EUROTRUSS

Competence in trussing

The Eurotruss Philosophy with the exact scientific approach

Eurotruss Philosophy

The exact scientific approach

Construction: Main tube and bracing size relationship

TOTAL QUANTIFIED ORIGINALITY.

Research and engineering expertise are the key factors behind the amazing performance of Eurotruss.

To achieve their standard of excellence Eurotruss analysed all aspects of truss manufacture to arrive at the format now used in manufacture.

Eurotruss unwilling to accept normally followed procedures, has solved the objectives resulting in a superior product in strength, simplicity of assembly, and safe interaction off all products.

Eurotruss does not accept terms like »*that is what all others do or it is general known etc*«. This leads to complete new insights and necessary improvements.

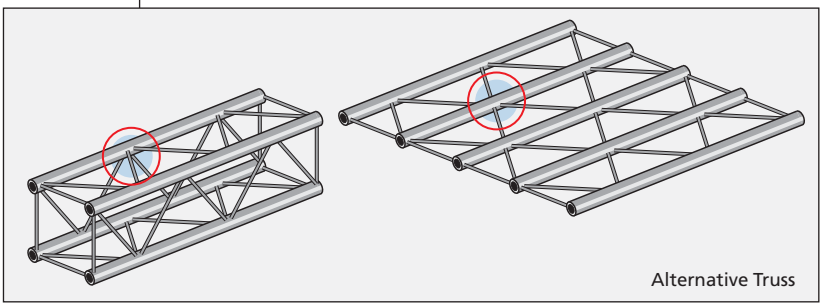
Eurotruss: re-writes the truss manual not accepting historic theories.

Eurotruss: »No secrets policy« an insight into our research as to the »How and Why« of truss.

An example of how far the Eurotruss research continues to explore…

FACT

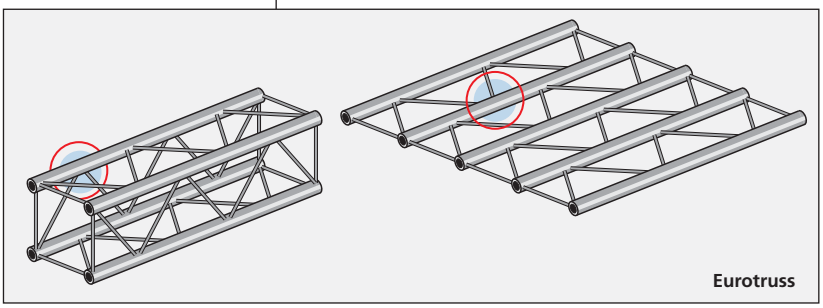
The loading bearing capacity reduces when more welding seams are joining at one and the same spot.



Alternative Truss

EUROTRUSS

On all the Eurotruss truss-types with diagonal bracing, the Eurotruss braces (welding joints) are limited to one side of the main tube.



Eurotruss

Eurotruss Philosophy

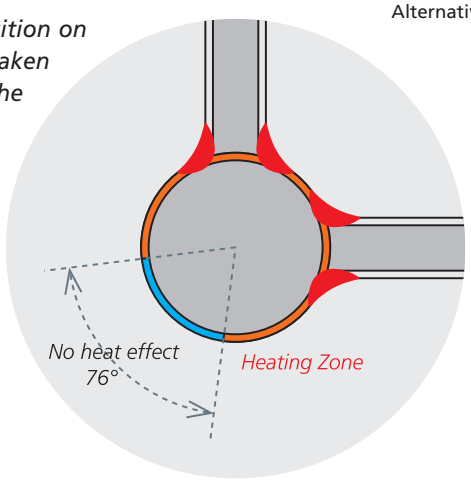
The exact scientific approach

Construction:
– Bracing size, position and attachment

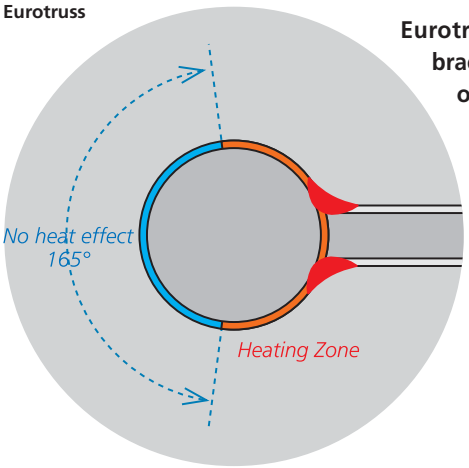
FACT

Extensive welding in one position on the main tube will severely weaken the mechanical strength of the connection.

Alternative Truss



Eurotruss



Eurotruss stagers the diagonal bracing around the construction of the truss section, to ensure that a reduced number of braces arrive at the same position on the main tube. Minimizing the weakening of the main tube properties and increasing greatly the safety factor of the completed construction.

EUROTRUSS

ARGUMENT

To demonstrate the effect of weld strength in relation to the size of heating zone, it is necessary to cut a section through the welded area as shown below.

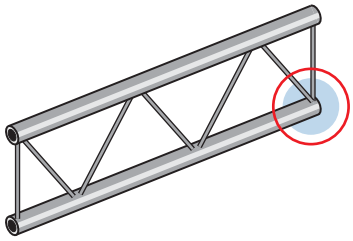
This shows conclusively, that Eurotruss with a smaller heat zone area gains a far higher strength factor in the main tube resulting in higher loads available with multiple truss lengths, benefiting in greater safety factor values.

This is valid throughout the Eurotruss range.

