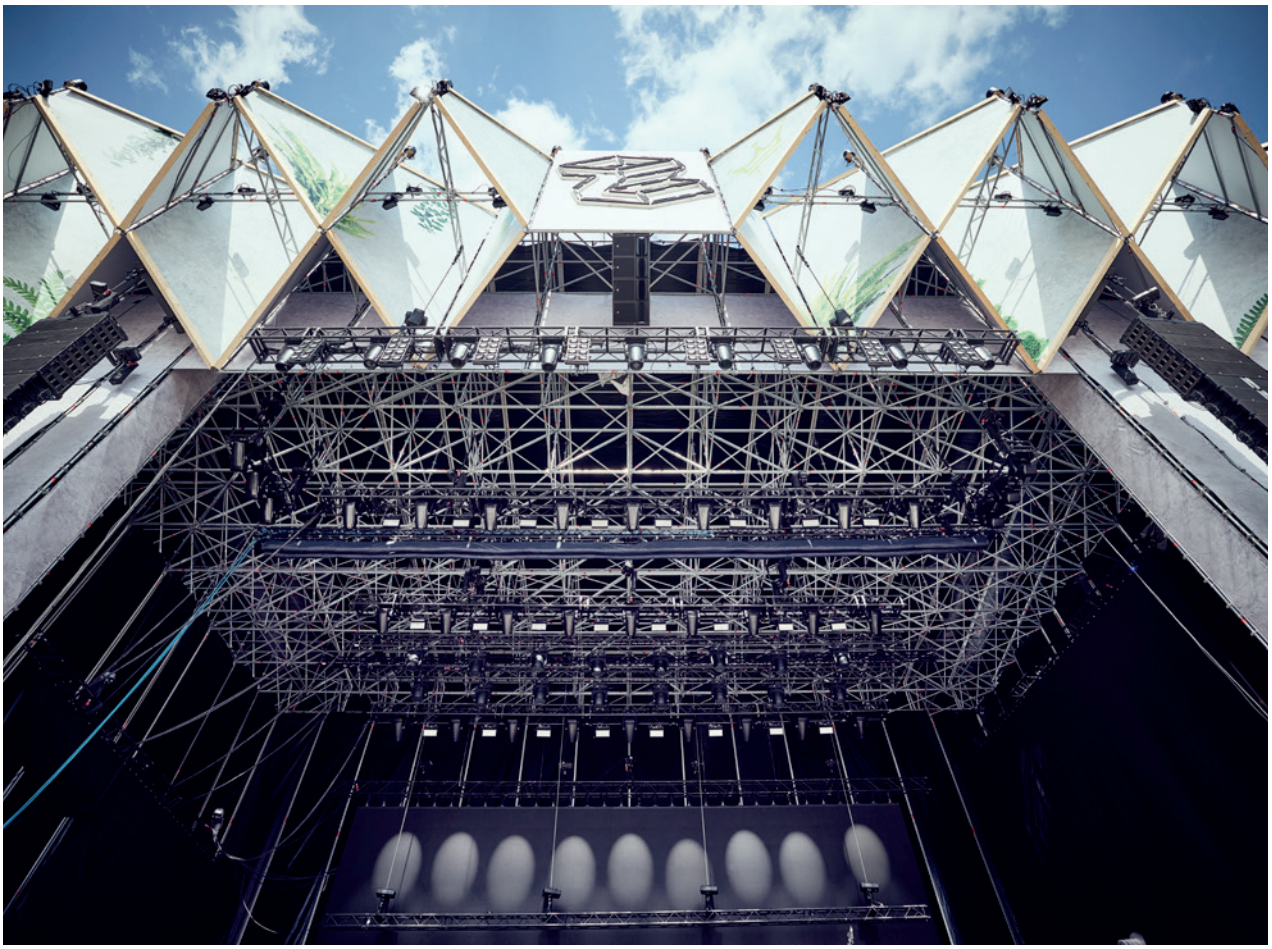
Layher

More Possibilities. The Scaffolding System.

Quality management
certified according to
DIN EN ISO 9001

Energy management
certified according to
DIN EN ISO 50001

Environmental management
certified according to
DIN EN ISO 14001



Layher
System
Solutions

EVENTS INDUSTRY

- Typical applications
- Solutions
- Useful ideas

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01 THE COMPANY

Quality made by Layher comes from Gueglingen-Eibensbach. Our company has set down deep local roots since it was established. Right up until today, development, production and management are all in one place. This proximity creates advantages that benefit our customers all over the world: short distances, short response times, controlled quality and production.

Layher's history began more than 80 years ago with the manufacture of ladders and other agricultural equipment. Since then, Layher has significantly influenced the market for scaffolding and access technology. Today, more than 2,700 employees create more possibilities for our customers every day with a comprehensive range of services, a sustainable training programme and customer proximity. In more than 50 countries worldwide.

Layher lives **economic and ecological sustainability** in all process steps. Social responsibility towards employees, customers and society takes centre stage.

Headquarters in Gueglingen-Eibensbach

Plant 2 in Gueglingen

Plant 3 in Cleebronn

Discover the world of Layher in its company film.

WITH LAYHER, THERE ARE MORE POSSIBILITIES.

A comprehensive range of innovative products, application-orientated solutions and comprehensive services for easy, fast and safe working at height.

Continual product innovations and design improvements

As leading innovators, we work continually to make scaffolding construction even simpler, even faster and above all even safer with our products. The development work focuses on:

- Improving safety during assembly and dismantling
- Increasing assembly capacity thanks to lower weight, more ergonomic shape and reduced number of components
- Increasing efficiency and profitability
- Complete integrability of new products into existing system
- Opening up of new fields of business with new products

The Layher Lightweight philosophy embodies this innovative spirit: the use of high-tensile steels and design improvements in lightweight products allow for assembly capacity to be increased by up to 10% and transport costs to be reduced by up to 12%.

Continual product innovations and design improvements

Products for greater safety when working

Safety when working is in everyone's interest. When you use Layher products, you satisfy the statutory requirements relating to safety when working, in every respect and in their latest version, or you even set new standards for safety at the site. This includes facade scaffolding with advancing side protection, shoring and stairtowers that can be assembled safely on the ground and then moved by crane, or shoring towers that are assembled directly at the place of use with system-integrated and advancing side protection.

Greater safety for event scaffolding

Large stocks and rapid material availability

Layher can draw on flexible production resources and significant inventories, and so can guarantee customers uniquely fast delivery at all times. We can deliver dependably and punctually for orders placed worldwide. "No time to lose" is also the motto of our logistics concept: customers can collect the materials they need from their Layher service centre, have them sent totheir warehouse, or delivered just-in-time to the site. This means they can start work without delay and complete their projects efficiently while maintaining the top quality Layher has come to represent.

Shipping warehouse at the main plant

Close-knit network of service centres

A worldwide network of subsidiary companies ensures that we are always close to our customers. You can rely on our Layher standards wherever you are in the world: local warehouses, technical support, training in accordance with national regulations and safety standards. The benefits for you: We can respond optimally to market-specific needs, because we know the local conditions, cultural characteristics and of course each country's specific regulations. This makes us competent partners, for internationally operating companies too.

Digital planning with LayPLAN SUITE

Scaffolding Information Modeling – SIM for short – is an intelligent process based on 3D models. SIM not only allows scaffolding constructors to plan, assemble and manage temporary scaffolding structures more efficiently, but also affords access to BIM at the same time. With the integrated Layher software solution LayPLAN SUITE, customers are provided with a powerful tool for the SIM process.

Standard and expansion parts in the component library of LayPLAN SUITE

Expert assemblers and technical assistance at the construction site

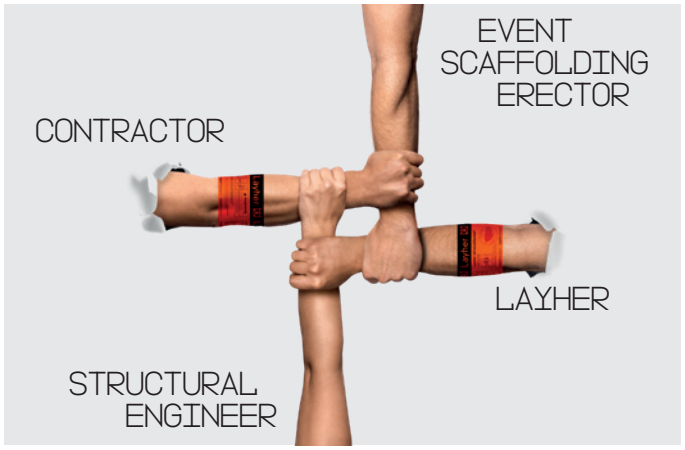
Our priority is our customers' success. This is why we believe in close cooperation, and invest in genuine and lasting partnerships at every level.

Our well-qualified engineers devote themselves to your specific requirements, finding solutions for you that deliver the right results at the right price – including directly on the site. It may be that new applications have to be tried out or that assistance is needed when assembling Layher scaffolding for the first time. Expert assemblers are there to assist you and your employees – at your site too.

Technical advice from expert assemblers on the spot

Strong partnership is part of our DNA

At Layher we're convinced that close and trusting cooperation between manufacturer, scaffolding company and end customer is the right model to ensure success when working on construction sites and projects. Only with this strategic partnership can jointly defined objectives be achieved economically and safely. Because it's not enough to have an outstanding product for successful scaffolding construction – what's crucial is what you do with it.



Technical seminars for regular training of employees

In toughly contested markets, companies need qualified employees. That's why Layher organises regular technical seminars specifically for scaffolding construction and building companies, preparing you for current and future challenges in scaffolding, and giving you more confidence and knowhow to make the most of Layher products.

We supplement our seminars with many further offerings, such as practical product training and open days for construction companies, with interesting presentations by industry specialists and intense group discussions amongst scaffolding professionals to encourage the exchange of ideas.

Technical seminars on theory and practice

02

STAGES & PODIUMS

Perfectly staged – whether it's a theatre performance or a festival. The stages and podiums from Layher make your event more efficient, safer, and unlimited in any dimension.

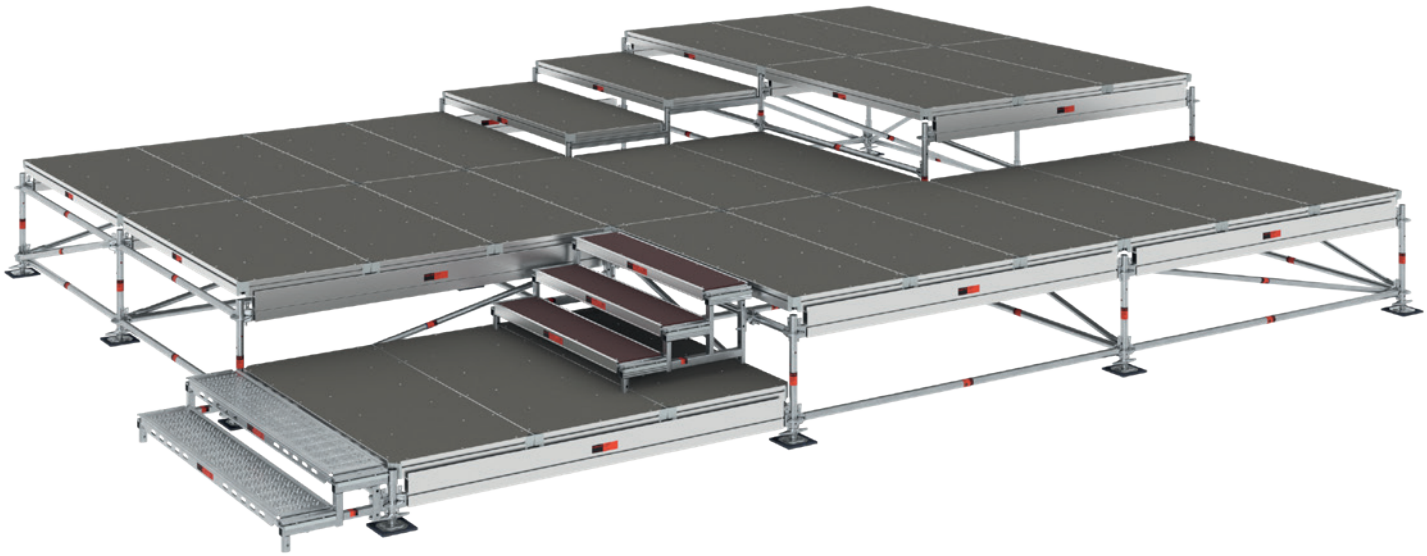
Thanks to the Layher Allround Scaffolding construction kit, on which the Layher Event System is based, no compromises have to be made at the site. With their modular adaptability to the factors at the locality, combined with proven Layher product quality, these stages and podiums are always a safe place to perform.

The Benefits for You

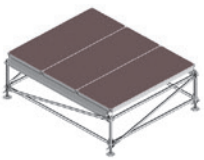
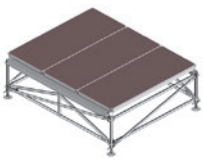
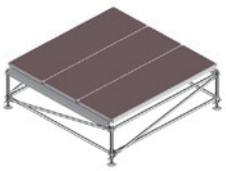
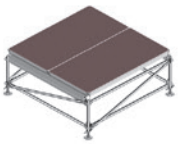
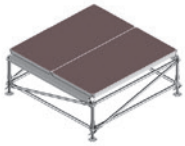
- Basic unit: Expandable, versatile ground plans, standard dimensions and performing levels
- Expandable: Caters for all requirements for different roof and support systems
- Substructure / assembly of Allround Scaffolding: High loadbearing capacity, rapid assembly and dismantling, palletisable
- Practically-minded design: Rugged connection technology, ergonomic handling, low-wear aluminium and steel parts, corrosion-proof thanks to hot-dip galvanisation, space-saving storage

For the basic variants of the podiums, inspection books are available. For more information see the Event Systems price list.

