



Hertfordshire
Growth Board

Hertfordshire Offsite Manufacture

Factsheet 7

27.05.2022

Factsheet 7: Why Donaldson Timber Systems?

Timber frame

Modern timber frame structures are precision-engineered, strong and durable. The build method relies on a factory manufactured timber frame as a means of structural support - carrying the loads imposed by the floors and roofs - before transmitting them to the foundations, which can be built at a lower cost due to the buildings being lightweight.

The construction of timber frame based structures utilises factory manufactured wall panels, floor and roof panels. The systems used are classified as either open panel, insulated or closed panel. These panels can include the wall insulation pre-fitted and can include the pre-fitting of doors, windows and service zones for onsite installation of M&E works.

Timber frame currently accounts for around a quarter of all new homes being built in the UK. This build method is utilised by every sector of the construction industry including social housing providers, due to timber frame's superb environment credentials, as well as being quick and easy to construct.

Timber frame is the primary method of housebuilding across the globe, in Scotland timber frame accounts for over 90% of all new housing. Uptake is on the increase in England and Wales as businesses seek a high-quality offsite solution that helps them meet their programme and budget requirements whilst providing an exceptional answer to the carbon challenge.

Open-panel

Timber frame open panel systems, are structurally engineered panels that form the inside load-bearing leaf of the external wall, comprising studs, rails, sheathing on one face and a breather membrane. The open panel system is made from treated softwood timber framing, over which a structural sheet material of either Ply or OSB board is fixed. Depending on the system,

U-values ranging from 0.26 down to 0.15 W/m²K, can be achieved. With higher environmental credentials clients are rapidly moving to specify closed panel.

Closed-panel

Timber frame closed panel systems are made from studs, rails and insulation, with sheathings and/or linings on the faces of the panel. A vapour barrier is also provided on the warm side of the insulation and a breather membrane on the outer face of the panel. If desired, closed panels may also include fitted windows and internal service zone battens, for ease of installation and construction. U-values from 0.25 right down to 0.10 W/m²K can be achieved. These solutions have been designed to deliver excellent thermal and airtightness properties and are ideal as the basis of a modern energy efficient home.

Who are Donaldson Timber Systems (DTS)?

Established in 1975 Stewart Milne Group became part of DTS in 2021. DTS aim to provide quality build systems that meet clients' expectations in terms of cost, delivery and innovation. DTS have unrivalled expertise in the sector since 1860.

DTS are a leading offsite timber frame specialist providing precision made timber frame structures to house builders, developers, contractors and housing associations across the UK. They are one of the most recognised brands in the sector, with a heritage of innovation, offering our customers a diverse portfolio of build systems including the market-leading Sigma® II advanced build solution.

They have a reputation for being awarded repeat business from key clients based on service and technical expertise and have successfully delivered projects up to £15m in value throughout the UK.

External links:
[Donaldson Timber Systems](#)

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DTS operate throughout the UK and have three manufacturing plants in Witney, Aberdeen and Falkirk and regional offices in Glasgow and Milton Keynes. DTS are passionate about the environment and work hard to reduce the impact that the business has on the planet.

Knowledge base

DTS have provided solutions to housing developers in the affordable housing construction market for many years. Their building systems have been developed with flexibility and choice in mind to enable affordable home builders to buy, dependent upon their own key drivers whether cost, speed of build, building performance or a combination of all.

Investing in Hertfordshire's future workforce

DTS are proud to be investing in the future of Hertfordshire and in September 2021 went live in partnership with West Herts College with an MMC Course funded by DTS. DTS are putting 12 Apprenticeships through the course. This demonstrates DTS's commitment to Herts & upskilling the local workforce.

Housing portfolio

DTS's portfolio of residential solutions is extensive, having delivered homes across a spectrum of house types and tenures, ranging from detached family homes to multi storey dwellings. Whether it be for a local authority, housing association or the open market DTS has the experience to deliver.

All frames and panels are manufactured offsite in a factory environment before being delivered to site ready to install. The offsite manufacturing process guarantees a higher standard of quality and a streamlined process leading to reduced build programmes and a reduction in waste during construction.