Eurotruss Philosophy

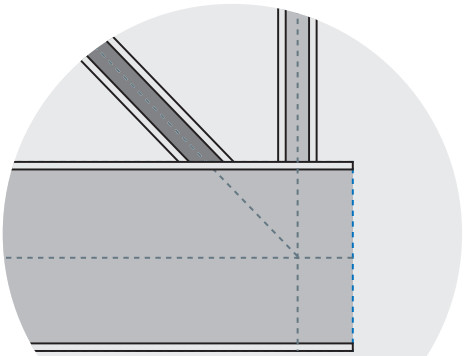
The exact scientific approach

Construction:
Main tube and bracing size relationship



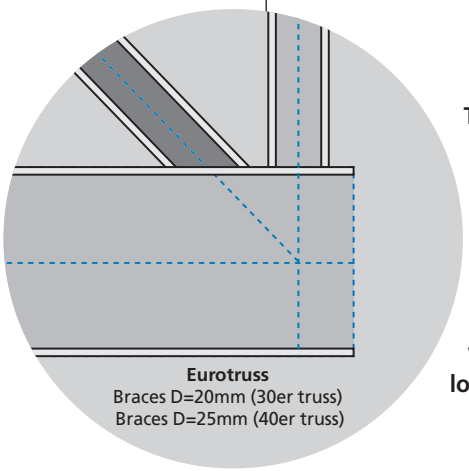
FACT

The loading capacity of thicker braces is much higher than with thinner braces.



Alternative Truss
Braces D=16mm (30er truss)
Braces D=20mm (40er truss)

EUROTRUSS



Eurotruss
Braces D=20mm (30er truss)
Braces D=25mm (40er truss)

The research of the relationship between the sizes of materials used in the main tube and structural bracing. A definite increase in truss capability both in strength of construction and performance is achieved with a choice of thicker bracing material as with different spans of truss the braces are subjected to varying loads.

The combination of all the design factors thoroughly researched at Eurotruss research and development labs. Has concluded using a thicker wall size in bracing material, substantially increases the absorption of the loads experienced in varying stresses found in different span lengths.

ARGUMENT

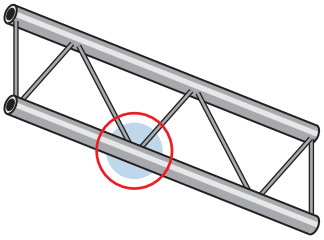
With long spans, the loads are transmitted into the main tubes and connections of the truss, thus reducing the stress in the brace material.

However, in a short span the loadings are of course heavier on the bracing material.Therefore, by using a thicker brace material Eurotruss can achieve greater performance from the same configurations size revealing the mystery of a better product.

Eurotruss Philosophy

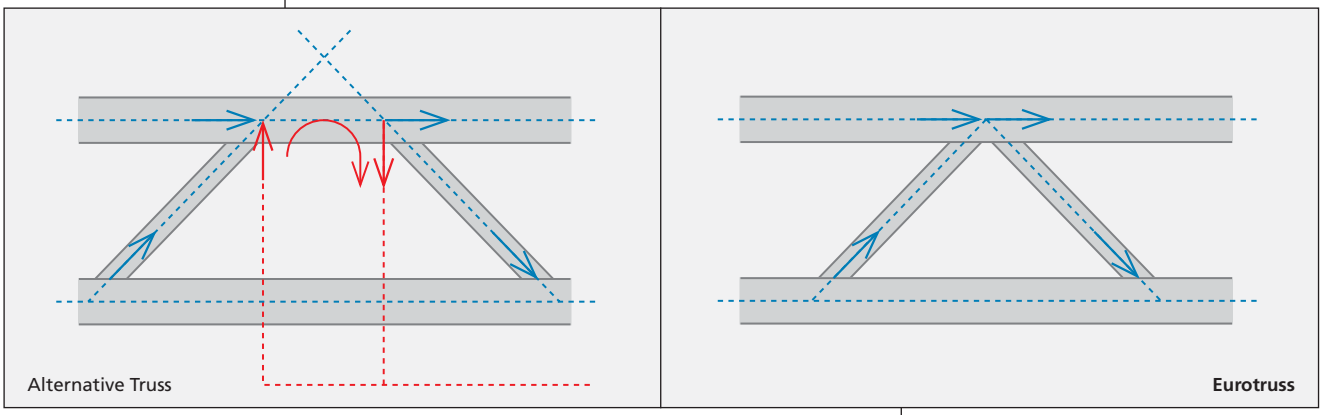
The exact scientific approach

Construction:
The cross-line at the main tube and the braces



FACT

When the diagonal braces are pulled outwards which result in bigger areas between the spots where the bracing meet on the main tube, higher bow moments will occur in the main tube and the braces.



At all Eurotruss Trussing the cross lines of the braces meet in the middle of the main tube, so maximum loadability is guaranteed.

EUROTRUSS

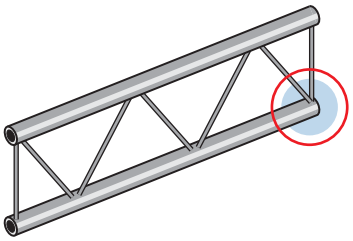
ARGUMENT

The basic principal of constructions – which have to deal with pull and push forces – is to keep the forces within the construction so the truss can be loaded to its maximum.

As the position of the braces will limit the possibilities of hanging the truss, Eurotruss advice to use Slimeline Couplers as those will also fit between the narrow spot of the braces.