2.1 Grid of Stages and Podiums



The basis of Layher Event Systems is the standard dimension for scaffolding construction. Depending on the requirements for the application, the individual standard dimensions enable the use of two or three decks, different loads and expandability at any time using expansion parts of Allround Scaffolding. Guardrails, stairs or grandstands can be fitted without any problems, thanks to the identical dimensions of the Integrated Layher System.

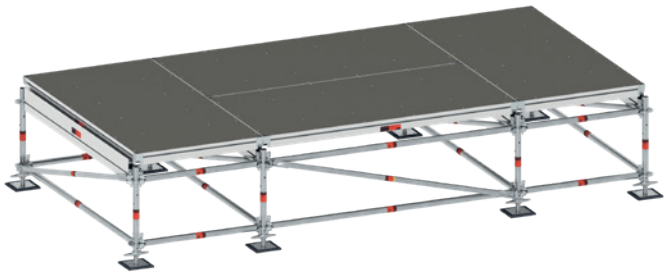






Module	EV 86	EV 86+	EV 86Q	EV 100 Metric*	EV 104
Bay [m]	2.07 x 2.57	2.07 x 2.57	2.57 x 2.57	2.00 x 2.00	2.07 x 2.07
Deck size [m]	0.86 x 2.07	0.86 x 2.07	0.86 x 2.57	1.00 x 2.00	1.04 x 2.07
Decks per bay	3	3	3	2	2
Perm. loading [kN/m²]	5.0	7.5	5.0	7.5	7.5

* Further metric-based components can be found in the Allround Scaffolding catalogue.

Technical data and detailed information can be found in the Event Systems catalogue.

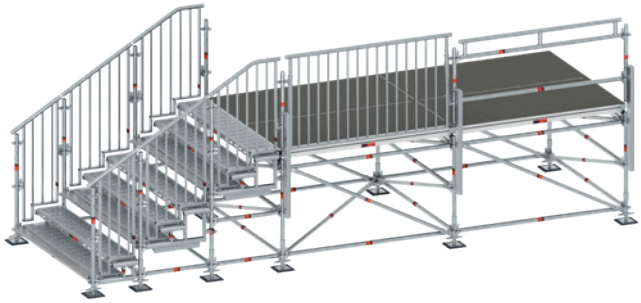
2.2 Event Deck



With the Event Deck, many geometric shapes can be built without extra effort. With the aluminium stile section, suspension is possible in both the longitudinal and transverse directions. The stile section and the reinforced cross rungs ensure high stiffness.

- Permissible working load of 7.5 kN/m² (L ≤ 2.07 m) or 5.0 kN/m² ((L = 2.57 m))
- Available with and without detachable corners
- Problem-free combination with other Layher deck generations thanks to Integrated Layher System

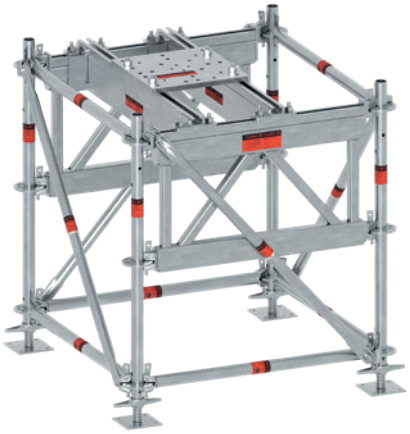
2.3 Guardrails and Stairs



Safety is of paramount importance at events. Layher offers system-integrated handrails or guardrails with child safety feature as side protection on podium and stages.

Access to these stages and podiums by event technicians and performers should be both safe and convenient. Stairs can be constructed in combination with Robust or steel decks and with the aid of a few components. The stair stringers can be extended accordingly, depending on the required height.

2.4 Universal Base



Operating stage roofs above a certain size without connecting the roof to a podium has not been economical since the introduction of the new regulations on temporary structures (EN 13814). The Universal Base provides you with an efficient way of connecting your roof structure to a Layher podium. The special feature of this module is that it is possible to adjust infinitely to practically every support position.

The system is dimensioned for the forces resulting from small and mediumsized roofs. If the Universal Base is to be used for larger roof systems, then it is advisable to install an additional support directly below the steel plate.

- Available for bay lengths: 0.86 m, 1.00 m, 1.04 m, 2.00 m, 2.07 m
- Less ballasting required: Forces arising from the rope hoist (wind braces) are absorbed by the podium, meaning that the dead weight of the podium can be partially offset
- Greater clearance at the level of the wind braces due to attachment points provided at deck level
- Awkward terrain at the installation site can be bridged over or compensated for without any problem
- Complete system with stairs, ramps and guardrails available

03
GRAND STANDS

Take your seats and enjoy the show – with Layher Event grandstands every spectator gets their money's worth, without losing out on the expected comfort and the necessary safety.

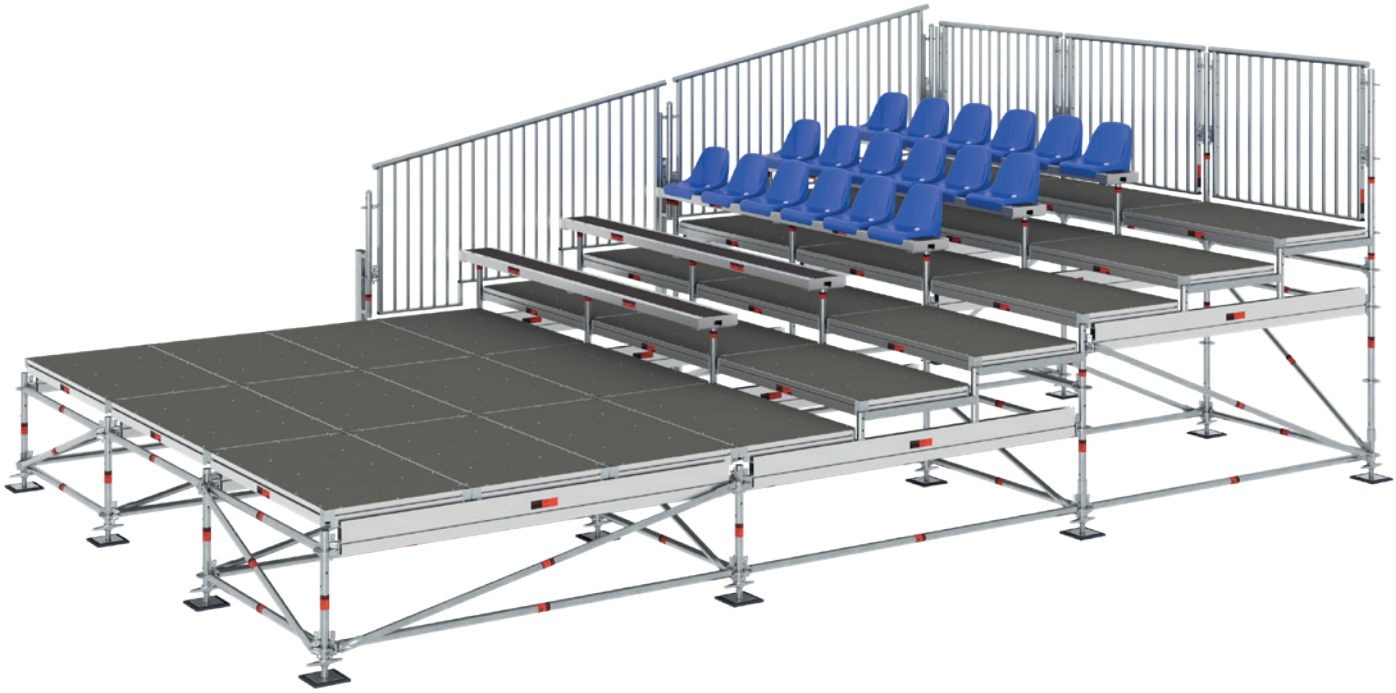
With the Allround Scaffolding construction kit, there are no limits on the substructures for these stands. They can be put up even in locations with different levels, permitting events in a special atmosphere for visitors. The strength of the system: you can build customised and specialised solutions in any dimensions and with any features.

The Benefits for You

- Standard solutions: Standard material, economical and complete solutions from a single source, rapid availability, verified safety
- Substructure with Allround scaffolding: High load-bearing capacity, rapid and flexible assembly and dismantling, choice of equipment
- Easy-to-handle parts: Easy to transport and store, palletisable
- Special structures: For individual requirements

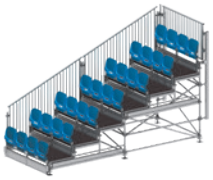
For the standard versions of the stands, inspection books are available. For more information see the Event Systems price list.

3.1 Grid and Gradient of Grandstands



The basis of Layher Event Systems is the standard dimension for scaffolding construction. Depending on the applications, the individual standard dimensions permit an optimum riser angle as well as suitable seating on the stand. In addition to that, the expandability using expansion parts or Allround Scaffolding is assured by the Integrated Layher System.



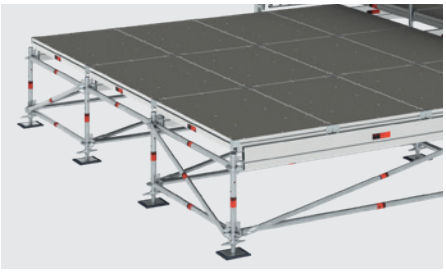



Seated grandstand	EV 86 x 16	EV 86 x 25	EV 86 x 33	EV 100 x 25 Metric*	EV 104 x 25
Step height [m]	0.166	0.25	0.333	0.25	0.25
Riser angle [°/%]	11.1 / 19.4	16.3 / 29.2	21.2 / 38.9	14.0 / 25.0	13.6 / 24.1
Standard dimensions [m]	2.57 x 2.07	2.57 x 2.07	2.57 x 2.07	2.00 x 2.00	2.07 x 2.07
Non-fixed seating	possible	possible	possible	recommended	recommended
Fixed seating	recommended	recommended	recommended	possible	possible

* Further metric-based components can be found in the Allround Scaffolding catalogue.
Further variants on request.

Technical data and detailed information can be found in the Event Systems catalogue.

3.2 Grandstand Parts



The Layher Event grandstands can be built with just a few parts and expanded with further Allround Scaffolding parts. This allows almost any site to be selected for building a stand.

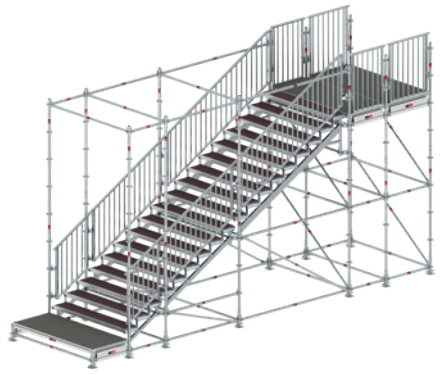
Components of the system:
- Stand elements
- Intermediate steps
- Side guardrails
- Guardrail posts

3.3 Seats

Layher has the seating options to match the intended use or operating conditions. Alternatively, already available chairs can be placed on the Event stands, while taking account of the specified access width.

The choice is between:
- Benches
- Shell seats in a range of colours
- Folding seats in a range of colours

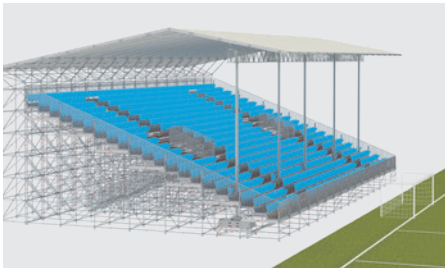
3.4 Accesses



The stair stringer series ETF matches the system's standard dimensions in Layher Event Systems. This allows easy provision of efficient accesses to stands. Stairs and escape stairs as per DIN 18065 for public areas are also possible without any problem depending on the design.

Key data of the stair stringer series ETF as per Layher dimensions:
- Continuously up to 18 steps
- Access height of up to 3 metres without intermediate platforms
- Structures in conformity with rules as per DIN 18065
- Ideal for use in inner stairways ("vomitories") and for intermediate platforms
- Can be installed in corners of podiums without any problems
- Can be used for stands, as well as for performers' access and stage access

3.5 Roofing



The solution for roofing temporaryr grandstand structures: the Layher Event grandstand roof. It affords protection from sunlight and precipitation, with the least possible obstruction of visibility thanks to narrow supports. This avoids the need for complex and expensive special structures for roofing.

The Event grandstand roof at a glance:
- Re-usable system solution for grandstand roofing
- Various roof widths for flexible adaptation to local conditions
- Slender support on the event side for the lowest possible obstruction of visibility

04 FOH TOWER

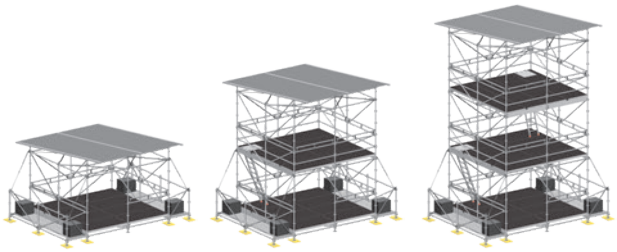
The Layher FOH Tower kit system provides you with the right solution for your Front-Of-House applications. To meet the most frequently encountered requirements, a total of twelve FOH Tower complete KITs are available.

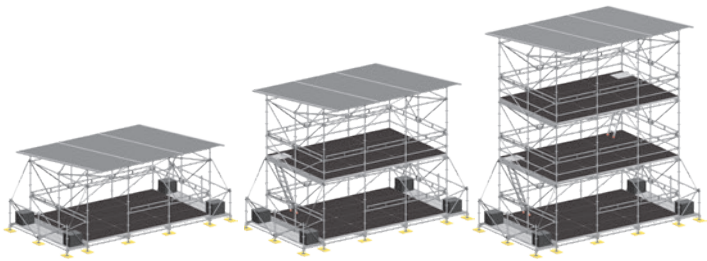
The kit system combined with flexible Allround Scaffolding offers a persuasively wide range of uses. Whether it's two or three bays wide, with or without a projecting roof and entrance, with one, two or three storeys. The Layher FOH Tower kit system means more possibilities.

