

Benefits of pre-fabricated timber roof trusses

The Institute for Timber Construction (ITC-SA), the South African professional body and regulator of the engineered timber structure industry, offers insight into the benefits of pre-fabricated roof trusses and how to prevent costly and potentially dangerous situations arising from having a non-compliant, site-manufactured roof installed by an erector that is not ITC-SA-accredited.

The following article has been adapted from an original article by Fred Wagenaar, former ITC-SA executive officer

The roof structure is arguably one of the most important construction elements of any residential building to be constructed, as it protects the occupier's property, finishes and inhabitants from the elements. It is also one of the largest, heaviest and most costly structural components in any home design.



A fully compliant roof structure as manufactured by a professional member of the ITC-SA. (Image: MTEK Industries SA)

Therefore, it is logical to expect that much planning, design and know-how would be invested in the project in order to create an aesthetically pleasing, sound structure that can safely carry the induced loading as well as offer acceptable longevity and aesthetic appeal for the lifespan of the building.

Although this sounds logical, sadly, many building owners choose price over quality with regards to both workmanship and materials, which can lead to costly, disastrous and sometimes even life-threatening situations.

ITC-SA-accredited fabricators

Each and every ITC-SA-accredited fabricator is audited on an annual basis with regards to quality, competence and compliance to inter alia the South African National Standards – SANS 10243: The Manufacture and Erection of Timber Roof Trusses. An annual Certificate of Competence is issued by the ITC-SA to confirm that the fabricator complies with the National Design and Material Standards and the ITC-SA requirements.

Pre-fabricated roof trusses shall, at all times, be in accordance with the rational design requirements given by the engineer as well as the SANS requirements below. To confirm compliance, an engineering certificate will be required on completion of any roof structure:

- SANS 10400 - Part L
- SANS 10243
- SANS 10163
- SANS 1783 - Part 1 and 2
- SANS 51075
- SANS 3575
- SANS 10096

Pre-fabricated roof trusses can only be approved when a rational design is available, confirming that the material and truss design meet and/or exceed the SANS requirements.



An example of a site-manufactured roof structure that will threaten life and limb.

What are the essential elements that need to be considered in ensuring a sound timber roof structure?

1. The timber used must be structural timber and must comply with the material and, where applicable, treatment requirements, to meet the design intent:

Structural timber needs to be marked with red ink on the face of the timber at 1m intervals. If it does not bear these structural markings, it will need to be rejected. Consumers should beware of unmarked timber or timber with black crosses at the end, as this marking, or lack thereof, confirms that the timber in question is not structural timber.

2. The designer must create an accurate cutting bill:

The cutting bill will dictate the exact lengths and angles at which the timber must be cut for proper assembly.

3. The right engineering systems must be used:

The ITC-SA provides accreditation for three systems that are recognised for meeting all South African prescribed design and manufacturing requirements:

- MiTek Industries SA
- International Truss Systems
- Multinail Africa

Note: The metal connector plates used must be supplied by the specific software system that was applied in the design. In addition, the metal connector plates must be the right size, positioned correctly and located as per the standard methods and tolerances prescribed by the system. In addition, it is critical to note that teeth direction on the connector plate(s) is also important – only a cutting bill can confirm this.

4. All connections and bracing details must be in accordance with the rational design intent:

In other words, everything that holds the structure together, such as the number of nails, bolts, washers, brackets and cleats, must be in accordance with the engineering design. All necessary bracing accessories must be stipulated on the design drawings.

Below are some of the most common pitfalls with regards to new timber roof structures:

• Choosing price over quality

The old adage of what you pay for is what you get could never be truer than when it comes to timber roof construction. Many consumers try to save on the roof construction and often end up spending more time remedying the resultant consequences that arise from using sub-standard materials and workmanship.

Bear in mind that in order to create a professional and sound end result, you will need to employ professional, knowledgeable and experienced individuals, which will no doubt cost more initially than non-qualified individuals off the street, but which will save a lot of money and stress down the line.

• Choosing the right engineer

Use an Engineering Council of South Africa (ECSA) registered professional, who is accredited with the ITC-SA to design and certify the timber roof structure. Ensure that your chosen professional has good working knowledge of timber and roof construction.

• Pre-fabricated roof trusses are preferred

Pre-fabricated roof trusses are cut by advanced, specially designed machinery and are therefore far more accurate than their hand-made counterparts. Pre-fabricated trusses covered by a rational design, will also use less timber and will comply with all regulatory requirements, assuming they are designed by an ITC-SA accredited professional. In all industry-related tests, the ITC-SA has found site-made timber trusses to be more expensive than pre-manufactured timber roof trusses.

• Guarantee

By using reputable fabricators, such as those registered with the ITC-SA, the consumer can immediately have the peace of mind that these companies or individuals are regularly audited and monitored, and that should something go wrong with

their workmanship, the consumer will have recourse in the form of a manufacturing warranty. Part of the membership requirements for engineers accredited by the ITC-SA is that they all carry their own professional indemnity insurance cover for any professional negligence on their part with regards to the specific structures they sign off and take responsibility for.



A fully compliant roof structure as manufactured by a professional member of the ITC-SA. (Image: BUCCO KZN)

Conclusion

Internal investigation and findings by the ITC-SA have confirmed that 90% of hand-/site-made trusses do not comply with the relevant building regulation and SANS material and design specifications.

Research suggests that hand-/site-made timber roof trusses are on average up to 20% more expensive than pre-manufactured timber roof trusses.

Pre-fabricated roof trusses come with guarantees in the form of a manufacturing warranty and an engineer's design certificate, which the owner may call upon to have the roof structure repaired. It is important to note that the so-called 'engineer's certificate' so often referred to on quotations refers to the certificate which certifies that the timber structure has been erected according to the design intent. In addition to this, the owner should insist that the fabricator prove that the roof structure has been designed according to a rational design.

For more information, go to www.itc-sa.org.

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