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Types of steel roof trusses

Gambrel Truss Commonly associated with barns or farming structures, gambrel trusses are popular on a variety of homes especially since the farmhouse style is wildly popular. The Queen Post steel truss is versatile, easy to design, lightweight, and adds beauty to roof designs. This truss is simple and cost-effective. 2. The Howe configuration remains relevant in steel applications for short- to mid-span systems demanding symmetrical load behavior. An appropriate truss configuration—such as planar or spatial trusses—is selected based on these parameters. In addition, the steel trusses have good airflow, robust construction, and wide spans of 20 to 30 meters, making them ideal for use on industrial shop roofs. What are the typical span limits for steel roof trusses?Standard steel trusses can span from 20 meters to 100+ meters. The open web design as used in steel roof trusses, vertical towers, and steel floor trusses demonstrate an incredible variety of design applications, fulfilling almost any architectural need in modern building and bridge construction. King Post Truss King post roof trusses are the most common variety and also the simplest, as it uses the fewest components of a truss – two top chords, one bottom chord, two webbing chords, and one central vertical post referred to as the king post. The type of Steel truss structure include Pratt, Warren, K, Howe, and Fink, which widely used in industrial, commercial, sports buildings, and bridge structure. it looks very similar to the Fink steel truss. In addition, you can build Flat steel trusses according to your own architectural requirements.Areas of application:Flat steel trusses are usually suitable for the construction of flat roof structures in buildings with restricted heights.This steel truss is also suitable when the building project requires a support structure for the floor or slab.Scissors Steel TrussThe scissor steel truss is also a truss structure. 7. They are constructed with Pratt steel trusses that can withstand strong upward forces.North-light Steel TrussesThis is also a type of steel trusse which are usually used in large industrial buildings with short-span roofs. 4. Over time, roof trusses have slowly taken over rafters as the most popular method for creating a roof frame, and for good reason – they're more cost-effective, more convenient, and incredibly versatile. They are incredibly durable and strong, which makes them able to span longer distances than conventional trusses. Not to mention, they can be installed in one piece, often off-site, and installed fully complete.Put simply, a roof truss is what creates the frame of the roof. The Howe truss is most often seen used for heavy-duty bridge spans and, more specifically, railroad bridges. You can expect to pay between 35% and 50% more for these types of trusses than a more standard-style. Constructed from interconnected steel members arranged in triangular configurations, these systems achieve remarkable strength while maintaining a relatively low weight. In this guide, we've broken down exactly what roof trusses are, what the most common types of roof trusses are, and why they're so advantageous. 13. To limit excessive solar heat, the glazing surface should face north or northeast.Areas of application:For roofs of large industrial buildings with short spans.Saw-Tooth Steel TrussThe saw-tooth steel truss is a type of steel truss for the top of multi-span buildings. Connections are secured using high-strength bolts or in-situ welding, depending on the design and load requirements. Fan Truss Also primarily made from steel, fan trusses have a relatively simple construction but still offer exceptional stability due to having many advanced elements. It has top and bottom horizontal beams with vertical and horizontal sections forming an "N" shape.Since this steel truss has compressed vertical members and tensioned diagonal members, fewer diagonal members can be used. Their lightweight yet robust framework enables the integration of cranes, mechanical ducts, and overhead utilities without compromising structural integrity. This synergy between material performance and fabrication logistics is advantageous in fast-paced, resource-conscious construction environments. 10. Also, the steeper the roof pitch, the taller the attic ceiling will be. Fire-resistant coatings are also used where required, enhancing the system's durability and compliance with fire safety standards. This is because it can effectively support the weight of the upper portion of the roof. Concurrently, steel materials are selected following structural demands—typically grades like Q235 or Q355—and appropriate cross-sectional profiles are chosen to optimize strength and material economy. These components form a series of A-frames and result in far better support than cut roofs. With little to no interior load-bearing walls, builders are able to easily craft the exceptionally popular open-concept living spaces. With the extra support columns, the truss can achieve longer spans than the King Post truss.In addition, to ensure the stability of the two columns, their upper ends are connected by a tension beam. 5. As a result, they are best suited for small scale projects like home additions, garages, and other short span applications. Therefore, unlike a truss with one center post, it does not put more weight on the middle of the connecting