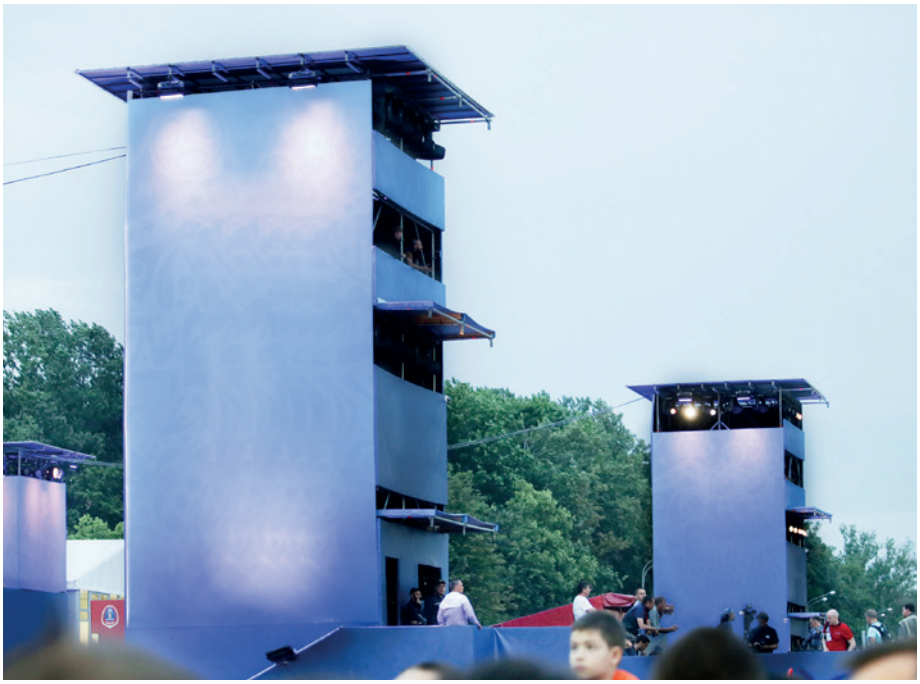
The Benefits for You

- Quick and easy assembly thanks to optimum use of material
- Neat and practical design down to the last detail
- A maximum of three levels are possible, all without intrusive central supports
- Complete enclosure using Keder tarpaulins
- Very few special parts

Variants







For the FOH Tower, two inspection books are available: 4.14 m x 4.14 m (4 x 4) and 6.21 m x 4.14 m (6 x 4). For more information see the Event Systems catalogue.

05 PA TOWER

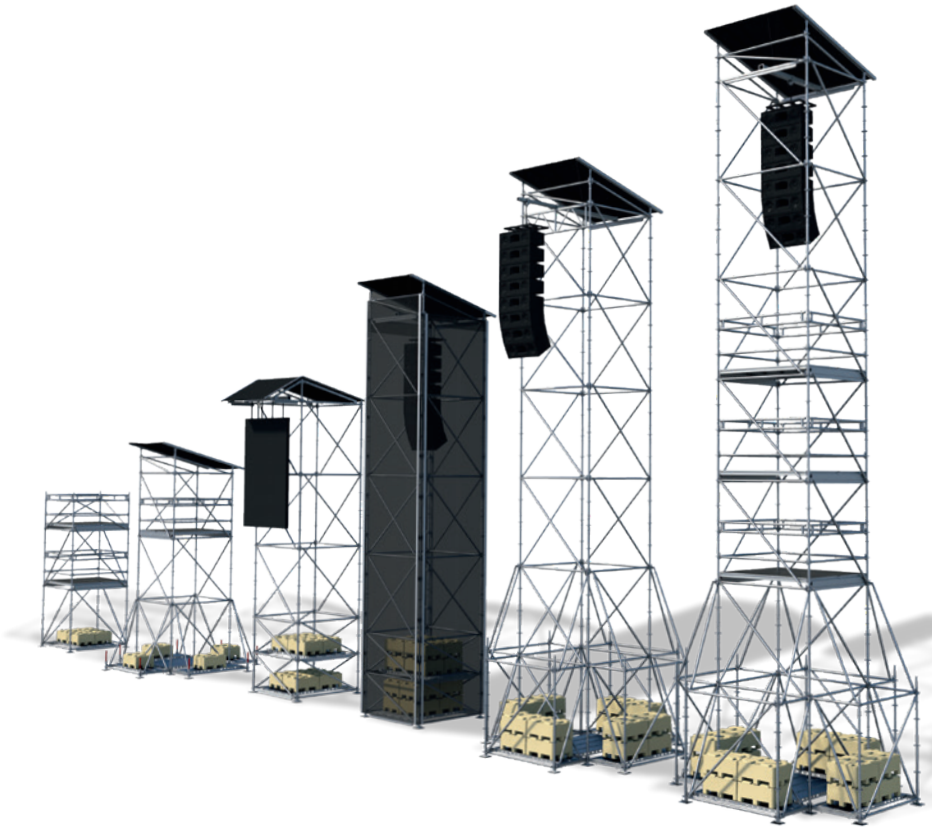
Towers for loudspeakers, camera equipment or lighting have become an integral part of any sporting or cultural event. The requirements for PA towers are as varied as the applications PA towers that are used here and offer solutions for sound reinforcement, lighting and videography.

The Benefits for You

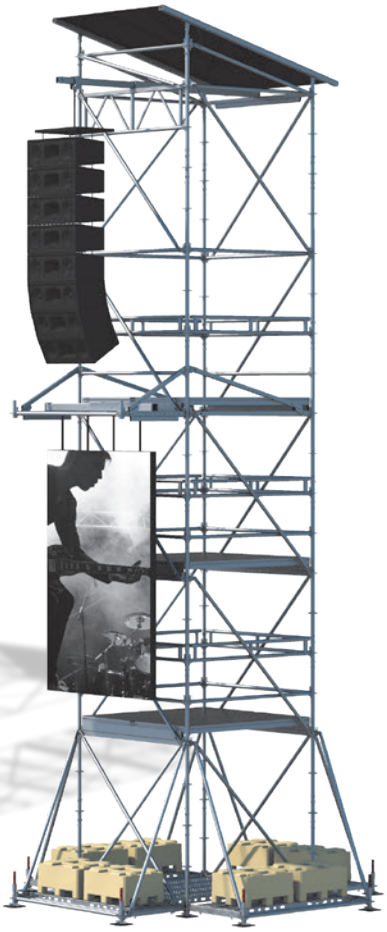
- Modular design, based on the Allround construction kit
- Economical to assemble thanks to bolt-free wedge and pin connections
- Minor logistic effort thanks to small packing dimensions
- Investments are protected by new application possibilities for
- existing material without major additional investments
- Fast assembly and disassembly thanks to a small number of Layher system components and the use of proven connection techniques
- Planning and legal certainty thanks to available inspection book
- High load-bearing capacity

For the PA Tower Plus, an inspection book is available.
For more information see the Event Systems catalogue.

5.1 PA Tower PLUS



Variants



Example for use

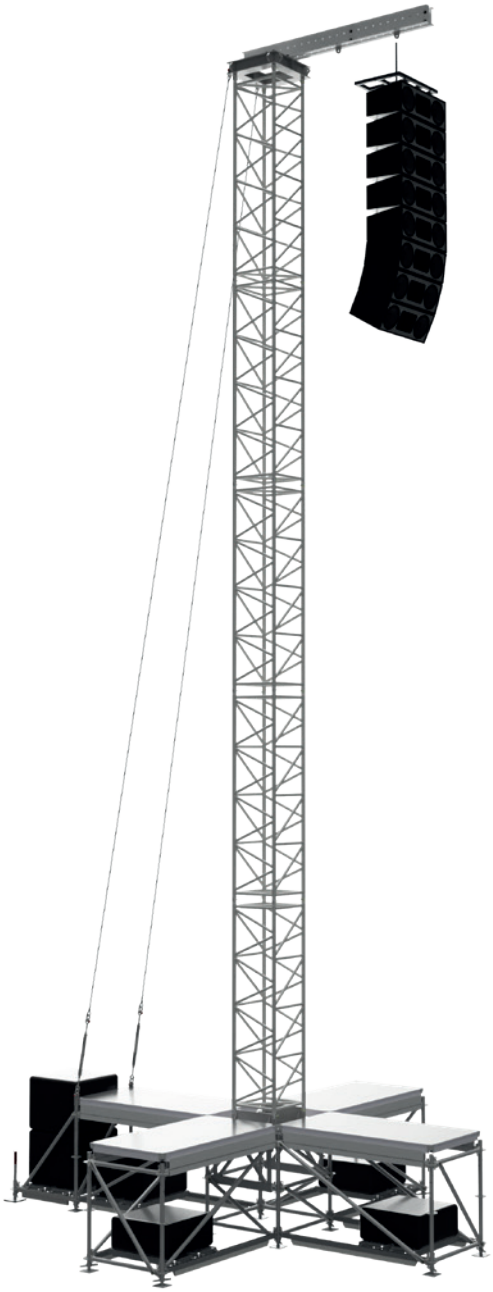
Two surface areas are available for the PA-Tower PLUS – 2.07 x 2.07 m and 4.14 x 4.14 m or 2.00 x 2.00 m and 4.00 x 4.00 m – plus heights from 4.7 m to 14.7 m. The applications range from classic loudspeaker towers and camera/directing towers to towers for lighting or advertising – roofs and enclosures using tarpaulins or the Protect System that quickly fits onto Allround Scaffolding cater to every requirement.

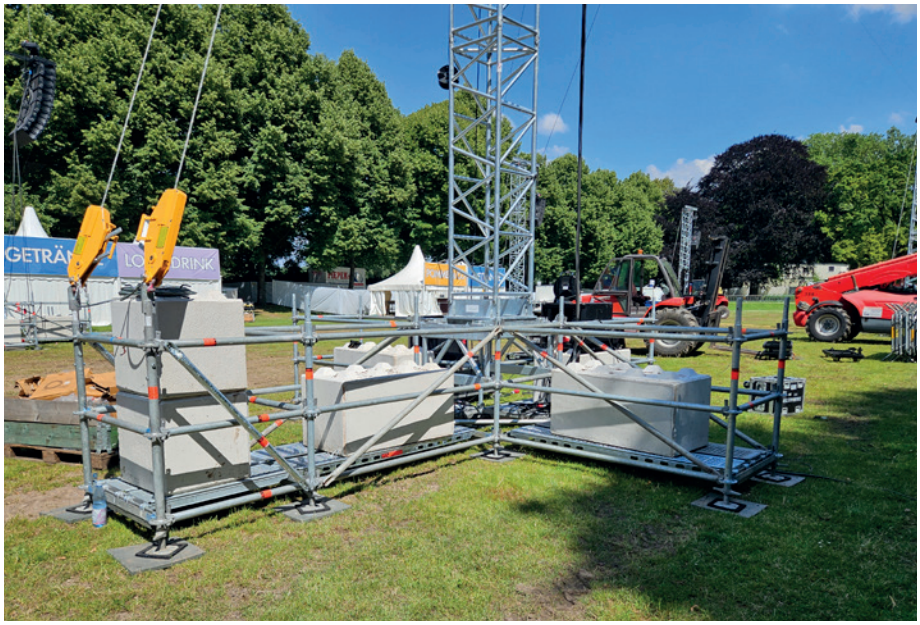
Example for use:

- Surface area 4 x 4 m
- Three working levels
- Video screen bracket
- Projection for loudspeakers
- Roofing

5.2 PA Tower MAXI

The Layher PA towers made of Maxi-Truss are compact to store and quick to erect. They are used for all types of PA systems that can have a dead weight of up to 1.5 tonnes. The product consists of just a few individual parts. The tried and tested Layher Allround Scaffolding is the basis and is supplemented by the Universal Base. A truss system up to 12 m long is assembled on this base, to the top of which the aluminium TwixBeam is attached as a cantilever.





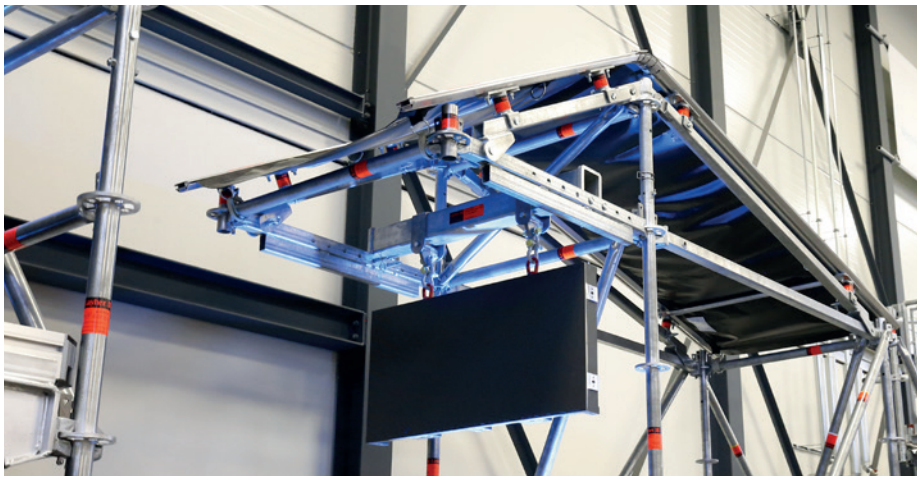
06 VIDEO SCREEN SYSTEM

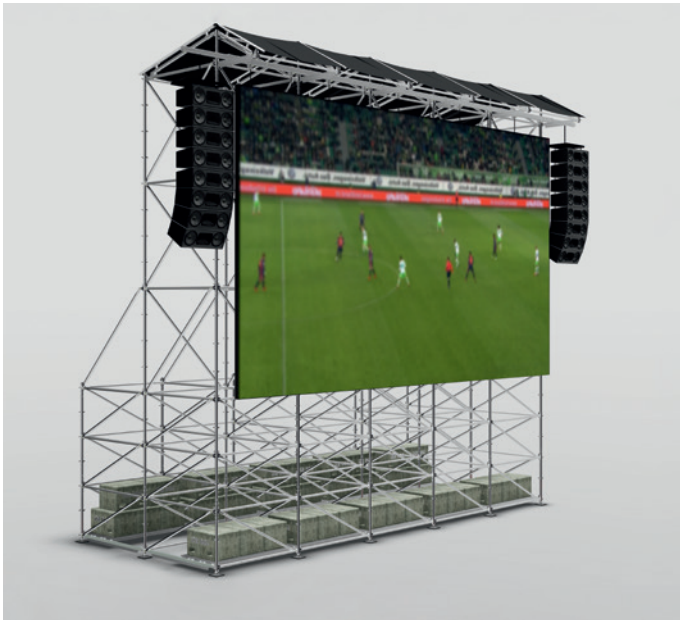
To give all of the audience a closer look at the performers at major open-air concerts or at major sporting events like the Football World Cup, LED video screens have now become essential. But since not every concert and not every fan community makes the same demands of a video screen, Layher has designed its Video Screen System for easy adaptation to requirements on the spot.