Eurotruss Philosophy

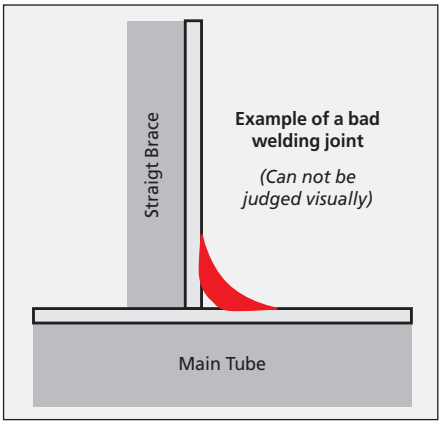
The exact scientific approach

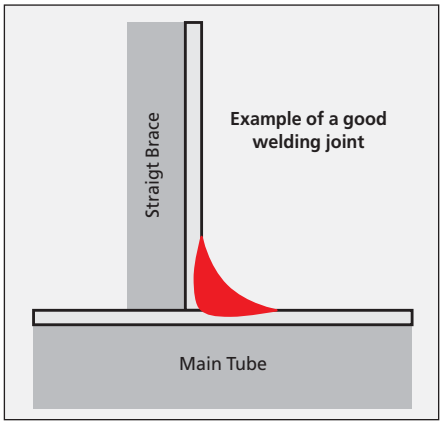


Welding-technic:
– Welding of the main tube and the braces

FACT

Only a good welding joint offers the required static value and safety.





In order to be sure of high quality welding, Eurotruss half yearly checkson their welders by Danske Norske Veritas and yearly by the German Schweiss-lehr- and Versuchsanstalt Duisburg SLV which has granted Eurotruss with a Verification for welding Aluminium.

EUROTRUSS

Whether a welding joint is good, can not be checked visually. Only qualified specialist like DNV and SLV are able to check a proper welding joint.

As every welding joint need to absorb and transport forces, a failure in the welding joint will lead to reducing the ability to absorb forces and in total the load capacity.

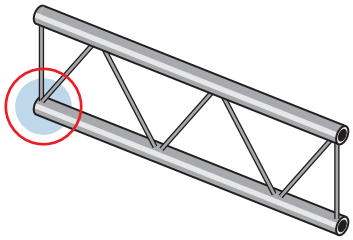
The welding joint will tear or crack open.

ARGUMENT

Eurotruss Philosophy

The exact scientific approach

Welding-technic:
– The welding joint

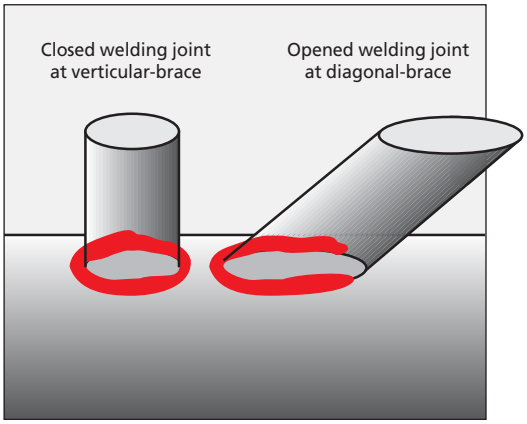


FACT

Only a good welding joint offers the required static value and safety. At the diagonal braces it is not necessary to have a closed welding joint in order to transport the forces in the brace.

EUROTRUSS

The diagonal braces do not have a total closed welding joint as it is not static necessary and to avoid bad welding which occurs as the angle gets to small to make a good welding joint.



Conform the static and structural reports the circular ring of a brace determs the capacity of transporting the forces.

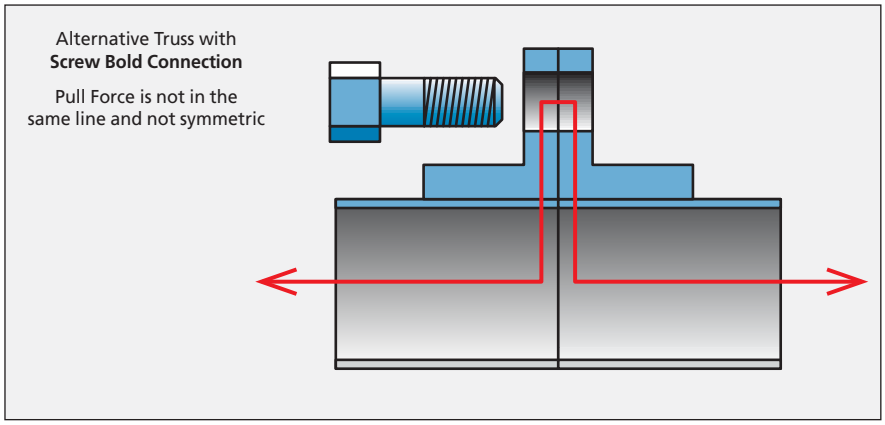
The welding joint has a ecliptic shape which is longer than the surface of the circular ring (diameter of the brace).

Therefore no necessity to weld all around the brace.

ARGUMENT

Spigot Connection:
– The Connection

FACT *The connection with Bold and Nut has the disadvantage that the pull force is not in the same line and not symmetric.*



EUROTRUSS **Eurotruss only uses conical fast connection system with conical spigots and pins.**

Tube, main tube – brace, and connection parts are all to be considered as one chain. The weakest point in that chain determines the maximum strength.

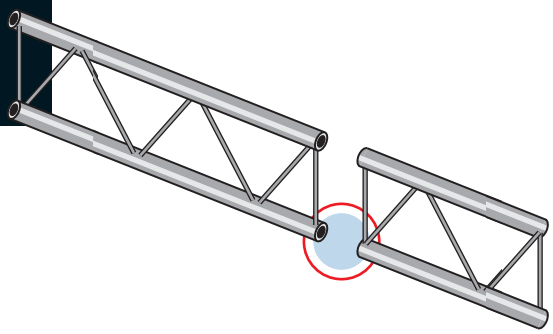
At Bold and Nut connection the transition from forces does not occur in the centre of the tubes. As the pull forces get interrupted by the connection, at this spot extra bow moments occur which put more pressure on the welding spots and tubes at that point. This need to be compensated with tubes of greater wall thickness which push up the price and own weight. This does not fit in the Eurotruss Philosophy. Besides that the extra time required for difficult and unpleasant mounting, is not according the Eurotruss Philosophy.