beam.In addition, each symmetrical queen post is connected to the diagonal edges of the two inclined top beams. With specialized engineering and material selection, exceptional designs can exceed this range, especially for stadiums or airport terminals. Thus, these steel trusses help in spreading the weight evenly across the sections. In addition, the vertical columns prevent the connecting beams or the lower part of the structure from bending in the middle.Areas of application:King Post steel truss is a short-span roof support structure. They are meant to support the roof sheathing and are constructed on either side of the roof's framework.The span of gable roof trusses will vary depending on the roof design. The project concludes with a rigorous inspection phase, comparing on-site execution with technical drawings and applicable standards. 8. Parallel Chord Truss Also referred to as girder trusses, parallel chord roof trusses are different from most other timber frame trusses as they are not triangular in shape. The process begins with thoroughly assessing the building's functional requirements and span constraints. Hence, it is one of the most popular steel trusses for various construction projects.Areas of application:Warren steel truss is the best support structure when building modular steel railroad bridges.Warren steel truss is suitable for commercial buildings with roof spans ranging from 20 meters to 100 meters.This steel truss also helps in the construction of gantry cranes or beam cranes.Howe Steel TrussHowe steel truss can be made of wood, steel, or a combination of both materials. This not only reduces the price but also improves the performance by reducing the weight.Areas of application:Pratt steel trusses are suitable for long roofs that are primarily subject to deadweight or lifting forces. Custom hybrid trusses or space frame variations often outperform traditional configurations when engineered for specific scenarios. Here are some of the most common types of roof trusses you have to choose from: 1. These steel trusses would be attached to large beams and allow enough natural light to enter the interior.The trusses are fitted with glass on the steep or short side to allow for light transmission and reduce carbon emissions. Hip roofs have slopes on all four sides, meeting at a point in the center of the roof. In addition, the shiny sides form a line pattern.Areas of application:Saw-tooth steel trusses are ideal for large industrial buildings with multiple sections. However, the biggest reason that trusses are so popular is because they are roughly 30% cheaper than rafters. Whether employed in vast roof systems or transport infrastructure, steel trusses continue redefining structural possibility boundaries. A gambrel truss is intended to support a wide-spanning roof and can add vertical space to a structure due to its' unique, tall design. The Howe truss inverts the structural roles observed in the Pratt variant: diagonal members resist compression, while verticals bear tension. Standard steel trusses ... Its short, high sections form a W-shape, resulting in a strong strength-to-weight ratio.Areas of application:Fink steel truss is the best choice for supporting the roof of a house. Moreover, it is suitable for short-span roofs from 5 to 10 meters, making it ideal for smaller houses.The main vertical component known as the "king post" connects the lower chord to the intersection of the two upper chords. These types of trusses can span between 10 and 15 yards, making them the ideal choice for medium structures. Upon completion of the structural framework, protective treatments are applied to exposed joints and welds. The concept gained prominence during the Industrial Revolution as steel began supplanting timber and wrought iron in large-scale construction. Fink Truss Fink roof trusses are the most common type used in the construction of residential roofs. Steel's recyclability and dimensional consistency further enhance the sustainability profile of trussed structures. This truss was created by Willian Howe in 1840 and is famous for building railroad bridges.The Howe steel truss is constructed in a manner similar to the inverted Pratt steel truss, which uses straight circular steel columns to connect the top and bottom beams. Over time, trusses evolved from rudimentary frameworks into sophisticated components of contemporary architectural and infrastructural design. 1. Their geometry is well-suited for resisting fluctuating vehicular loads, wind forces, and thermal movements. Its minimalist configuration—with fewer vertical elements—reduces internal force concentrations, making it suitable for structures requiring balanced force transmission. Attic trusses eliminate an issue that many types of trusses present – the webbing limits attic space. In the realm of bridges, steel trusses offer time-tested durability and adaptability. During assembly, precise alignment is maintained through verticality and levelness checks. This brings in enough natural light while avoiding direct sunlight that could heat up the building. Scissor Truss These types of trusses allow the possibility of vaulted ceilings. Then the Scissors steel truss is the ideal solution!Areas of application:You can consider Scissors steel truss for residential or commercial buildings with raised ceilings.It is also ideal for shading at commercial events.Steel Fan TrussAnother type of steel truss that can be used in commercial