Based on proven Allround Scaffolding from Layher, it can be adapted in modular form to the most commonly used video screen sizes. Complete kits are therefore available, offering you not only certainty in your material planning thanks to an already available inspection book for all variants in accordance with DIN EN 13814, but also a high degree of legal security and simplicity, since no further structural strength calculations are needed.

The Benefits for You

- High degree of planning certainty and simplicity, by covering many application scenarios with one system and by rapid material availability
- Stability is verified for up to wind zone 4 (coast)
- Economical to assemble thanks to bolt-free wedge and pin connections





For the video screen system, an inspection book is available. For more information see the Event Systems catalogue.

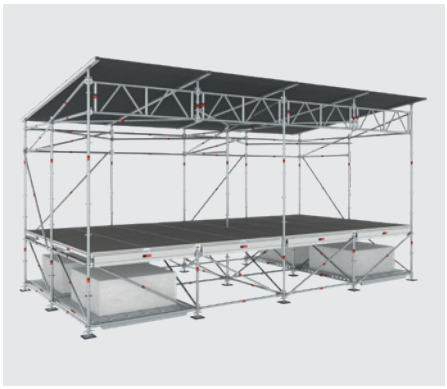
07 SIDE ATTACHMENTS

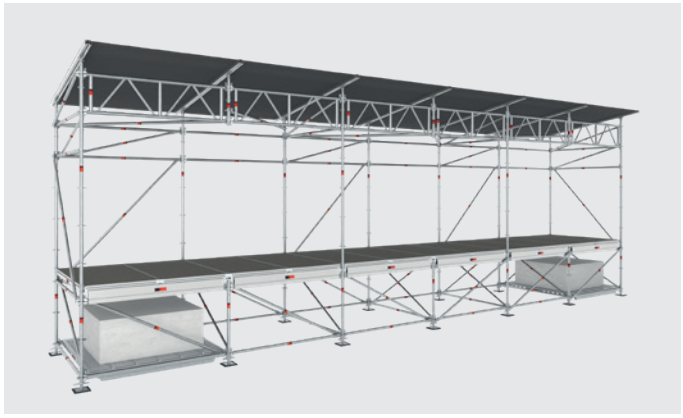
Structural strength calculations and inspection books for smaller open-air stages and mobile stages usually ignore a technical area positioned at the side or behind the stage floor. This technical area is needed for preparing and storing technical equipment and instruments. Unlike expensive one-off solutions, side attachments for stages using Allround Scaffolding are considerably faster to build, making them more economical too.

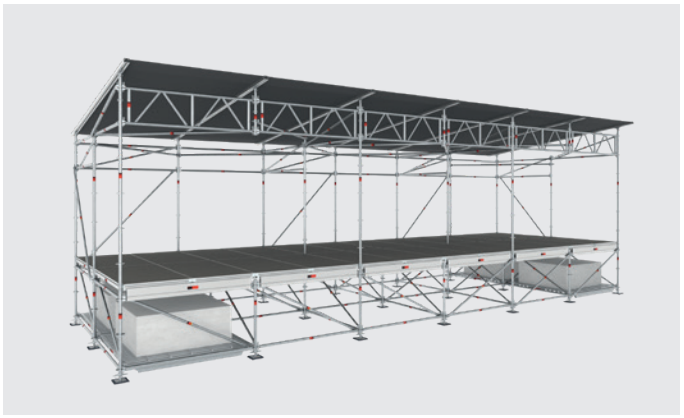
To assist its clients even during the planning phase, Layher has verified the stability for a range of different configurations. None of the possible variants is subject to the criteria of the model approval requirement – meaning that an inspection book is not needed.

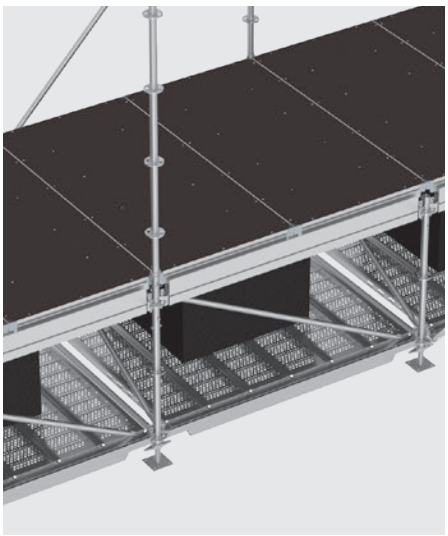
The Benefits for You

- No need to invest in individual structural analyses for side attachments
- Safety under the law from available verification of stability
- Added value of existing material – new application options without additional investment
- Well thought-out system solution using rapidly available standard Allround Scaffolding parts
- Quick and easy building manually





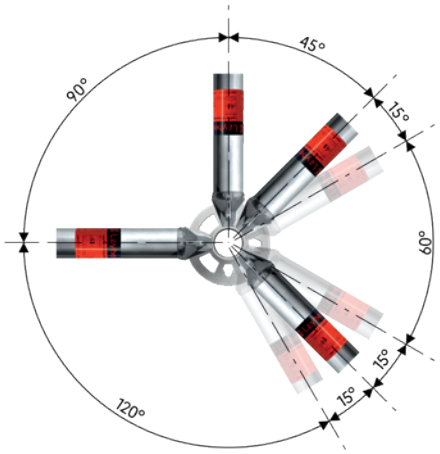




08

ALL ROUND SCAFFOLDING

Layher Allround Scaffolding has become a synonym in the marketplace for modular scaffolding. The proven combination of positive and non-positive connections in rapid and bolt-free system technology with AutoLock function permits connections that are automatically right-angled, obtuse-angled and acute-angled as required, with built-in safety at the same time.

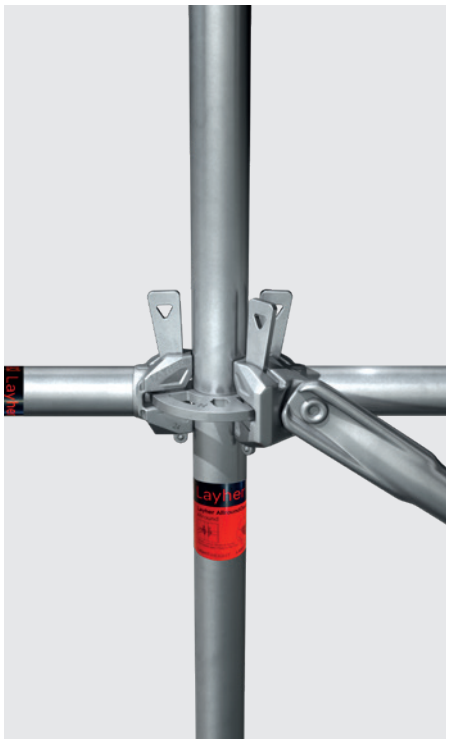


This original system has been continually improved since it was launched, and offers a persuasive variety of uses in classic scaffolding construction, but also much more than that. Even with very difficult layouts and architecture styles and with more stringent safety requirements, Allround Scaffolding is always the faster, safer and more economical solution.

The elements of the Layher Event Systems can be supplemented with the modular construction kit of Allround Scaffolding, consisting of a few individual parts, and expanded by innovative expansion parts. This allows complex, strong and imposing structures to be built.

Basic components

- The **standards LW** are made from hot-dip-galvanised steel tubes of 48.3 mm diameter. The rosettes spaced 0.50 m apart permit the connection of ledgers and diagonal braces.
- The **O-ledgers LW** with welded wedge heads connect the standards to one another.
- The **diagonal braces LW** with rotatable wedge heads further brace the basic system consisting of standards and ledgers, providing convincingly high connection values.
- The **horizontal-diagonal O-ledgers** have two straight, welded wedge heads for a square ground plan or two obliquely welded wedge heads for a rectangular ground plan. They can be used as an assembly aid to ensure rectangularity in the ground plan and to obtain a bracing effect.



Expansion parts

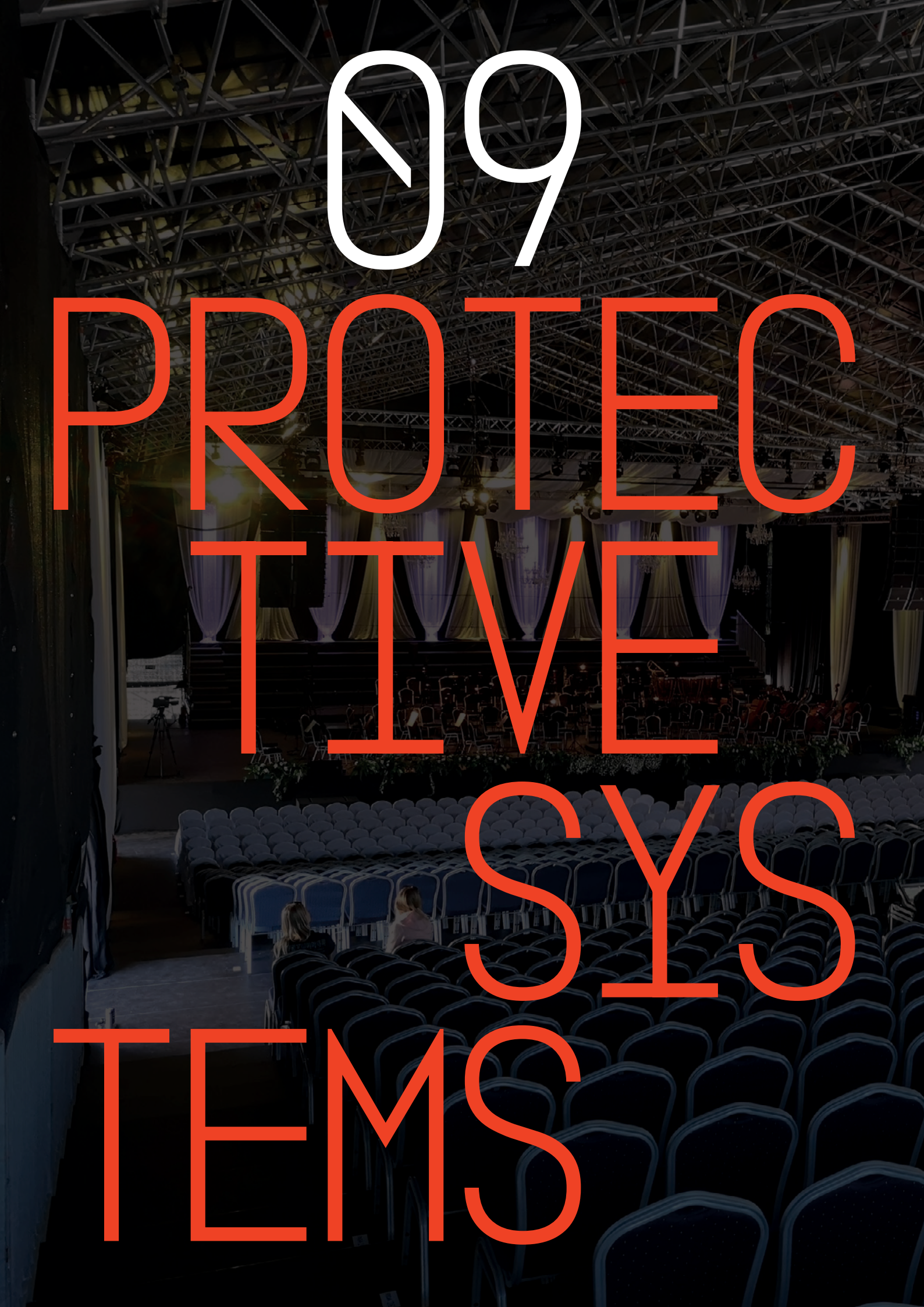
Allround Scaffolding and the expansion parts for the event sector are examples of the Layher integrated system. With just a few structurally and dimensionally integrated expansion parts, we offer economical, safe solutions for a range of possible applications.

- Lattice beam
- Aluminium FlexBeam
- Aluminium TwixBeam
- Allround FW System
- Allround Bridging System

Further components for unlimited possibilities and more detailed information can be found in the Allround Scaffolding catalogue.

The Benefits for You

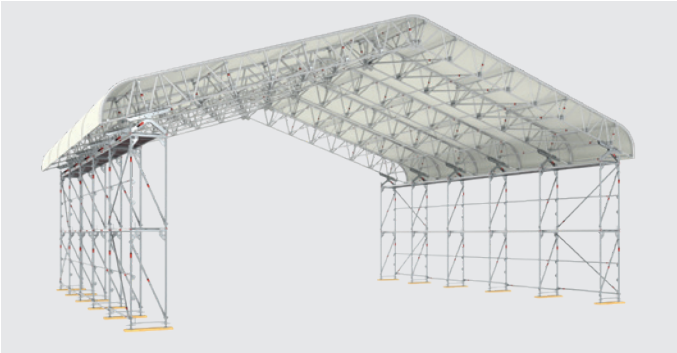
- Increase in the assembly speed and higher transport capacities thanks to new materials and design improvements that reduce the part weight while still providing the same load-bearing capacity.
- Time-consuming fitting of separate spigots and duplicated stocks are avoided, since only one standard is needed for both standard and suspended scaffolding thanks to the integrally cast spigots.
- The Integrated Scaffolding System for both simple and complex applications can be used in combination with all earlier generations. A future-proof investment thanks to the long service life, decadeslong availability for purchase and continuous further development.
- Improved occupational safety and reduced assembly times thanks to the AutoLock function.
- Reduction in muscle strain thanks to the reduced weight of the system together with an increase in height clearance by up to 10 cm.