ARGUMENT

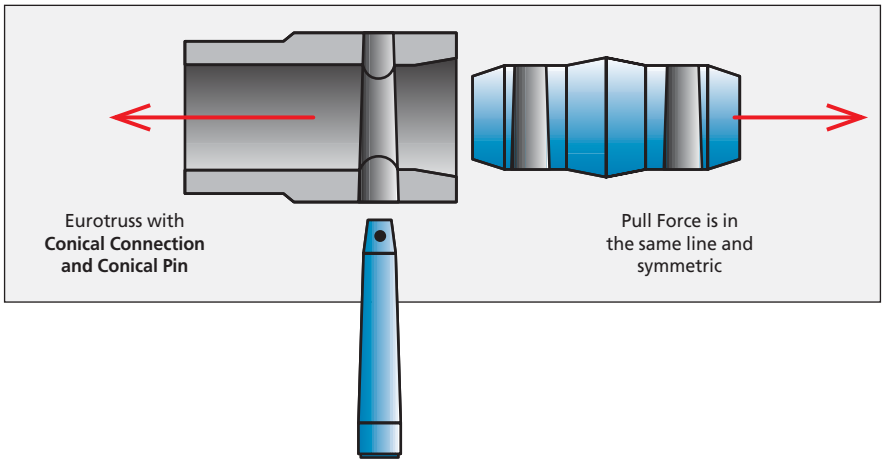
Eurotruss Philosophy

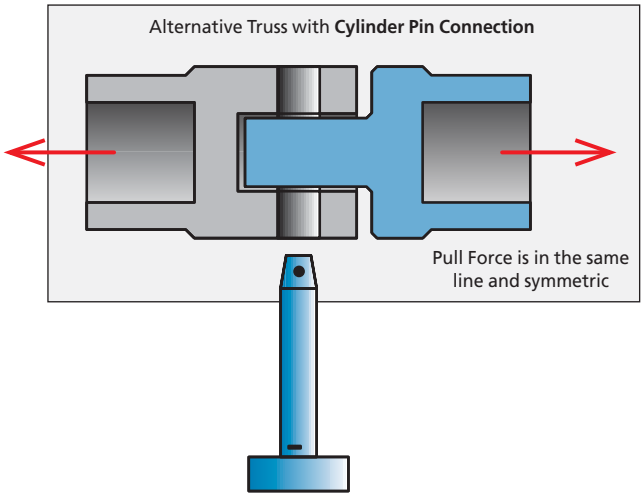
The exact scientific approach

Spigot Connection: – Pull Forces



FACT *Statically you cab compare the conical spigot and pin connection with the connection of male-female part with a cylinder pin. At the male-female connection with cylinder pin the pull forces are in straight line and in the centre of the tube.*



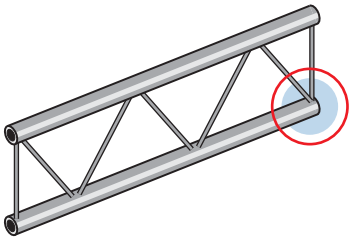


Eurotruss only uses conical fast connection system with conical spigot because pins as male-female connection gives a too big tolerance. **EUROTRUSS**

The connection form with conical spigot and pins keeps the same characteristics after many years of use.

The space and tolerance does not change as a result of frequent use. The mounting of a conical spigot with pin is much easier as the pin has a thinner front and due to its shape it will find its own way during hammering. The fitting of the receiver is inwards so protected during use and transport. The pin and spigot can be packed separately. **ARGUMENT**

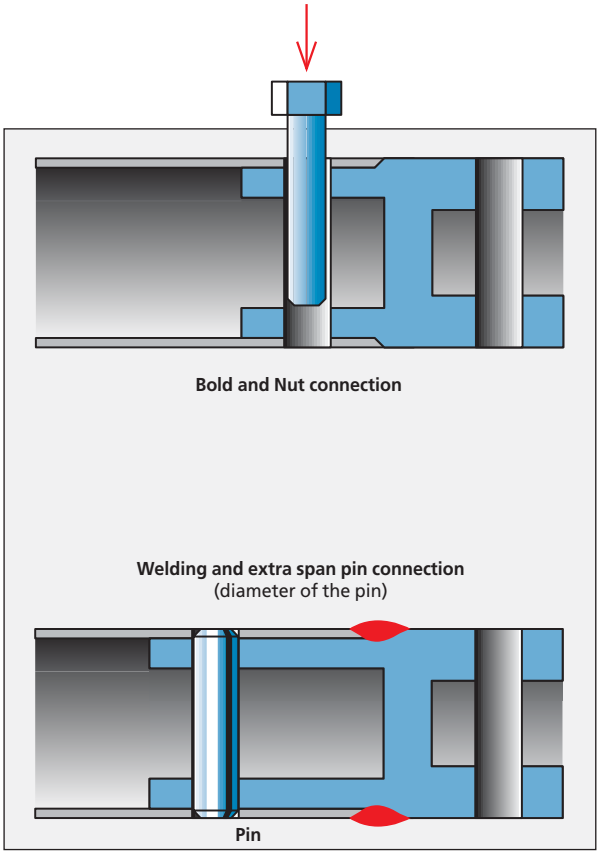
Connection:
– Different ways of connecting



FACT

Connections with bold and nuts or span-pins have an extreme tiny contact spot to absorb all the forces.

To prevent the holes in the main tube from enlarging the wall thickness of the main tube must be quite big which results in a heavy truss.