buildings is the fan truss. Bridges, train sheds, and early factories embraced trussed systems for their unparalleled strength-to-weight ratios. This depends on the specification of the steel and the height of the roof. 12. Then you can consider using an attic roof truss. In both utilitarian and visionary projects, steel trusses offer a resilient framework that bridges the practical and the aspirational in structural design. They are integral to projects requiring rapid assembly, high load tolerance, and material efficiency. but its design is more complex as it includes a roof area.Areas of application:If your project requires additional storage in the ceiling or additional space in a room. What determines the spacing of steel trusses?Truss spacing depends on roof loads, decking systems, and overall structural configuration. Whether you're building a home, a multi-family structure, or an extensive agricultural project, roof trusses are crucial to the style, structure, and cost of your build.With that said, it's important that you choose the right type of truss that best suits your project and your budget. They are manufactured using lightweight materials, such as 2x4s, and are then shipped to the construction site.The standard roof truss consists of three main components: the top chords, the bottom chords (I-joists or ceiling joists), and webbing (posts). The Fink truss utilizes a fan-like arrangement of multiple triangulated segments to enhance load capacity across wide roof spans. Comprised of a series of equilateral or isosceles triangles, the Warren truss distributes static and dynamic loads uniformly. They also allow for more straightforward utility incorporation and reduce dead loads. A primary virtue of steel trusses is their ability to translate distributed loads into axial forces along the members, minimizing bending and shear stresses. Steel truss structures are engineered assemblies of interconnected straight steel elements, typically organized in triangular configurations to ensure optimal stability and load distribution. 6. While common spacing ranges from 3 to 10 meters, specific project requirements and load conditions ultimately guide spacing decisions. Why are trusses considered stronger than beams?Trusses outperform solid beams in many large-span applications because they distribute loads through multiple members, reducing internal stresses. 14. Steel truss structures represent a confluence of engineering precision and architectural ambition. Flat Truss As the name suggests, flat roof trusses are used for flat roof designs. Since king post trusses consist of the fewest materials, they are less expensive than most other options.However, the downside is that king post trusses do not have the ability to span long distances, spanning between five and eight meters. A steel truss, by comparison, is a composite structure made of interconnected components, offering greater strength and spanning capability due to its triangulated design. The additional posts in this design result in queen-post trusses costing a bit more money to construct.Though, the advantage is that queen-post trusses can span greater distances than their king post counterparts, meaning they can be utilized in larger projects like residential home construction, and larger-scale home additions. Installation typically employs cranes or other lifting equipment to erect the truss in a predetermined sequence—either center-outward or from one end across. Queen Post Truss Like king post trusses, queen-post trusses have a relatively simple, yet durable design. The north light truss is most suited for industrial buildings but can also work in homes that desire a durable solution with proper ventilation. Comprehensive construction drawings are developed, outlining the specifications for member dimensions, connection details, and erection sequences. 6. This fact also makes it much easier for homeowners to remove interior walls for future home renovation projects.As an added benefit, there are countless types of trusses, allowing you to create roof framing for nearly any roof style. Hip roof trusses are especially beneficial for high wind and snowy conditions, as they are much more stable than gable roofs. 7. It is the oldest and strongest type of steel truss. Moreover, the structural openness accommodates complex mechanical systems, integrated lighting, and adaptable interior layouts. North Light Roof Truss Traditionally used for short spans in commercial buildings, North Light Roof Trusses are one of the oldest forms of roof trusses. The stringers then cross to form the scissors shape.Scissors steel trusses have large spans of up to 50 meters. 3. This makes them lighter yet structurally efficient, particularly for wide-span roofs and bridges. This type of steel truss is similar to North-light steel trusses in that the repeating portion of the truss forms a ridge, giving the roof a zigzag shape.The shorter side of each steel truss is covered with glass and turned back to the sun. What are the typical span limits for steel roof trusses? 