09 PROTECTIVE SYSTEMS

Even the most imposing locations are not immune from outer influences such as the weather. Not only that, large sound systems and loud concerts can be seen as noise pollution by local residents. Layher Protective Systems can be combined with both Event Systems and Allround Scaffolding, and offer the right solutions precisely for those situations.

9.1 Keder Roof XL

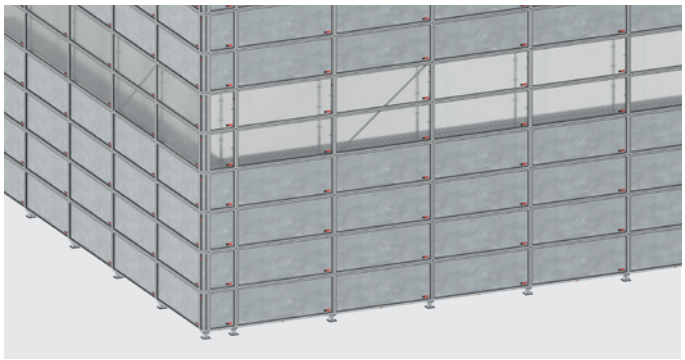


The Layher Keder Roof XL is a lightweight and strong weather protection roof. Spans up to 30 m and roof angles of 18° are possible under normal weather conditions. Used in conjunction with Keder rails for wall cladding, it means that the entire construction can also be designed to form a lightweight hall or to protect individual stage areas.

The Keder Roof XL is based on aluminium Lattice Beams 750 with integrated Keder section in the top chord. Tarpaulins acting as non-insulated but rainproof coverings are pulled into the Keder sections.

- High snow loads (up to about 1.0 kN/m²) with medium spans
- Adaptation to all circumstances thanks to high roof widths and different assembly variants such as double-pitch, mono-pitch and polygonal barrel roofs
- Economical in use thanks to flexible system technology, lightweight aluminium components and short assembly times
- Material and loading tables available

9.2 Protect System



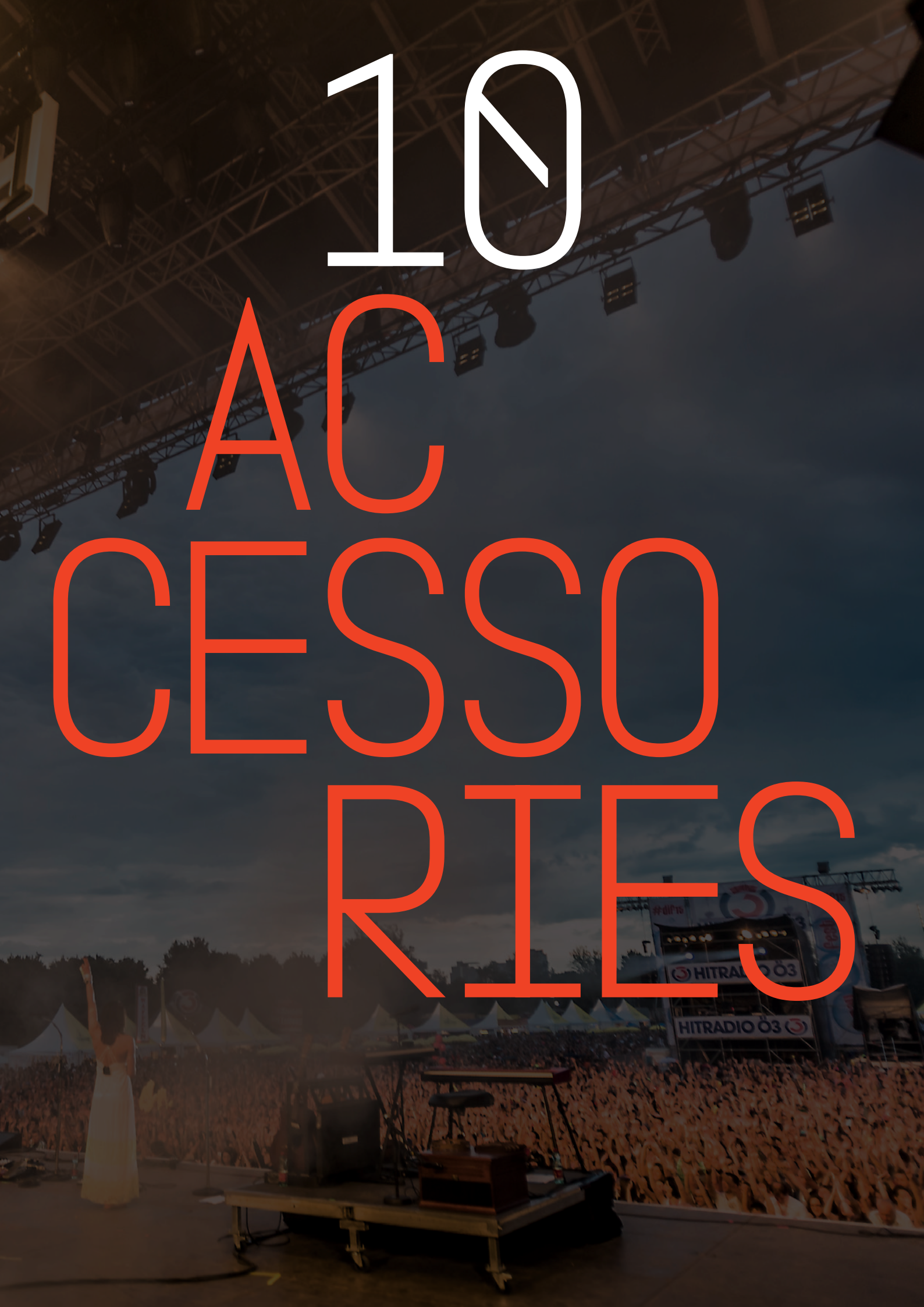
With the Protect System, Layher offers a cassette enclosure system meeting requirements relating to environmental protection and insulation from noise and weather, plus maximum economic efficiency in Layher's renowned quality. The few but visually attractive system components can be assembled multiple times and in changing configurations.

- Quick and easy assembly in a simple and logical sequence
- Electrostatically inert and therefore easy to clean
- Wall cassettes for noise protection with an airborne sound insulation level of Rw'=26 dB
- Light cassettes for controlling light incidence
- Matching access elements

All components of the products plus detailed information can be found in the Protective Systems catalogue.

10

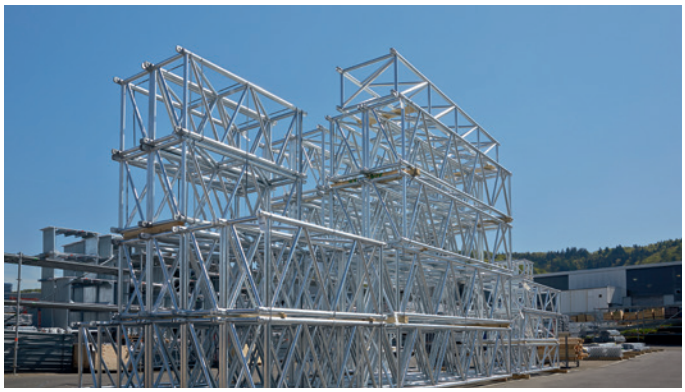
ACCESSORIES



Well thought-out, system-integrated and system-free accessories create more possibilities at your events. The Layher product portfolio comprises parts that are often invisible to visitors, but which are essential for the event itself. From the small rubber underlay for the base plates to the effective steel truss.

The Benefits for You

- System-free accessories can be used for all Layher systems
- Safety under the law from calculations and verifications where required
- Durable materials in the accustomed Layher quality
- Flexible use in any application



Accessories for events:

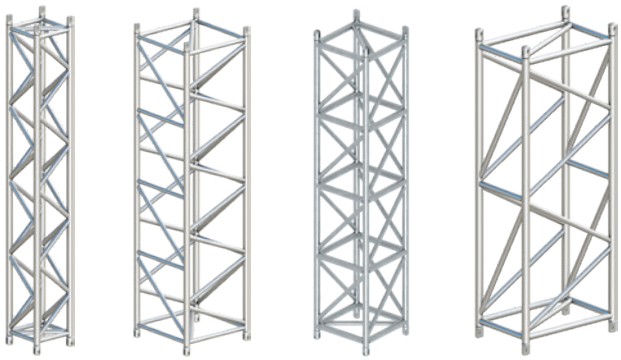
- Steel truss
- Ballast element
- Keder rails
- Rubber underlay

Many more accessories can also be found in the Layher catalogues for Allround Scaffolding, System-free Accessories and Event Systems.

10.1 Steel Truss Systems

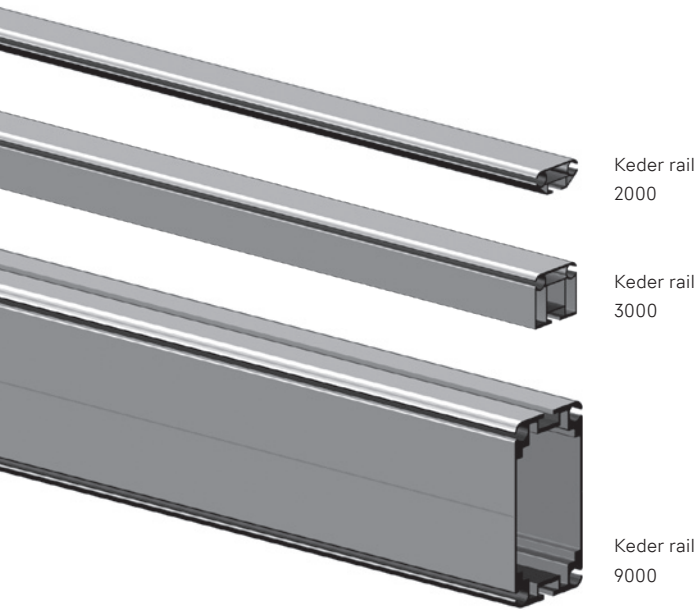
Structures that have to achieve outstanding performance in terms of load-bearing capacity, and yet still be quick and easy to assemble, demand sophisticated and very strong components. For applications like this, Layher offers you the steel truss as the ideal tool. The four available Layher steel truss systems are incredibly strong beam types relative to their size, and playa big "supporting role" as vertical load-bearing supports, in particular in the case of roofing solutions. They are produced individualised to suit customer requirements.

- **Tower-Truss**
  The Layher Tower-Truss is suitable for use as a vertical support for structures with horizontal Maxi-Truss beams. Examples of use: Ground support, advertising panel and cable bridge
- **Maxi-Truss**
  The Layher Maxi-Truss is ideal for use as the main supporting structure for stage roofs, ground supports, pre-rigs and cable bridges.
- **Nova-Truss**
  The Layher Nova-Truss is suitable for use as a vertical support for structures with horizontal Super-Truss beams. Examples of use: Ground support, advertising panel and cable bridge
- **Super-Truss**
  The Layher Super-Truss is suitable for use as the main supporting structure for stage roofs, ground supports, pre-rigs and cable bridges.



Tower-Truss | Maxi-Truss | Nova-Truss | Super-Truss

10.2 Keder Rails



Keder rail 2000

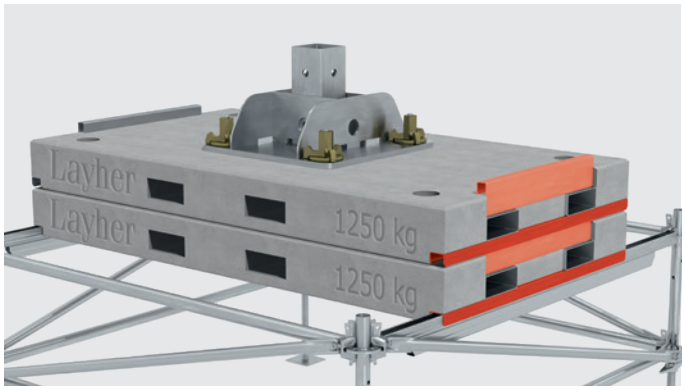
Keder rail 3000

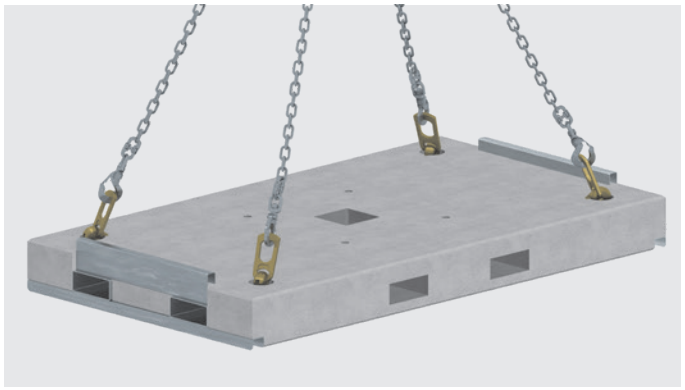
Keder rail 9000

Quick and easy tarpaulin roofs and wall coverings are no problem with the Layher aluminium Keder rail range. The grooves provided in all the Keder rails for the proven Layher groove bolts offer the flexibility needed to cope with all design challenges. The possible maximum spans of the Keder rails depend on the installation situation and on the location of the overall structure, and must be individually verified by a structural engineer.

- **Keder rail 2000**
  Known for its low weight and ideal for lightweight applications, in particular for wall and scaffolding coverings.
- **Keder rail 3000**
  The lightweight yet very strong Keder rail 3000 is perfectly suited for medium spans, as found for example in FOH and directing towers or in technical and storage areas. It can also be used as a wall Keder rail over large spans.
- **Keder rail 9000**
  The Keder rail 9000 is suitable as a heavy-duty marquee section for large and very large spans. Roofs and side coverings for large open-air stages can be constructed with this section just like massive roofs for stands.

