitudinal weld seam, the profiles are no

longer affected by heat, with all the attendant changes to material properties and profile deformation. This makes it possible to produce very flat panels without the need for complex and expensive straightening measures.

The OTTO FUCHS cold joining method significantly lowers production times and, in turn, reduces the production costs compared to welded constructions.

Please contact us for assistance if you wish to construct profiles and composites for specific applications or problem areas.

Challenge us!





Selected example applications

OTTO FUCHS –
Your powerful partner in development and construction

Truck floors and pedestals

The core of the innovative concept is the self-supporting integral construction of the flat aluminium components. By employing cold-joined OTTO FUCHS aluminium extrusion compounds composed of individual load-supporting profiles, it is possible to create significant load-bearing and weight benefits. The large pre-assembled elements reduce or even remove the need for complex substructures and enable rational final assembly. Non-shearing OTTO FUCHS aluminium extrusion compounds create a bracing effect on the vehicle as a whole, with a positive effect on vehicle handling.

Advantages and customer benefits

- simpler substructure
- higher payloads
- fast production and assembly times
- purchasing advantages thanks to simpler material planning
- positive vehicle and handling characteristics
- use of aluminium as a material enhances the vehicle's value retention



Truck tail lifts

OTTO FUCHS has substituted conventional truck tail lifts for designs using cold-joined aluminium extrusion compounds. By doing away with welding and thereby eliminating the drop in strength caused by the impact of heat in the joint zone, it is possible to employ a lower strength aluminium material. This lends itself better to material pressing and then at lower cost. In combination with welded-on longitudinal and transverse struts made of aluminium of high load capacity, these light and visually favourable tail lifts are suitable for use in a range of load classes.

Advantages and customer benefits

- considerable cost benefit resulting from the OTTO FUCHS cold joining method (up to approx. 30% lower than welded joints)
- short throughput times
- favourable appearance
- easy to effect variations, including foldout construction
- available load classes: 0.75 t, 1.0 t, 1.5 t, 2.0 t, 2.5 t



Bridge decking

Highly durable, corrosion-resistant aluminium profile panels from OTTO FUCHS are characterised by their fast assembly times compared with constructions involving steel, wood and concrete. The large-format decking elements only require placing in the ground construction. This results in considerable cost reductions on the building site. Since aluminium is highly resistant to corrosion and does not require the repeated application of protective coatings, there are virtually no maintenance costs.

Advantages and customer benefits

- high load-bearing strength
- stiffening effect
- short assembly times thanks to industrial prefabrication
- low building site costs
- high-quality appearance
- easy servicing
- long service life and low maintenance



Commercial vehicle platforms and operating platforms

Both the cost and the duration of production can be reduced by substituting the differential construction using individual profiles and metal decking for a self-supporting integral construction comprising OTTO FUCHS profile panels. The vehicle value is also visually enhanced. The special processing applied to the surface of the decking also enhances its functionality in terms of slip resistance and safety. The anodised surface reinforces the sophisticated appearance and gives the vehicle an innovative character.

Advantages and customer benefits

- enables a simpler substructure
- standardised modular construction
- high degree of standardisation of accessory components
- fast production and assembly times
- functionally sophisticated
- optically favourable surface



Multifunctional flooring for vans

Thanks to its high level of functional integration, the use of this aluminium extrusion compounds is the optimum solution for accommodating the varied demands that are commonly placed on a vehicle's flooring, both from a commercial and a functional point of view. The selected profile construction enables the possible integration of load securing and vehicle seat attachment functions. Its enormous stability means it can be incorporated as a supporting element in the vehicle structure. In addition, the integral construction facilitates the assembly process.

Advantages and customer benefits

- cost benefits of economic production
- long service life
- clean joints for enhanced appearance
- low weight
- simple assembly
- high functional integration





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..... We give form and function to high performance materials.

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