House designs - A collaborative approach to the development of standard house type designs and details. Flexibility is key, DTS can create frames and panels to suit any design suitable for a range of external finishes, roof designs, and window styles.

DTS can provide:

- A full supply and install service;
- An assisted supply only service; or
- Be the supplier of the systems for you to install.

DTS systems

DTS's portfolio of timber frame wall panel building systems, complete with the reassurance of compliance with building regulations and technical standards, offer effective solutions to meet the challenges of build speed, fabric performance, building design and cost. They have a range of award-winning systems tailored to suit a variety of performance needs. With a choice of open panel or closed panel construction, they can design their timber frame houses to meet clients' precise requirements.

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THE SYSTEMS

3 systems offered:

Alpha - An open panel solution

Delta - A factory insulated panel system

Sigma® II - A higher level of prefabrication offering improved levels of assured performance, the same potential performance as Passivhaus.

Alpha – An open panel solution, the most cost-effective system. This system is designed to meet the needs of low-to-medium rise house building, fully tested on large volume housing projects. Available as a supply and install service or supply only service depending upon individual client needs and requirements.

Key Features

- Open wall panels
- Wall U-Values ranging from 0.32 to 0.14 W/m²K
- Airtightness ranging from 5.0 to 3.0 m³/h.m²@50Pa
- Thermal bridging ranging from 0.08 to 0.03 W/mK
- Range of internal build-ups available to suit your specific requirements
- Chipboard or OSB clad floor cassettes
- Roof trusses or pre-insulated cassettes
- Ground level roof assembly

Delta - A factory insulated panel system offers a higher level of thermal performance and quality, reduces on-site activities and site waste. Available as a supply and install or supply only service depending upon individual client needs and requirements.

Key Features

- Pre-insulated rigid insulation wall panels
- Reduces thermal bridging
- Wall U-values ranging from 0.27 to 0.13 W/m²K
- Airtightness ranging from 5.0 to 3.0 m³/h.m²@50Pa
- Thermal bridging ranging from 0.08 to 0.03 W/mK
- Range of internal build-ups to suit specific requirements
- Chipboard or OSB clad floor cassettes
- Roof trusses or pre-insulated cassettes
- Ground level roof assembly
- Floor cassettes wrapped, air sealed and insulated
- Range of wall width and external finishes
- Roof trusses or factory made roof cassettes
- Potential to air test, immediately after kit erection
- Principle service routes preformed in floor cassettes

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Sigma® II - A higher level of prefabrication offering improved levels of assured performance, award-winning, BOPAS and BBA approved, closed panel Sigma® II Build System is the robust and effective solution to achieving high levels of fabric performance. Excellent thermal performance and airtightness, the Sigma® II Build System offers reduced material and labour costs by using conventional materials in a more innovative manner. A market leading system that is utilised on large volume housing projects only available as a supply and install service to allow full responsibility for the quality and integrity of all site-fitted works.

Key Features

- Fully insulated closed wall panels
 - Service cavity pre-fitted
 - Built-in airtightness detailing and pre-fitted seals
 - Floor cassettes edge wrapped and insulated
 - Wall U-Values ranging from 0.26 to 0.13 W/m²K
 - Airtightness ranging from 5.0 to 2.0 m³/h.m²@50Pa
 - Thermal bridging of 0.04 to 0.02 W/mK
 - Chipboard or OSB clad factory made roof cassettes
 - Chipboard or OSB clad floor cassettes
 - Roof trusses or pre-insulated cassettes
 - Ground level roof assembly
 - Potential to air test, immediately after kit erection
 - Option to air-test immediately after frame erection
 - Principle service routes preformed in floor cassettes
- DTS HAS:
BOPAS in place – 60 years
BBA in place – only MMC supplier who does.