10.3 System Ballast Elements





To give free-standing scaffolding structures the required stability, they have to be weighted using ballast elements. A solution within the system, that does without the often non-permissible water tanks, is provided by the Layher System Ballast Element, made of reinforced concrete and with a weight of 1,250 kg.

It can be used as a ballast weight for free-standing scaffolding towers or, for example, as a base for the single support of grandstand roofs. A connection possibility for this option is provided in the middle to receive the grandstand support. The latter is non-positively secured to the ballast elements using threaded rods and jack nuts.

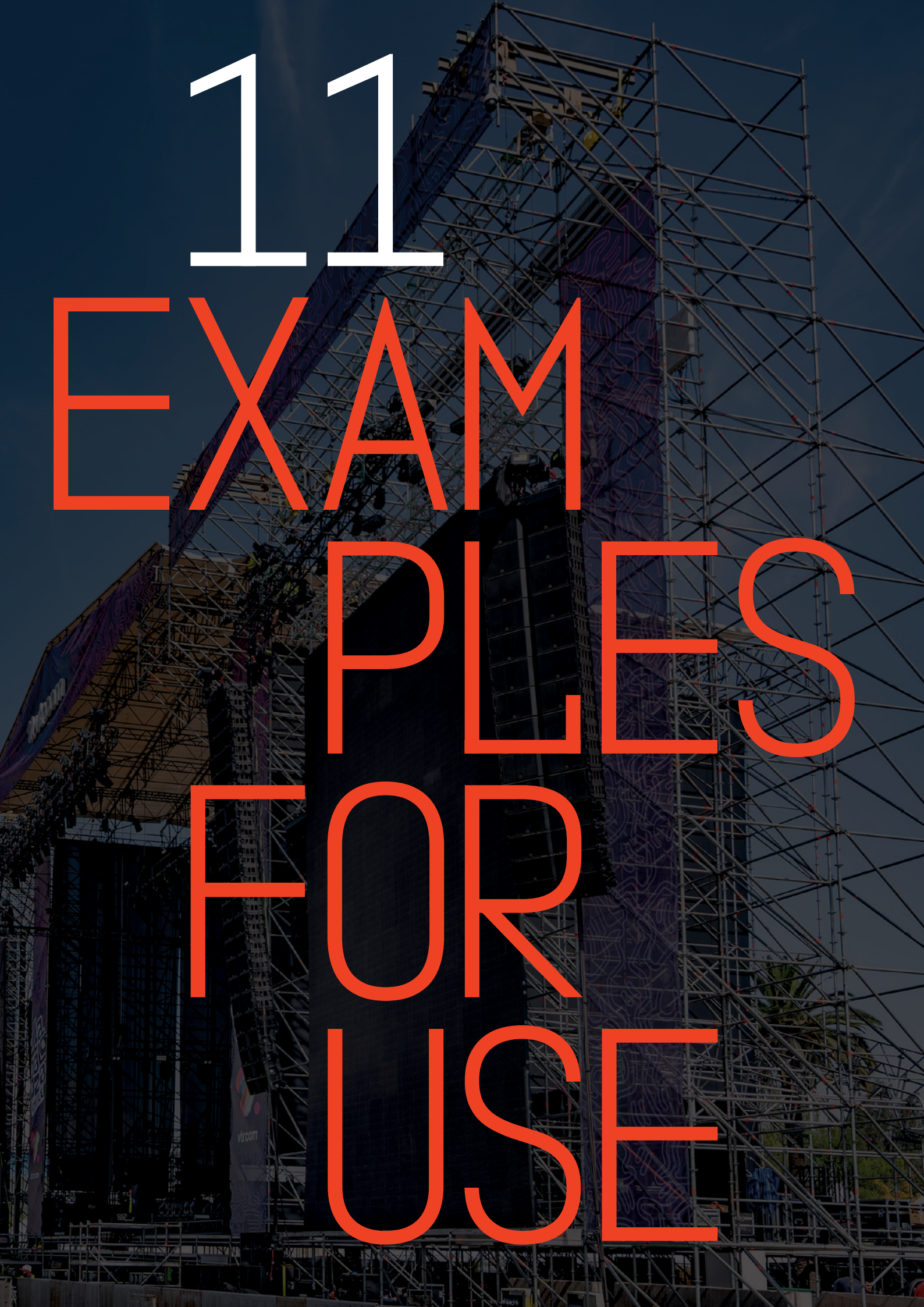
This ballast element is mounted using its integrated steel mounting section, which can be laid either in the U-suspension system or directly onto round tubes. The mounting section and the guide rail also prevent slippage of the ballast element during stacking.

In multi-bay scaffolding structures, the ballast elements can be arranged either alternatingly or unidirectionally. The alternating arrangement considerably reduces the load on the ledgers.

If the ground is uneven, height differences can be compensated for using a height-adjusted Allround scaffolding structure and adjustable base plates. For bigger height differences, braced Allround substructures can also be used. Here too, there are no conflicts with external diagonal braces as a result.

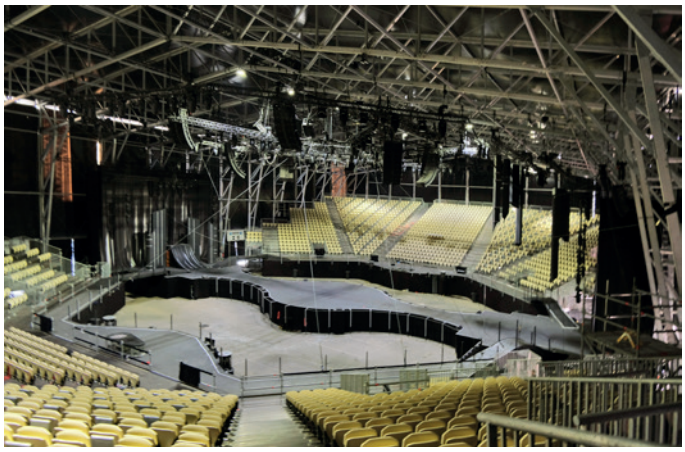
10.4 Non-slip Rubber Underlay

In order to cope properly with high wind loads and other horizontal stresses, Layher has designed a special non-slip rubber underlay for base plates. This allows a reduction in the ballast possibly required for verification of sliding prevention. The rubber underlay can be used outdoors on firm ground, where a load-distributing underlay is not normally required, or in combination with load-distributing timber underlays. The rubber underlay, visually appealing yet unobtrusive, also protects sensitive floor surfaces against surface damage.



11 EXAMPLES FOR USE

Theatre stage in Schuepfheim, Switzerland



Temporary hall with stage and grandstand for Cirque du Soleil in Andorra

Pedestrian bridge at the State Garden Show in Eppingen, Germany

Ziplining at the Eiffel Tower in Paris, France

Summer Festival in Antwerp, Belgium

Art exhibition in Maastricht, Netherlands

Stage with FOH tower and video screen in Scheessel, Germany

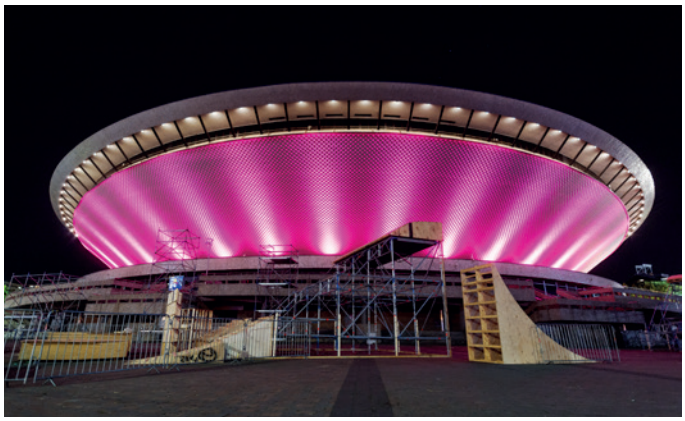
Festival stage in Santiago, Chile

Pop-up Globe Theater in Auckland, New Zealand

Festival stage in Marsa, Malta

Concert stage in the Olympic Stadium in Seoul, Korea

Stand for a sports event in Bogota, Columbia



Sports event in Katowice, Poland

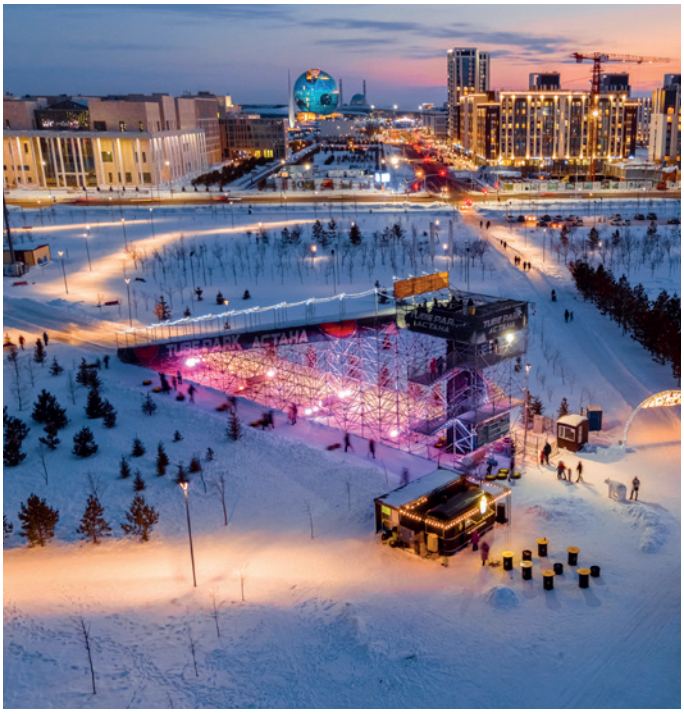
Access to temporary gallery at the Scandinavian Boat Show, Sweden

Temporary concert hall in Torva, Estonia

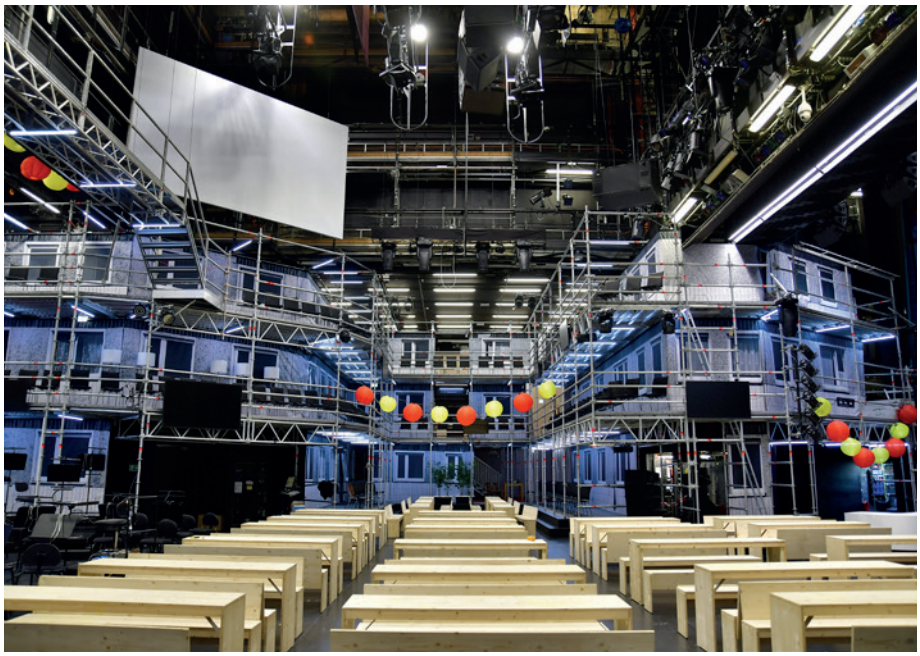
Rooftop bar at a festival in Zurich, Switzerland

Concert stage with grandstand in Fisekhane, Türkiye

Festival entrance in Zurich, Switzerland



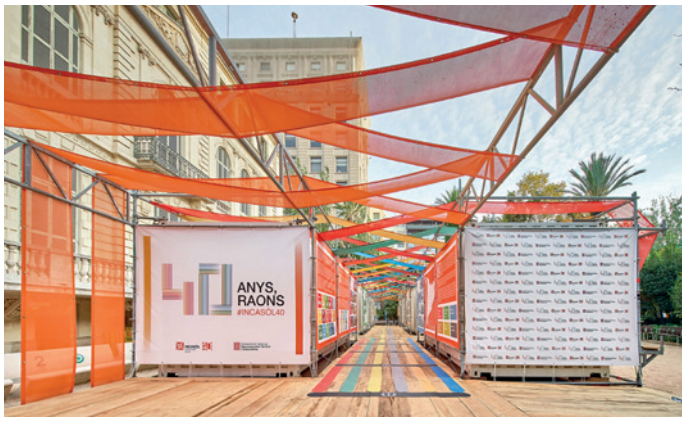
Snow slide in Astana, Kazakhstan



Theatre stage in Kassel, Germany

Grandstand at the World Cup in Trondheim, Norway

Exhibition in Catalonia, Spain



Concert stage in Le Touquet, France

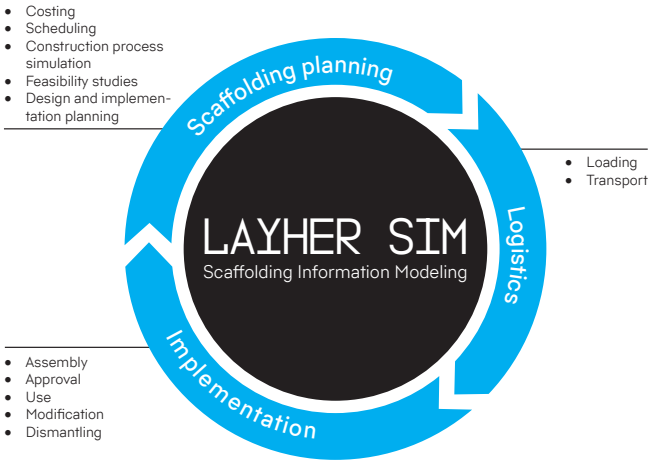
Grandstand for a sporting event in Paris, France

12 DIGITALISATION

- Project Workflow
- LayPLAN CAD
- LayPLAN VR VIEWER
- LayPLAN MATERIALMANAGER
- LayPLAN TO RSTAB
- SIM2Field

Digitalisation is affecting every industry. That includes scaffolding construction for events. And rightly so, because nothing else optimises project planning so effectively, while opening up for you enormous potential for both transparency and cost savings. Layher therefore asked itself the question of how the BIM concept – Building Information Modeling – originating in civil engineering – could be adapted to scaffolding as temporary structures. The result is SIM: **Scaffolding Information Modeling – SIM for short.**

SIM enables temporary scaffolding structures to be planned, assembled and managed more efficiently. With the integrated **Layher software solution LayPLAN SUITE**, a powerful tool for the SIM process is available, consisting of different modules. That's a solution involving many advantages: dependable 3D planning with conflict check; realistic visualisation of structures, allowing work to be coordinated with clients or the people responsible for the project; transfer of the scaffolding planning to structural analysis programs; and output of material lists and assembly plans.