Bold and Nut connection

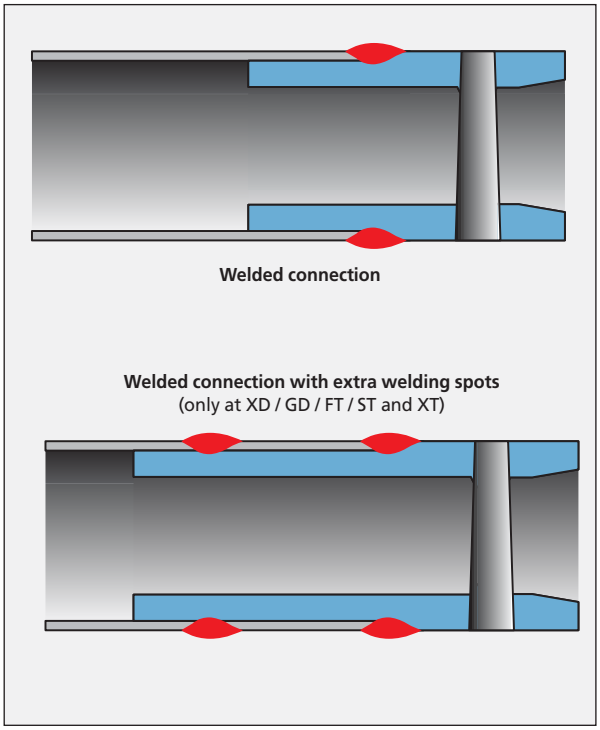
Welding and extra span pin connection
(diameter of the pin)

Pin

Span Pin

Connection:
– The way of connecting Eurotruss

EUROTRUSS Eurotruss uses only welded connection methods.



Welded connection

Welded connection with extra welding spots
(only at XD / GD / FT / ST and XT)

REASON

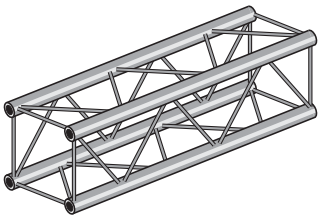
The Eurotruss welding joint covers the entire diameter of the main tube to absorb the forces.

At the connections in the series XD,TT,FT,ST and XT extra welding spots are made on the main tube to enhance the loading capacity of this truss.

A combination of Welded Connections and Elastic Connection Methods (like Span Pins) is of no use as this connection type, »Scher-/ Lochleibungs-Verbindung« is accordingly the E-DIN 4113 part 2 (Chapter 6.4.1) is not suitable.

Eurotruss Philosophy

The exact scientific approach

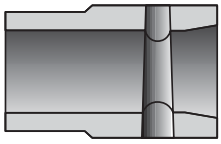
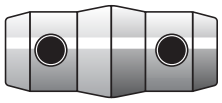
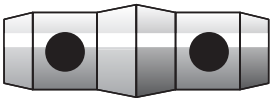
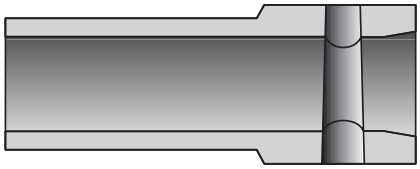
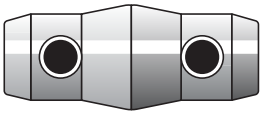


The Material:
– The Alloy of the Receivers and Spigots

RAW MATERIAL

Eurotruss uses only raw material (aluminium etc) with a high quality degree as they can supply the required strength and durability in the end-product.

The alloy of the Receivers and Spigots

	Connection receivers	Spigots (Connectors)	Trusspins	R-Clips
FD HD SD				
XD TT				
FT ST XT				

Eurotruss Philosophy

The exact scientific approach

The Material:
– The Alloy of the Tubes and conical Pins

FACT

For Truss in general several different kind of materials with various alloys are being used. Hereby a list of the most common used materials:

Alloy DIN	*International*	*Pull Limit*	*Pull Limit after welding*
AlMgSi 0,5 F22	*6060 T6*	*160*	*65*
AlMgSi 1 F28	*6082 T5*	*200*	*125*
AlMgSi 1 F31	***6082 T6***	***260***	***125***

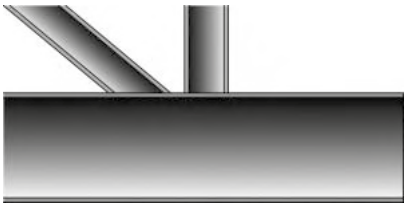
All figures in N/mm²

EUROTRUSS

Eurotruss only uses AlMgSi 1 F31 (also for the connection receivers)

REASON

The stronger the used material – the higher the loading capacity of the truss.



FACT

Also for the pin it is a fact that the stronger the material of which it is made, the higher the loading will be. A list of material quality will underwrite this fact:

Material	*Strength-quality*	*Strength in N/mm²*
9 S 20	*4.6*	*400*
9 SMn 28	*5.8*	*500*
10 C 20	*6.6*	*600*
C 45	*8.8*	*800*
46 Cr 1	*8.8*	*800*
42 CrMo 4	***10.9/12.9***	***1000 – 1300***

EUROTRUSS

Eurotruss uses for all the pins a quality of 42 CrMo 4.

REASON

The maximum result of the high quality of material does not only count in extra loading, due to its strength the pins will not deform as soon as pins with a lower quality.

Approvals and Certificates

What is what...?

Certificates:
From calculation to »Prufbuch«

CERTIFICATES… WHAT DOES IT TELL YOU ?

Today, truss systems are used routinely to build mobile staging and exhibition stands as well as fixed installations. Unfortunately, one tends to forget how much actual expert knowledge individual manufactures need and how much user skill is required for these purposes.

This absolutely important safety issue requires competence and responsibility on both sides. The primary problem lies in the lack of contact between the user and the manufacturer.