15. You can choose between several trusses that vary in style and purpose such as fink trusses and gambrel trusses. Explore 12 types of steel trusses like Fink, Pratt, Warren & Howe, their uses, features, and applications in construction projects. This triangular roof truss design consists of vertical and diagonal components that create an outward slope from the center. Gable trusses consist of two top chords, one bottom chords, and several vertical posts. Instead, they have a rectangular shape, with the top and bottom chords (the long, straight component of the design) spaced and reinforced with intermediate elements known as webs.Parallel chord trusses are commonly used to provide support to traditional trusses, purlins or rafters. Particular focus is placed on joint zones, where reinforcements may be applied to ensure overall stability and to accommodate structural tolerances. The Fan truss, a derivative configuration, radiates diagonals from a central node, optimizing load paths while allowing greater adaptability to complex roof geometries. In addition, you can customize it to meet your roofing or architectural needs.Areas of application:Queen Post steel truss can be used to build roof structures or porch bridges.Flat Steel TrussAnother truss type in the list of steel truss types is the Flat steel truss. Gable Truss Gable trusses are often seen installed in conjunction with other truss types. Since they are constructed out of lighter materials they are both produced and purchased in large quantities, which, in turn, lowers the price.Not to mention, the labor costs involved in building roof trusses are relatively low, as they do not require the skills of an expert carpenter. Its efficiency in material distribution makes it a preferred choice in residential and industrial roofing. It generally functions as the 'end cap' for the entire roof. Queen post trusses can span between 8 and 12 meters. The geometric rationale—rooted in the inherent rigidity of triangles—allows these systems to effectively transfer loads to their supports. 4. Depending on the design and project requirements, the maximum length can be 30 meters or longer.Areas of application:The Howe steel truss is an excellent choice for the construction of train bridges. Mono Truss Put simply, a mono roof truss is basically half of a full roof truss. Scissor trusses consist of sloped bottom chords, which result in a dramatic ceiling in the living space below. A roof truss is an effective tool used in the building of roofs for both residential and commercial structures.They allow a wide array of roof styles to be built using lighter materials, all while maintaining structural integrity and strength. They are built relatively similar to floor trusses. The type of truss you choose for your project will not only affect the design of your structure, but also the cost and time it takes to build – so, choose carefully! Related Guides Published February 11th, 2021 12:36 AM Below are a few common types of steel trusses. What is the principle behind steel trusses?Steel trusses function by converting applied loads into axial forces—tension or compression—within their members. They can be used to build residential roofs, commercial buildings, and other sturdy structures such as bridges:Fink Steel TrussIf you are working on residential construction, the Fink steel truss is the best choice for roofing. The prefabricated nature of truss components allows for rapid assembly over active roadways and waterways, reducing construction impact on urban and ecological environments. The original way to build American homes involved having a roof frame that was a "cut roof," meaning the individual beams and rafters were cut out and installed in a standard triangular shape with vertical internal supports. The primary structure includes wood, but the tension members and vertical members of Howe trusses are made out of steel.This helps to enhance the durability and reliability, allowing the truss to span up to 30 yards. Diagonal members then connect the bottom of one column to the top of the next.Howe steel trusses typically span between 7.3 and 18.3 meters. Frequently found in long-span bridges and industrial roofs, this truss exemplifies the marriage of structural clarity and performance. Types of Roof Trusses As previously mentioned, there are a myriad of trusses available to fit the needs of your building project. This reversal makes it adept at accommodating distributed roof and floor loads, particularly in timber or hybrid construction scenarios. Truss members are prefabricated under controlled factory conditions to ensure high precision. 2. However, instead of having on king post at the center, this type of truss features two queen posts connected by a straining beam. This is because it can withstand weight very well, especially in the lower part.It can also be used to build roof structures to support various loads that exert pressure on the upper trusses. ... What distinguishes a steel truss from a steel rafter?A steel rafter is a singular beam element supporting roof loads, typically used in smaller spans. 