The Benefits for You

- Transparency in all work steps and cost control
- Increase in safety and profitability for every project
- Reliable planning and scheduling
- Access to BIM

12.1 Project Workflow

The underlying task of Layher SIM is to perform the scaffolding planning that provides the basis and the digital twin for all subsequent process steps. One of the required inputs is the geometry data of the object at which the scaffolding is to be erected. This can be provided in the form of existing 3D models, the results of a 3D laser scan or remodelling based on 2D plans. Based on the digital twin, it is possible to obtain further information as output that can be used directly for subsequent process steps. Layher SIM focuses on the end-to-end use of data and the elimination of digital barriers in order to ensure loss-free data exchange.

FROM THE REALITY INTO THE DIGITAL PLANNING →→→

3D model available?
If a 3D model of the building project is available, this data is used

No 3D model available?
Capturing the reality of existing buildings using the 3D laser scan digital service

→→ →

Digital planning with **LayPLAN SUITE:**

- **LayPLAN CLASSIC**
- **LayPLAN CAD**
- **LayPLAN MATERIALMANAGER**
- **LayPLAN TO RSTAB**
- **LayPLAN VR VIEWER**

→→→ FROM THE DIGITAL PLANNING INTO THE REALITY

Measuring on the construction site for precise positioning of the scaffolding using the **SIM2Field** digital service

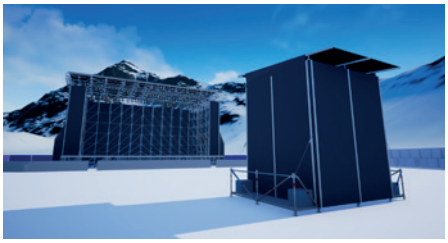
Virtual installation support with the **SIM2Field XR App**

12.2 LayPLAN CAD

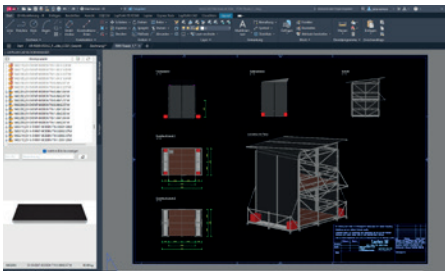
For complex scaffolding structures as part of large-scale engineering scaffolding for events, look no further than LayPLAN CAD. It is a plug-in for Autodesk AutoCAD and BricsCAD. It enables three-dimensional planning of scaffolding structures of all types.

Functions of LayPLAN CAD

- Scaffolding planning and design in 3D
- Dependable visual conflict check thanks to realistic rendering as a volume model
- Extensive component library with a convenient search function
- Preview image of components and output as 3D models
- Automatic component labelling
- Real-time material list for transport and assembly
- Further editing of the model data in visualisation software
- Further editing of the model data in RSTAB for structural strength calculations as part of project-related verifications of stability



Professional 3D rendering of the LayPLAN CAD models



Creation of planning documents with integrated material lists

12.3 LayPLAN VR VIEWER

The free-of-charge LayPLAN VR VIEWER enables virtual tours of scaffolding structures, to convey a realistic spatial impression of the overall situation. Based on the data from LayPLAN CAD, Layher can create VR models for display in the LayPLAN VR VIEWER for you. We'd be happy to assist you on the spot with our specialists and equipment for the VR presentation.

Functions of LayPLAN VR VIEWER

- Virtual tours of scaffolding structures with VR headset (e.g. Oculus Rift)
- Optional display of VR models in Desktop mode
- Integrated measurement and comment function
- Conveying of a realistic spatial impression of the overall situation

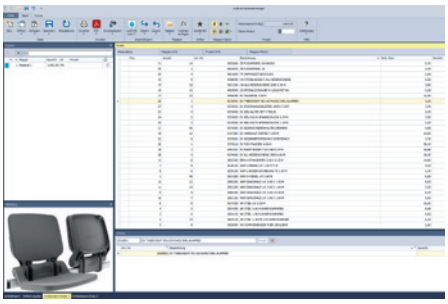
Virtual tours of scaffolding structures with VR headset

12.4 LayPLAN MATERIALMANAGER

The LayPLAN MATERIALMANAGER allows material lists to be created and edited – for example splitting into different construction sections to permit prices and weights to be considered separately.

Functions of LayPLAN MATERIALMANAGER

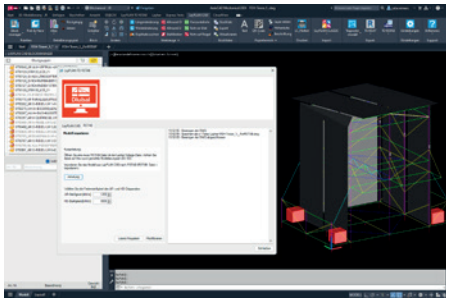
- Automatic creation of material lists from LayPLAN CAD
- Manual editing of material lists, for example splitting them into construction sections and applications
- Detailed information on the scaffolding components including preview image
- Output as PDF and export in Excel
- Optional component images on the material lists in the printout – this makes it easier to identify components during loading and assembly



Program interface

12.5 LayPLAN TO RSTAB

For structural strength verification of scaffolding structures, frame analysis programs are generally used. Using the LayPLAN TO RSTAB module, all modelling-relevant information about an Allround Scaffolding structure can be imported three-dimensionally into the RSTAB frame analysis program from Dlubal. Automated transmission of the information means that re-entering the model data is not needed. This means that the user will benefit from an enormous time saving, and also avoid a possible source of errors during modelling.



Transmission of model data with the aid of LayPLAN TO RSTAB

Functions of LayPLAN TO RSTAB

- Time saving thanks to automated 3D model transmission of Allround Scaffolding structures
- Transmission of all structurally relevant information according to the approvals (geometry, cross-sections, materials, frame types, eccentricities and non-linear connections)
- Avoidance of possible sources of errors during modelling in the frame analysis program

12.6 SIM2Field

SIM2Field complements Layher SIM in the field of execution. The integrated concept creates a continuous, digital process, from 3D scaffolding process, from 3D scaffolding planning to completion of the scaffolding on the construction site. The 3D scaffolding model data from LayPLAN CAD is used efficiently for assembly. Thanks to **SIM2Field**, potential sources of error are avoided when measuring and creating the scaffolding, even with complex geometry, and paper plans are reduced.

Reliable layout based on the 3D model data

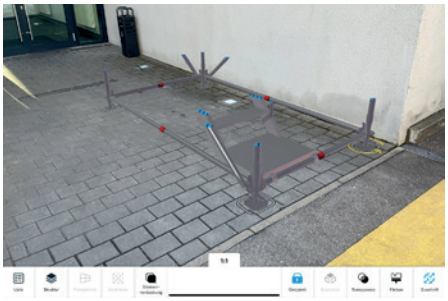
The **SIM2Field XR App** is used for work preparation and to support the assembly and inspection of scaffolding structures on the event. Various projects including associated project documents (PDF files, photos, etc.) can be provided in the app. The project data comes directly from LayPLAN CAD. This can be called up either via a link or a QR code and is then available offline on the mobile device. If an internet connection is available, the project data can be updated when changes are made. In the 3D models of the scaffolding structures, further information on the Layher scaffolding components is available in addition to the geometry.Among other things, the article designation, the article number and the component weight are displayed. The complete material list of the scaffolding construction can also be displayed.

Control and data transfer by using a tablet PC

Functions of SIM2Field and of the SIM2Filed XR App

- Direct use of 3D scaffolding model data from LayPLAN CAD for assembly
- Measuring and creating scaffolding even with complex geometries
- Intelligent and interactive parts list function
- Cutting function for displaying partial areas
- Virtual scaffolding display in the real environment
- Use the app without registration

Placing the virtual scaffolding in the real environment using augmented reality



Augmented reality mode with cutting function (limit box) for visualising parts of the scaffolding structure

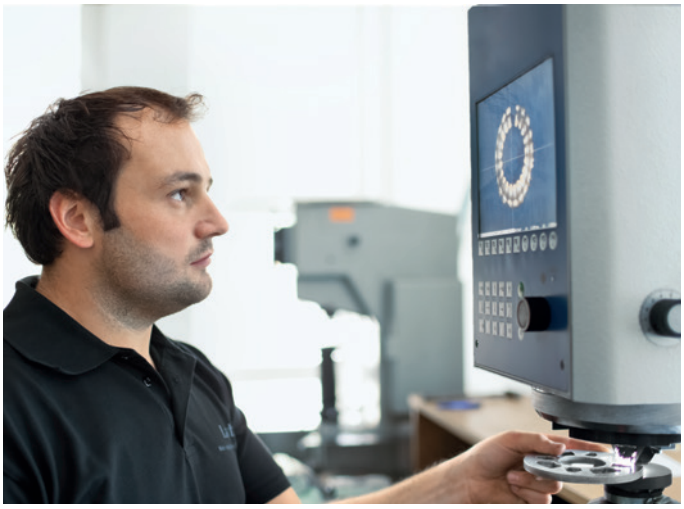
You can find further information on digital solutions from Layher in the "System solutions for digitalisation and software" brochure.

13 SAFETY DOCUMENTATION

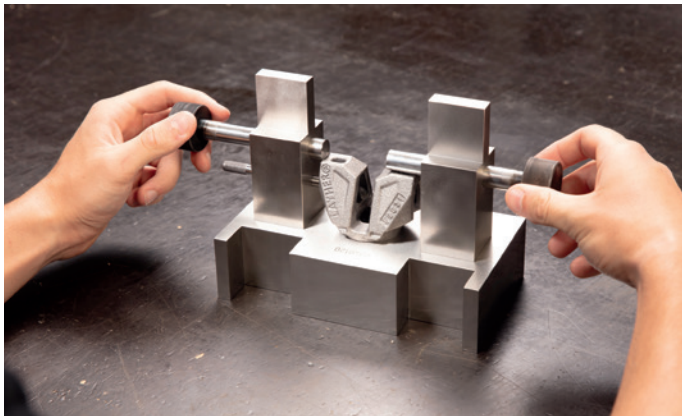
13.1 Layher Quality Management

Layher processes some 30,000 kilometres of steel tube every year – and we take responsibility for the safety of our customers with every single metre. This is why one of Layher's core tasks is quality management.

- Our products possess DIN/ISO certifications, German TÜV approvals plus many other German and international seals attesting their excellent quality.
- We have been DIN EN ISO 9001-certified since 1994.
- Uncompromising commitment to quality, from incoming-goods inspection to every production area.
- The manufacturing methods are precisely defined for every component and backed up by clear instructions for work and inspection.



Hardness test during the incoming-goods inspection



Dimensional and function test of the semi-finished parts

Product identification to permit tracking of its manufacture

13.2 Internal and External Monitoring

At Layher, rigorous checks at every stage of production are equally important and routine as identification and documentation of all components. For example, every Layher deck is stamped at the end of the production process with information on the machine, the date of manufacture and various production parameters.

To comply with the quality requirements and the legal basis for high-grade Layher products, they are routinely monitored with both in-house and external inspection measures.

Internal monitoring
- 100-percent inspections of dimensional accuracy
- Destructive random checks in all production areas

External monitoring
- Commissioning of independent test institutes with certification

Monitoring by external test institutes

Laser-assisted dimensional testing

13.3 Approvals

Layher scaffolding systems have national approvals in a variety of countries – for maximum safety at work and safety under the law.