Even the most responsible user depends on the precision of the manufacturer's information and honesty of its dealer. Nowadays all manufacturers have or claim to have all required certificates and or approvals.

Be critical and request for the concrete evidence. A respectable manufacturer or partner cannot possibly refuse to supply these certificates. Be sure that you get these documents in your possession, but what is what…?

THE STATIC CALCULATION

All Eurotruss Truss-Types have a static calculation and these (loading figures) have been carried out by independent qualified engineers.

Your own created constructions like roofs, outdoor constructions or exhibition stands may need a static calculation for your own use or for third parties. Eurotruss can offer you static calculations in German and English according DIN and with loading results as well as all required information as ballast, anchoring etc…

Do not hesitate to contact us.

THE APPROVED WELDER

Eurotruss welders are approved according DIN EN 287 T.2 (Prüfung von Schmelzschweissern für Aluminium und Aluminiumlegierungen)

This alone is not sufficient. Eurotruss is very keen on a perfect welding process.

What is this welding technique; The welding process should basically afford a chemical unity (thorough melting). An optimum welding technique, carried out by an appropriately qualified expert welder, will afford an excellent welding quality throughout the entire material.

The sole official certificate confirming compliance with these requirements regarding the company and the welding of aluminium according to DIN 4113 (Eignungsnachweis zum Schweissen von Aluminium).

Approvals and Certificates

What is what...?

Certificates: From calculation to »Prüfbuch«

– Schweisseignungsnachweis –

VERIFICATION FOR WELDING ALUMINIUM

Along with the approvals for their welders a truss manufacturer should have a Verification for welding aluminium, which can be obtained when all required tests has been completed.

The organization, the machinery equipment, the premises and the welders must apply to the required standards.

Eurotruss is one of the few truss manufactures which enables Eurotruss to obtain Construction Approvals like roof systems, special aluminium constructions etc.

– Building without restriction–

THE »PRUFBUCH«

When aluminium truss is built together in a construction / roof with a fixed character like a (temporarily or not) building, this construction should apply to different requirements.

A „Prufbuch" gives the user the approval and freedom to build this Eurotruss roof without any governmental restriction.This „Prufbuch" is the result of a approved static calculation, drawings, building instruction, certificates like the 'Verification for welding aluminium'.

All Eurotruss Roofs are build and assembled accordingly these regulations and possesses such a „Prufbuch".

– Zeichengenehmigunsausweis –

THE TUV BAUART APPROVAL

The Tuv is a German Institute which tests and approves that what a manufacturer ask them to.

If this is just a single piece of truss (included spigot or not) or a more comprehensive product line, can not be told from the Label „RW Tuv Bauart geprüft". The actual approval itself will tell you exactly the content of that particular product as it lists material and alloys etc. Always ask for a copy of the original „Zeichengenehmigungsausweis" from the RWTUV.

The RW Tuv Approvals of Eurotruss can be easily downloaded from the internet and the content (loading figures) match those Eurotruss list in this catalogue and their technical info sheets.

Technical Load Explanation

Definition of Loading Figures:

Loading Figures:
– Divided Load and Point Load

FACT

Load cases are the figures which describe the loading capacity of a truss.

In order to give the right loading figures of a truss, two types of positions are mentioned:

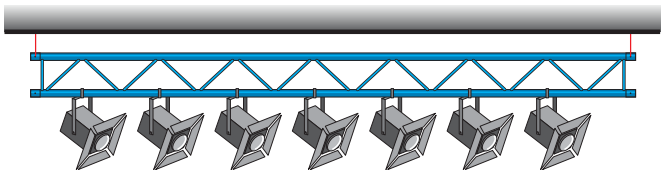
- **Divided Load**
- **Point Load**

In the Eurotruss figures the own weight of the truss is already being calculated, so the given figures are the actual loading which can be used on the truss.

DEFINITION OF THE EUROTRUSS LOADING FIGURES

Divided Load:

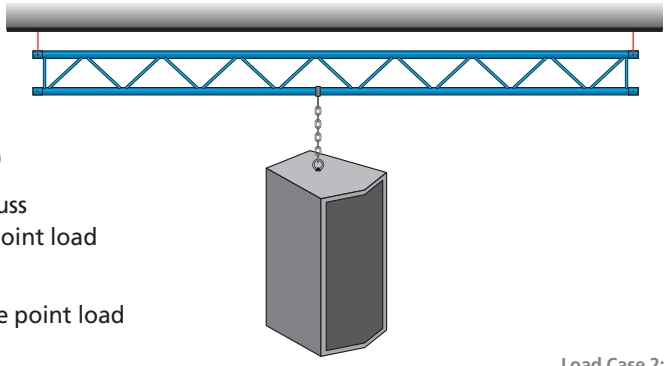
- Divided Load is a load which is equally divided over the entire span.
- On every truss section the load force is equal. The loading is given in Kilograms pro Meter (kg/m).
- You can calculate the total load as following:
  Total Load (kg) = Divided Load (kg/m) x Length of Span (m)



Load Case 1:
Free movable span divided load

Point Load:

- A point load is on fixed load on the entire span.
  Examples of point loads are LED Screens or Speakers (fixed on the truss at one point)
- For the main tubes and connectors in the truss the forces reach their maximum when the point load is exactly in the middle of the span.
- For the bracing the forces increase when the point load switch more to the endings of the span. Whether the braces or the main tube will be the limited factor is depending on the chosen truss system.