8. Depending on your building requirements, the steel fan truss can cover spans from 10 to 40 meters.Areas of application:Steel fan truss is suitable for roof structures of large residential or commercial buildings.Attic Roof TrussIf you need to build a storage room on the roof of your building, consider the attic roof truss. In addition to supporting the overall structure of the roof, they also determine the shape of the roof and ceiling below. At the base of the main columns, the columns are connected to the opposite sides of the roof beams to form a lattice truss. The location of the webbing on the truss also allows for more storage space, which can accommodate items such as water tanks.These types of roof trusses are also considered one of the most cost-effective options, especially due to the fact that they span large distances. Due to their versatility in construction projects, there are a number of types of roof trusses that can meet the needs of practical applications and building styles.From kingpost, double fink, and dual pitch, to Polynesian, cambered, and bowstring, the amount of roof truss types is substantial. Then Pratt steel truss is the best choice for steel roofing. This includes cutting, welding, drilling, and applying anti-corrosion coatings. Trusses deliver exceptional value for aviation and logistics where spatial flexibility is paramount. The resulting efficiency enables lighter foundations, enhances seismic resilience, and supports long-span applications with reduced material consumption. This option is incredibly versatile and is often to create a roof that offers more visual space and natural sunlight.Mono trusses are most often seen in garages or sheds, though, they can also be used to build extensions or create additional roof tiers on an existing roof. It is more expensive to make compared to other types of steel trusses such as King Post or Queen Post.If you need extra space or just want a higher roof for your building. The two queen posts prevent the horizontal or connecting beams from yielding. 3. Advantages of Roof Trusses The growing popularity of roof trusses as an alternative to rafters is due to a couple of reasons. This is followed by a detailed structural analysis to evaluate the proposed system's feasibility, load-bearing performance, and cost-efficiency. Evaluation criteria include dimensional tolerances, weld quality, and the integrity of protective finishes. From vaulted ceilings and attic spaces to asphalt shingles and metal roofs, there is certainly a truss to get the job done. Following approval, the structure is formally handed over for operational use. For example live loads, dead loads, or moving loads.King Post Steel TrussKing Post truss is another type of steel truss that is used to support buildings with huge roofs. Whether it be hip trusses, flat trusses, or gable trusses, follow along as we explore the 12 types of roof trusses. Howe Truss Howe roof trusses are traditionally made from a combination of wood and steel. These types of loads include:The weight of the roof, including shingles or insulation.Live loads caused by roof movement.Accumulated snow or strong winds.Pratt Steel TrussIf your building project has a span of between 20 and 100 meters. Modern stadiums and arenas demand structural systems that support vast roof expanses and complement architectural ambition. In fact, research shows that you can expect to spend between $30 and $400 per roof truss.Aside from affordability, another major advantage to roof trusses is that they effectively distribute the weight onto the exterior walls of the structure, as opposed to the interior walls. Hip Truss A common roof type, the hip truss is built to craft a hip-style roof. You can expect to spend, in some cases, 30% more for scissor trusses than other truss types. Steel trusses—particularly those with curved or retractable configurations—fulfill these requirements with finesse. In fact, this type of truss is the ideal solution when you need to span a distance without a central supporting post. In contrast, a truss employs triangulated members that optimize load transfer, often making it more efficient for large spans and lightweight applications. These types of roof trusses are most often seen in commercial applications, made out of steel. The Pratt Truss can also cover lengths between six and 10 meters, making it the ideal truss for homes within this range. Cut roofs were relatively easy to construct, though, as manufacturing technology advanced, architects discovered a better way to build roof frames – the truss.A trussed roof is constructed as a series of interlocking jacks, joists, and rafters. With a small span of 5 to 9 meters, this truss is the most popular and economical choice for residential steel roofing. Each component is marked and often pre-assembled to verify dimensional accuracy and fit-up quality before site delivery. Steel trusses provide an ideal solution in spaces where column-free interiors and clear vertical volumes are essential. They offer the maximum benefit regarding natural lighting with the use of glazing on the steeper pitch which typically faces north or north-east to limit solar gain.In fact, the use of north light trusses to enhance natural daylighting can help reduce operational carbon emissions in industrial structures. The top of chords of a fan truss are divided into smaller lengths, creating enhance purlin support. This option combines the convenience and efficiency of pre-constructed wood trusses, while still enjoying the benefits of high ceilings.The downside to scissor trusses is that they come at a higher cost than other alternatives. They help provide even natural light and can reduce the heat from sunlight.Warren Steel TrussNamed after its creator, James Warren, the Warren steel truss is a sturdy load-bearing structure. Though similar to the gable truss variety, there are a wide range of hip truss variations that can be used to create different architectural styles. Its repetitive geometry supports economical material usage and streamlined fabrication, making it a mainstay in bridge construction and floor support systems. They appear similar to queen-post trusses, but the two vertical posts are positioned further apart