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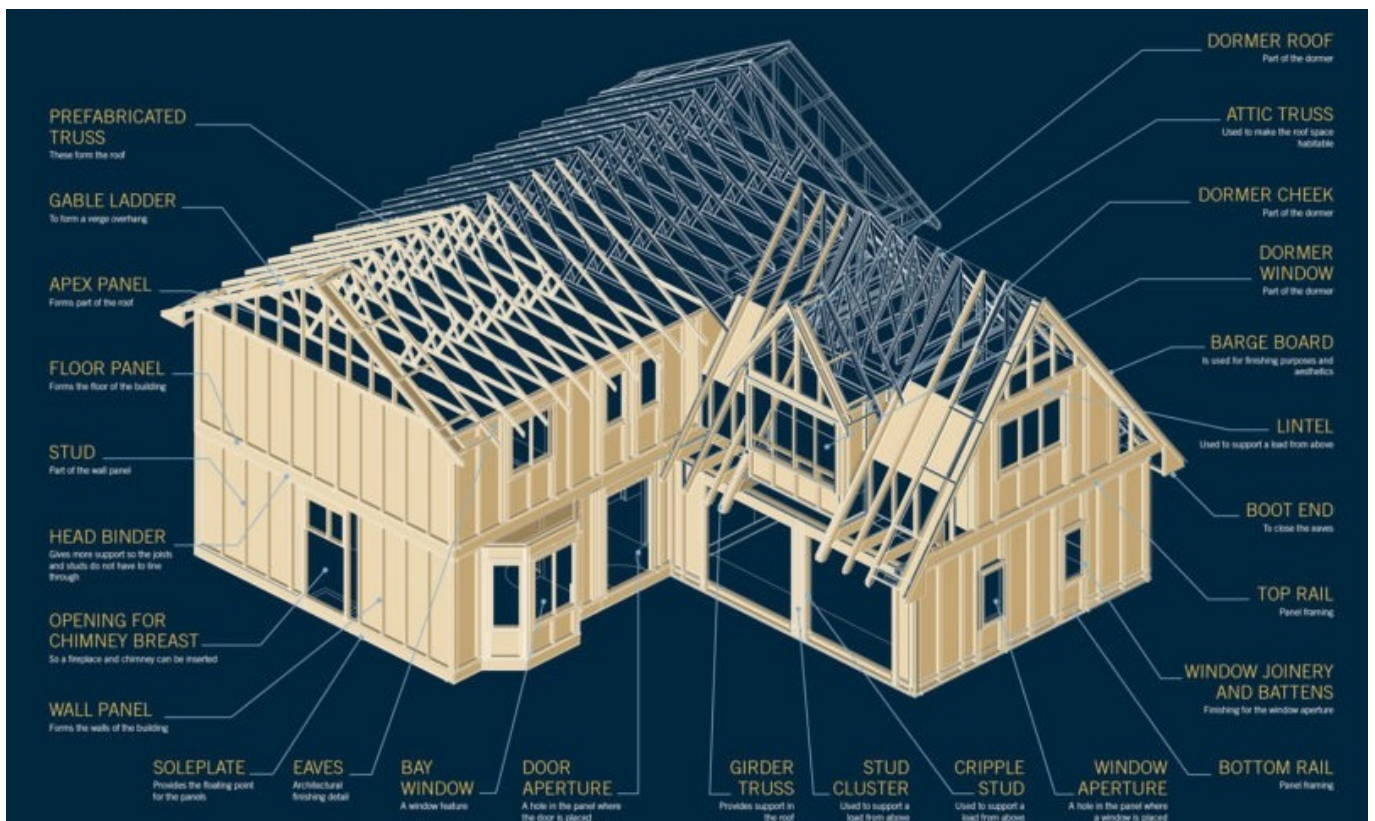
Building information modelling (BIM)

DTS's offsite factory produces housing portfolio options, uses state-of-art BIM software offering Developers and Designers pre-made BIM Objects. BIM Objects use three-dimensional design and on-time information sharing, offering an effective solution for handling the organisation and budget challenges of today's complex construction projects.

BIM will help projects by:

- Increasing certainty at early stages of development – time, cost and quality.
- Reducing design time and cost
- Providing ideas for developers and designers to develop into projects
- Improving accuracy in design
- Improving accuracy in materials scheduling reducing costs and increasing time certainty
- Reducing traditional estimating, quantity surveying and scheduling times.
- Providing on time transparent information sharing regarding the projects progress.

Note: Diagram inherited from HGB document. HGB to provide original / high resolution image.