Approval for the Allround modular system in steel: Z-8.22-64, Z-8.22-939, Z-8.22-949

Approval for the Allround Connector in aluminium: Z-8.22-64.1

Certificate for the Allround modular system in steel

Certificate for the Allround modular system in steel

Certificate for the Allround modular system in steel

Certificate for the Allround modular system in steel

Approval for the Allround modular system in steel and aluminium

Approval for the Allround modular system in steel

Certificate for the Allround modular system in steel and aluminium

Certificate for the Allround modular system in steel and aluminium

Certificate for the Allround modular system in steel

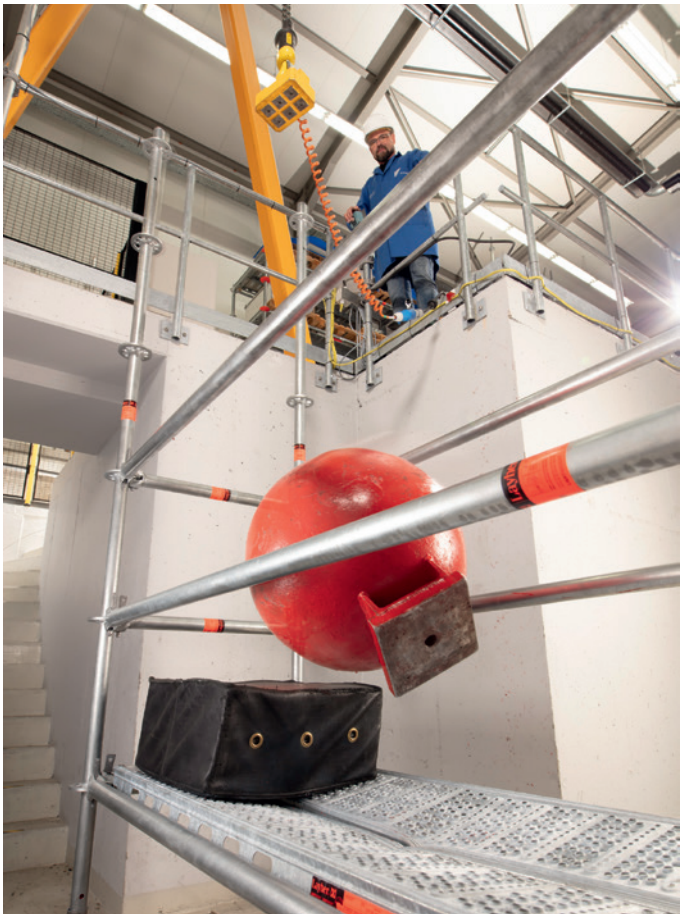
Further approvals and certificates worldwide. In a number of countries, the listed approvals or certificates are also accepted.

13.4 Trial and Test Stand

Before they come onto the market, all products are thoroughly tested on Layher's up-to-date test stand. This can involve the simulation of thousands of load cycles, and drop tests are conducted too. These drop tests have to be passed by all scaffolding decks before they can be used in brick guards.

The ball drop test conducted in accordance with EN 12810-2 is strictly regulated. It is conducted with a steel ball with a weight of 100 kg and a diameter of 0.5 metres, impacting the scaffolding deck from a drop height of 2.5 metres. To simulate the impact of a human body, a cushioning pad with precisely defined properties is positioned at the point of impact. The deck may be deformed, but must not fail.

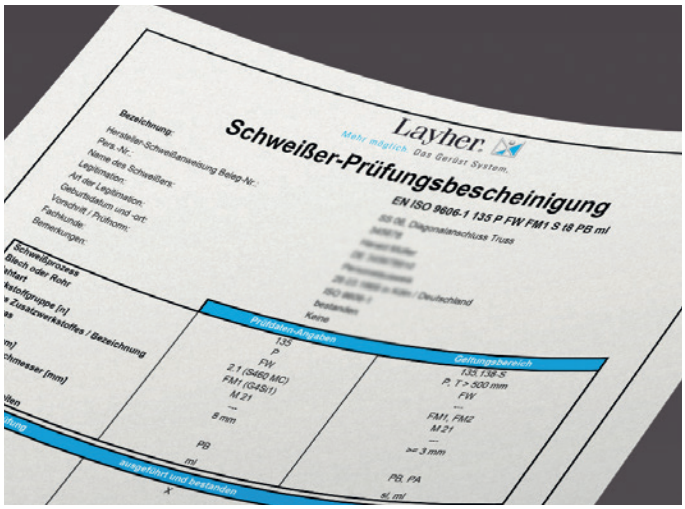
Continuous stress tests



Ball drop test

13.5 Welding Technology

Layher is a certified company for welding technology. We process our products on the latest welding equipment and with welding robots.



Certificate of examination for steel and aluminium welders

Robot and automatic production

13.6 Technical Documentation

For planning certainty, extensive technical documentation is available for Layher scaffolding systems:

- Approvals
- Type tests for lattice beams
- Instructions for assembly and use
- Structural data sheets
- Comprehensive technical brochures with load capacity tables

13.7 Catalogues and Price Lists

Layher customers can find extensive information material for downloading at **downloads.layher.com** or they can request it in printed form free of charge.

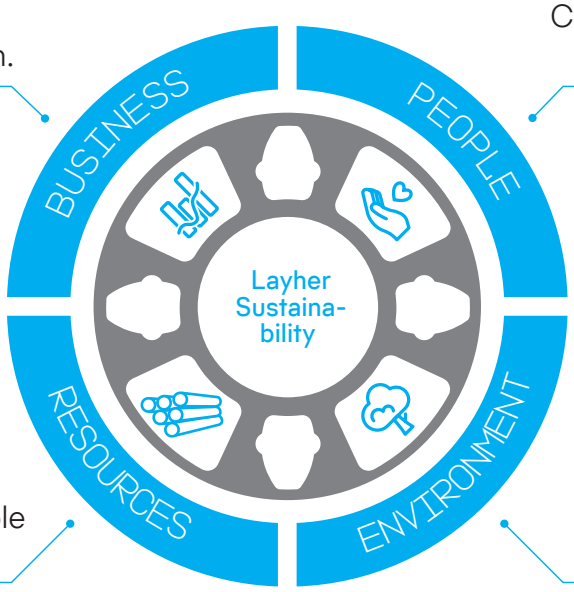
- Layher Product Range
- Layher Guideline for Professional Users
- Layher Infos with useful information for the scaffolding user, plus information on new products and on their possible uses and applications

14 SUSTAINABILITY

Layher is geared towards sustainable business practices.
People, the environment and the use of resources play a central role here.

Business is viable and profitable in the long-term.

Customers, employees and suppliers are satisfied.



Resources remain available for future generations.

Sustainable protection for the environment.

Building and maintaining properties is unthinkable without scaffolding. Layher scaffolding is essential for the construction of many central components of our infrastructure for living and working. The sustainable transformation of our economy and society also needs these products. With scaffolding, Layher offers tools for change. They provide support, for example, in transformation areas such as the energy sector, building refurbishment or new technologies.

Layher lays the **foundation for sustainability** with a well thought-out product design:
- Very long service life and value retention
- Products can be used and combined across generations
- Layher Lightweight: efficiency use of resources and improved material handling
- Using recyclable materials like steel and aluminium

Practising sustainability

Using resources responsibly
- Use of photovoltaic systems
- Operational energy management in according with international standard
- Energy generation by using wood chips
- Energy efficient lighting
- Using electric forklift trucks
- Durable products made from recyclable materials

Protecting the environment
- Exhaust air, wastewater and noise emissions well below legal limits
- Certified environmental management
- Renaturing a section of the Zaber river (Local tributary of the Neckar)

Bearing social responsibility
- High safety standards
- Ongoing improvement of occupational health and safety
- Promotion of young talents
- Comprehensive training concept
- Close ties with charity organisations
- Reducing physical strain in production by automation
- In-depth training for customers

15 SUCCESS STORIES

The following success stories, and many others too, can be found in various issues of our "Success stories" magazine.

Request it free of charge at:
brochurerequest.layher.com

All success stories can be watched as videos at
success-stories.layher.com

15.1 Of full-blooded Musicians and Event Specialists

Normally, it's mainly ski fans that can be found at the Idalp at Ischgl, in Tyrol, where they can enjoy the sport over nearly 240 kilometres of piste. At the end of the season in April 2017, the Ischgl tourist office organised, on a stage of almost 200 m² in area, two top-class pop concerts with Andreas Bourani and Zucchero, with more than 15,000 guests being expected.

For an event specialist like Christian Ritter, managing director of Ebner event logistics GmbH in Austria, that's normally a routine matter. But in this case things were different. That's because the Idalp is inaccessible to heavy equipment like trucks or cranes. This meant that the material needed for the stage, the technical equipment and the backstage area, delivered using seven semi-trailer trucks, first had to be carried up to the event venue, 2500 metres up, in 100 helicopter flights.

But before the project could even begin, a solution had to be found for the roof structure, without the help of a crane. It was not possible for Ritter and his project manager Oliver Keim to fall back on the otherwise usual truss systems. "We devised, in a one-day workshop together with the experienced engineering office partner of Layher and the scaffolding experts in Eibensbach itself, a completely new roof structure using the lightweight, fully modular Allround FW System, which breaks down into very small parts", explains Ritter. And his project manager Oliver Keim adds: "We can build this structure even without a mobile crane – anywhere. It's only that which makes it possible to build a stage like this at a very exposed location directly on a ski piste". Transporting and assembling the stage and the adjacent backstage area took the 15 event specialists from Ebner event logistics GmbH just five days, including material transport. "It is very important for us, for both practical and economic reasons, that the Allround FW System perfectly matches our other Allround stocks, both structurally and dimensionally. That enables us to use the material anywhere and very efficiently", adds the director.

SAFETY IS NOT NEGO TIABLE

The stringent safety requirements for temporary structures didn't allow any compromises during planning. This meant that the structure was designed such that the show on the completed stage would only have to be stopped at wind speed eight on the Beaufort scale (20 m/s). The roof can withstand a snow load of 25 kg/m². In the case of heavy snow, the roof is also heatable. For operating in winter, an effective load of 15 t remains for the lighting and sound systems – and in summer 20 t without a reserve for snow. The basic structure using Layher Allround material also allows loudspeaker systems with a weight of up to 1 t per side to be mounted, on the left and right of the projecting section of the roof.

Ebner event logistics GmbH was established in 2010 by Manfred Ebner, and after his tragic death in an accident in 2012 it was continued by Christian Ritter as the managing director. The core competence of the Austrian company is the planning, implementation and logistics of temporary infrastructure solutions for events of all sizes. Its clients include Formula 1 racing and the Ironman Tour Europe, as well as the Hahnenkamm Races and more besides. Ebner also offers, in addition to infrastructural services, everything needed for events, such as power, light, sound and video. "Our clients assume that we, as a professional service provider, use material from the market leader, Layher. This is the material that makes us most flexible and effective, and ISO certification of the material – required by Formula 1, for example – is standard for Layher", is how Christian Ritter explains the consistent use of Layher Event material. Ebner makes regular use of the training courses offered by Layher for its employees, to keep them up to date on the current status of standards and rules. Ebner also often resorts to technical advice from Eibensbach when the project isn't exactly trivial, like the stage up on the Idalp. "Without that solution, it simply wouldn't have been possible to pull off an event project like this", concludes the project manager Oliver Keim.

15.2 The „Weisse Rössl“ on Lake Ammersee

When the lakeside stage at Utting on Lake Ammersee puts on the "Weisse Rössl" (The White Horse Inn), the 350 or so spectators watch from a grandstand with folding seats made by Layher. The brothers Stefan and Johannes Dankel, who are also managing directors of Opera GmbH & Co. KG, have completed their services portfolio (which previously included above all exclusive tent solutions and event technology) with grandstand construction, and together with the specialists from Layher came up with a great solution to the specific challenges of this exposed lakeside location.

The performers on the Utting lakeside stage traditionally act without technical amplification, which has implications for the grandstand construction work at an open-air like this, directly in front of and also in the picturesque backdrop of the Ammersee. "We designed the entire structure like an amphitheatre, where the sound is trapped so that every spectator can hear everything as best as possible. What's more, the front supports of the grandstand are directly in the water, to give the visitors the feeling of being seated on the lake itself – so the play, the "Weisse Rössl" at Ammersee had an additional appeal", explains Stefan Dankel. Layher's event technicians implemented its special form by combining standard and special components. The substructure consists of Layher Allround Scaffolding, distinguished by its high load-bearing capacity plus fast and flexible assembly. Not only the grandstand gets its feet wet in Utting: the six-strong team too were standing in the pleasantly cool water of the lake during assembly and alignment of the structure.

Corrosion-resistant and hot-dip-galvanised steel components enabled the grandstand foundations to be under water. "This year we'll be building a grandstand with Layher material for the first time, and we're very glad that Layher's technicians and external staff are giving us such strong support here on the spot. All the special parts designed and produced especially for this event also fitted right away", adds Johannes Dankel.

ALL STRINGENT OFFICIAL AND SAFETY REQUIREMENTS MET!

This project, which seems simple at first glance, turned out to be very complex in planning, due to numerous safety regulations and a number of specific requirements for the lakeside stage. For example, it was important to construct the escape and rescue routes to be safe and without any tripping hazards, despite the different slope angles, before the local authorities could grant the necessary approvals. The fact that the structure is partly under water made it difficult to achieve a solid foundation for the front grandstand areas. The Technical Office at Layher's main plant in Eibensbach took on, for this debut project of a company which actually specialised in high-end tents, the entire planning, and also assisted in the assembly work itself with two specialists together with the external service and TÜV inspectors.

"We've been working for some time now and with great success on our tents with a deck / stage solution from Layher that enables us to solve a lot of structural problems easily. So it was actually obvious that we would decide very quickly on a solution from Layher when we received the enquiry from the organiser. The fact that we can easily combine the new material with our existing stocks, plus the excellent and close contact with Layher's external staff, made this a very easy decision", says Dankel. With the grandstand from Layher, Opera GmbH & Co. KG can expand its services portfolio and immediately cater for even more customer requirements. The smart entrepreneurs already have a lot of new ideas for the future on how to combine their tents with Layher material, enabling them to offer their clients even more new solutions.

The secret behind the success of Opera GmbH & Co. KG, which started off as a garage company, is surely its unique tent system in the form of a concert shell, using which the brothers can handle demanding projects. The Layher brand had already long been familiar to the brothers from the events industry, as it was synonymous with dependable and flexible solutions, Made in Germany. "We discovered the Layher System for ourselves while looking for a deck/stage system for our tents. In combination with the Layher material, we can now offer and handle projects that would otherwise not be possible for us", explains Stefan Dankel. "In addition to the proven and ingenious system, being able to select a supplier from Germany was one of the criteria for the decision. Things don't always go according to plan at events, and it was often the case that we had to get additional material directly from Layher on the morning of the day planned for assembly – and that's only possible when the partner is close by", explains Johannes Dankel. "We take the term 'enterprise' seriously, and we're always looking for new solutions where we can be 'enterprising'. With Layher, these possibilities have grown considerably", says Stefan Dankel, the technical planner in the management.

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Layher

More Possibilities. The Scaffolding System.

Customer proximity is a key success factor for Layher – also in a geographical sense. That is why we are present with ideas and solutions wherever our customers need us.

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