Load Case 2:
Free movable span point load

- **In the Eurotruss Loading Scheme the Point Load is always calculated hanging in the middle of the span.**

Technical Load Explanation

Definition of Loading Figures:

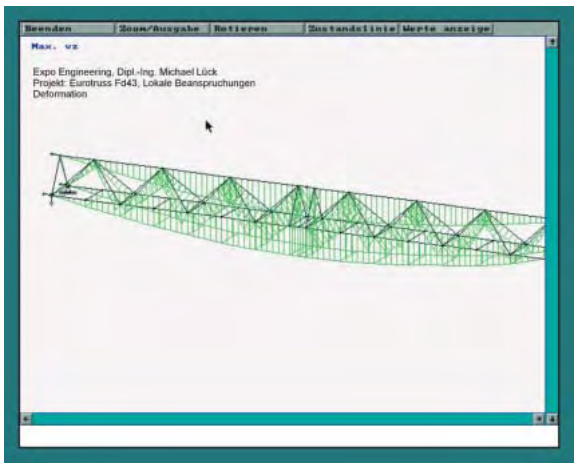
Loading Figures: – General Information

FACT

General Information:

In order to determine the admissible load-bearing capacity of a given system, calculations should be carried out based on the relevant DIN norms.

These calculations regulations pertain to all groups of components, such as main tubes, braces, connectors and weld seams. Any design engineer who is aware of his responsibility should ask a certified agency to check and certify these calculations. Unchecked calculations always remain doubtful, since they may cause incalculable practical consequences.



Any respectable manufacturer's information concerning the statics should be based on defined load cases, since only specific load cases can include a complete structural calculation pertaining to the individual element and the load transmission of their connections.

The described load cases should only refer to flexible sections. Rigidly clamped sections do achieve a higher load-bearing capacity, but can rarely be realized in the practical context.

BASIC APPLICATION RULES

- **Never combine original Eurotruss elements with different brand or so called »compatible« Truss from different manufactures.**
- **Open-air structures covered always, necessitate a mathematical analysis of the total construction statics.**
- **If necessary, reinforce any vertical trusses and ground-supports and provide them with lateral outriggers and bracing.**

  In the absence of a basement, always use system-compatible base plates.
- **Make sure that all pins (truss pins) are inserted and secure them with R-clips or nuts. Pins which go in entirely have to be removed.**
- **In addition, closely observe the manufacturer's assembly instructions.**

Frequently Asked Questions

Common question that are repeatedly asked

FAQ's:
– Legal issues

FAQ's

Many questions and open issues shall always remain despite all books, instructions, bigger catalogues etc. Therefore we have listed common asked questions or issues which repeatedly are being discussed.

If you have any comment, question or issue you would like to discuss, do not hesitate to call us. We are more than delighted to help you !!

LEGAL ISSUE	Static report for Riggs at Exhibitions
Which reports do I need to use a truss Rigs at an exhibition without any problems with local authorities or regulations?	Very often a copy of the TuV Certificate of the used truss type is adequate. Those certificates indicate the maximum load on that truss type between two hanging points (or legs). In case the rig or structure is more complicated than organizations or local authorities may ask for an individual static report of that particular structure or rigg (especially when the structure needs to be flown). In the near future the expectations are that rough figures, product certificates are no longer accepted and proven static reports are required Eurotruss can supply you those static reports.

LEGAL ISSUE	Building Roofs without a permit
Is it possible to build tents or covered structures no bigger than 75 m² and lower than 5m without any report?	This is common told in the market as a rule but this is not the case. Every country and county has its own building and construction regulations which contain a certain limit under where you may build without permit or static report. Check your local authorities or ask us to be sure.

LEGAL ISSUE	Roofs and the paperwork
Which paperwork do I need when building a roof?	Many truss suppliers convince you with the fact that they have statically reported all their roofs and stages so the user do not require individual static reports or permits. This is not the correct information. To be sure and avoid any misunderstanding all roofs need an individual static report which is the responsibility of the user to have this in his possession.

LEGAL ISSUE	Aluminium alloy and quality
Are there differences in aluminium alloys and quality?	Eurotruss uses strictly the aluminium quality AlMgSi 1F31 also described as EN AW-6082 T6. Common used quality of aluminium is EN AW-6061 which is significant inferior in quality than EN AW-6082 T6. The aluminium of this quality is being supplied with a 3.1B Certificate and with U-Zeichen which guarantees AlMgSi 1F31 quality. Eurotruss can supply copies of such certificates. An inferior alloy will reduce the strength and durability of the finished product.

LEGAL ISSUE	Compatible to other brands
Which brands are compatible with Eurotruss?	None is the only and correct answer. Compatible is a technical word which means a perfect match between two items which are identical. However often does the word compatible mean can I connect the two items. You will find some brands which can be connected to Eurotruss however the specs as material, welding technique and quality are different and therefore the overall quality and load capacity is different. Therefore it is not compatible.

Frequently Asked Questions

Common question that are repeatedly asked

FAQ's:
– Geometric and Static issues

GEOMETRIC ISSUE	Circles and segments
How do I build the circle-parts together?	Circles and segments purchased before 01.11.2003 have an individual Letter engraved in the receiver like A, B etc. Every segment has a letter A or B etc which match the segment with the same letter A, B etc. The two segments with letter A needs to be built together. New Circles and segments (purchased after 01.11.2003) are completely exchangeable due to our new production method and machines.

GEOMETRIC ISSUE	Truss installation between two walls
How can I install a truss between two walls?	The Eurotruss can be installed between two walls using two end plates (base plates) and the required screw thread to fix it in the wall. Make sure you use minimum four bolts of M12x100 with the steel quality 4.6. Statically you need to consider this span as free hanging.

STATIC ISSUE	Position of a sling or hanging adapter
Can I put the sling only on the two upper main tubes of a truss?	Statically that is possible and correct as in this case the braces will get push forces and in case you put the sling on the lower two main tubes pull forces will occur. The Eurotruss braces are fit to handle both forces equally and so statically there is no difference in where you mount your hanging adapter or sling.