to account for the additional overhead space.The wider the structure is, the bigger the attic space will be and the longer the truss span. Their minimal visual mass and capacity for dynamic loading conditions make them the backbone of high-performance, large-span architecture. Their capacity to span over 100 meters without intermediate supports opens new possibilities in large-scale enclosures such as auditoriums, hangars, and exhibition halls. the upper part of this steel truss looks like the royal column steel truss. This minimizes bending and results in an efficient, lightweight structure that can sustain heavy and distributed loads. As a result, they reduce the need for artificial lighting and the risk of overheating. Once fabricated, components are systematically transported to the construction site. 11. Pratt Truss The Pratt Truss was invented in 1844 by Caleb and Thomas Pratt. For example, prefab steel airplane hangars are open buildings with long-span roofs. What is a Roof Truss? The construction of steel truss structures involves a series of carefully coordinated steps designed to ensure structural integrity, efficiency, and long-term performance. 9. This efficient tension-compression interplay makes it particularly effective for gravity-dominated loads. Attic trusses can span up to 25 meters. It consists of two parallel lower and upper beams connected by diagonal steel members.The dead or live loads applied to the top chord are distributed through the connected members and finally reach the two lower support points. Steel trusses empower architects and engineers with spatial freedom unmatched by traditional framing systems. Attic Truss This type of truss is used for residential home construction projects that require either an attic or additional living space. It has extra steel webs on the top chord to allow it to carry more weight. Their ability to span vast distances without intermediate supports makes them especially suitable for applications such as bridges, industrial warehouses, sports arenas, and large-scale roofing systems. It has inclined stringers at the bottom which cross in the center to form a "V" shape at the bottom and an "X" shape at the top. Steel trusses are indispensable for solving spatial and load-bearing challenges in structural engineering. Each phase, from conceptual planning to final inspection, integrates engineering precision with practical execution. 5. The diagonal posts deliver compression, while the vertical posts offer tension to the design,This type of truss is one of the most common steel trusses since it is economical. Their capacity to span considerable distances without intermediary support enhances structural efficiency and facilitates innovative architectural expressions. Our Final Thoughts Although we've provided you with 15 different types of roof trusses, the options extend beyond this list. How does a steel truss differ from a steel frame?While both are skeletal systems, a steel frame uses vertical columns and horizontal beams in a rectilinear configuration. This design strategy significantly reduces structural weight while maintaining superior load-bearing capacity. The Pratt truss is distinguished by its diagonals sloping toward the center of the span under tension and verticals under compression. Why choose steel trusses over other systems?Steel trusses offer long-span capability, efficient material use, rapid prefabrication, and compatibility with complex architectural geometries. 11K Views Updated: December 15th, 2021 Trusses are a key part of many structures, and there are 12 types of them that suit different purposes. They are not meant to provide a specific or stabilizing load to the support.Warren steel truss is strong, lightweight, and easy to install. It consists of longitudinal members with a series of equal and alternating members that form an equilateral triangle.Warren steel truss is supported by bars of the same length and can withstand pushing and pulling forces very well. Which steel truss type is the strongest?"Strongest" depends on the context—longest span, heaviest load, or stability under dynamic forces. Truss geometry's modular and repetitive nature lends itself to prefabrication, reducing on-site labor demands and construction timelines. They span up to 14 meters and the webbing forms a "W" shape allowing for a greater load-bearing capacity. Special attention is given to secure storage practices to prevent mechanical damage or deformation, thus facilitating efficient site assembly operations. It gives a stylish look to the roof of a building.In aviation, this steel truss is used to provide strong support for airplane wings.If your project includes the construction of short-span bridges, then the King Post steel truss is a good choice.Queen Post Steel TrussesWhile the Queen Post steel truss has two vertical support columns, the King Post steel truss has only one support column. Their unmatched ability to span vast spaces, endure variable loading, and integrate seamlessly with modern construction methods ensures their continued relevance. The construction of flat roof trusses offers a great deal of support, due to the fact that they don't contain any slope for shedding precipitation or bearing a load. With spans of typically 8 to 12 feet, it's perfect for small buildings or shade structures. Steel truss structures represent a fundamental form of structural design characterized by their efficient geometry and material economy.