STATIC ISSUE	Position of a sling or hanging adapter
Can I put the sling only on the two upper main tubes of a truss?	Statically that is possible and correct as in this case the braces will get push forces and in case you put the sling on the lower two main tubes pull forces will occur. The Eurotruss braces are fit to handle both forces equally and so statically there is no difference in where you mount your hanging adapter or sling.

STATIC ISSUE	Use Stage as Ballast
Can I use my stage as ballast in a roof system?	In principal it is not possible to count stage decks as ballast as the decks are not able to coop with the lateral wind forces. Those horizontal forces will create too much tension on the stage construction. Optional there is a possibility to use a ballast safe to connect the Layer under construction to the towers. In this case you can count the own weight of the stage as ballast.

STATIC ISSUE	Stability in Ground Supports
When do I need to use corner braces in ground supports?	If no extra lateral forces or loads occur and the towers will not exceed 6 meters than the use of corner braces can be avoid. At greater heights it is wise to use corner braces to compensate the tolerance on the sleeve blocks wheels. Alternatively you can use outriggers at the basement. In case that the ground supports are used outdoor and wind forces will occur than use of corner braces are obligatory. When you use canopy or other forms of covering you also need to use guy wires.

Users' Guideline

The guarantee for ensurance of a trouble-free system

Users' Responsibility:
– Working with truss systems

– USER'S RESPONSIBILITY –

Working with a truss-system involves a certain amount of specialized knowledge, however practically designed and customer-friendly the product may be. The decision on where and how the loads should be attached and the methods of construction and demonstration of the system are all the responsibility of the user.

A TüV certificate is a guarantee that refers to the quality of the product, and not a guide of how to use it. Even the lack of regulations related to the product does not release the user of his responsibilities with regard to the safe and correct use of the system.

Please use a point-by-point instruction sheet or rigger' handbook in addition to the basic instruction sheets. Only this, combined with the use of the best truss available will ensure a trouble-free and responsible utilization of the system.

Nowadays more and more copies of Eurotruss are available on the market which claim to have the same specifications and therefore to be used as a replacement of or in combination with Eurotruss.

As this is false statement, please ensure that you always have an original Eurotruss product. The logo engraved in the receivers is for you the guarantee that you have an original Eurotruss Truss Product.

Do not accept verbal proof of quality, ask for the certificates and check the logo engraved in the receivers.
If you want to be sure, make sure that you have the original Eurotruss Truss.

ATTENTION

- **Do not drill or screw things into the truss-sections**
- **Do not alter the basic and original elements by yourself**
- **Never combine truss-parts or different makes, even if they appear compatible**
- **Free-hanging spans outdoor needs always a static report to calculate the total system and its capacity as often the existing forces are underestimated**
- **Upright constructions and ground-supports must be stabilized with outriggers; if no bases are used, then suitable base plates are required**
- **In order to achieve the necessary strength and stability with triangle shaped truss, the truss must be used » two tubes down« as this spreads the load**
- **Always use spigots and pins first, and then R-springs. Without spigots the structure will be weakened**
- **When in doubt, please make use of our technical help desk or mail to: technical@eurotruss.nl**

Eurotruss Tools

Tools to support your daily work

Eurotruss Tools:
– Eurotruss Tool-CD and Load Calculator®

TOOL-CD

On the TOOL-CD you will find easy tools, figures and programs which shall be very supportive and handy in your daily work with Eurotruss Truss Systems.

The Tool-CD Rom contains:

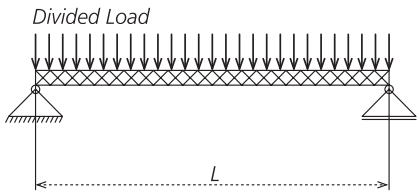
- **Load Calculator®**
  Easy program to easy calculate load cases
- **Approvals and Tests**
  Certificates and Verifications of all systems
- **Multicorner**
  Excel Program calculating dimensions in various shapes
- **CAD Library**
  Extensive 2D and 3D Drawings and Symbols
- **Spacers and Distances**
  Calculation sheet for dimension and sizes
- **Trucking Space**
  Calculating volume and specs of circles

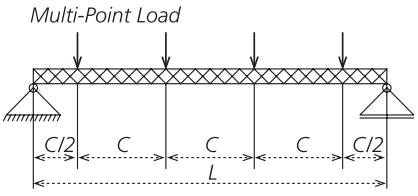
Do not hesitate to ask us your nearest dealer or Eurotruss for a free CD Rom – even if you require more CD's – we will send it free of charge. These tools are also to be downloaded from our website: **http://www.eurotruss.nl**

LOAD CALCULATOR®

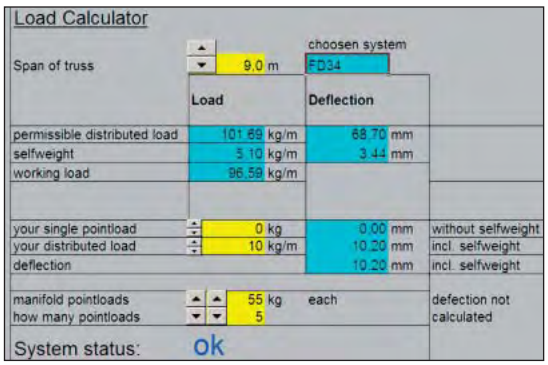
An example to show you how it works:

Input: **FD34**, L=9m · **Divided Load** 10 kg/m including a **Multi-point Load** of 4x 55 kg

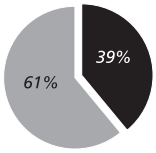


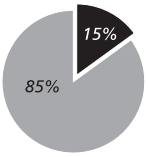


On your computer screen this graphic will show up:



The program calculates the result and informs you with a graphic in percentage the status:





The load ability of this truss type FD34 has been used for 39%.

The System Status is OK.