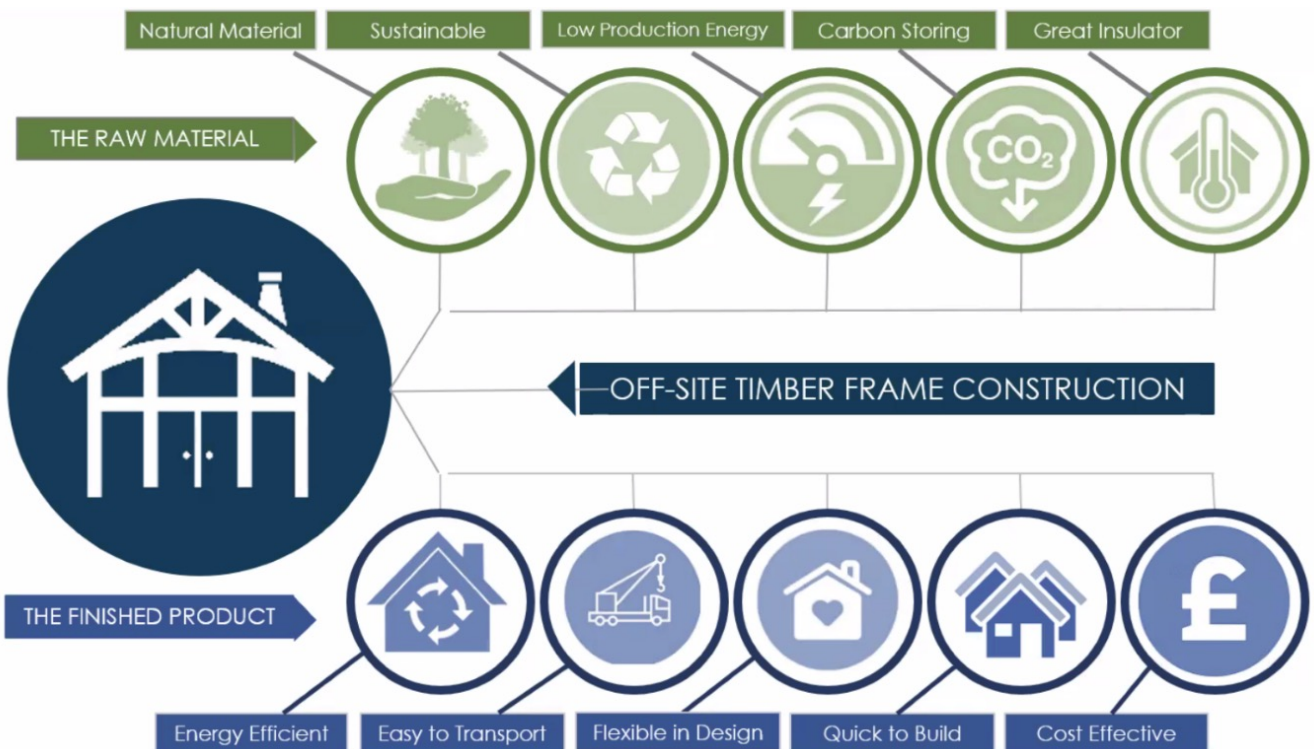
Examples of Timber Systems House

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Sustainability

Wood is a natural, renewable and sustainable material for building, with a lighter carbon footprint than steel or concrete, providing sustainable building solutions.

- Maximizing wood use in both residential and commercial construction will remove millions of tons of CO₂ from the atmosphere annually. 0.75 tonnes of CO₂ removed from the atmosphere for every cubic metre of timber used.
- Wood stores carbon and, with the least embodied energy of all major building materials, it requires less energy from harvest to transport, manufacturing, installation, maintenance and disposal or recycling.
- Harvesting and replanting increases the forests' carbon sink potential as the rate of sequestration is greater during young, vigorous growth.
- Active forest management, or forest thinning, mitigates wildfires, cuts carbon emissions, expands wildlife habitats, and creates jobs in rural areas.
- 100% of waste timber is recycled or re-used.
- Every timber frame building we produce for our clients is a fabric-first low carbon building.
- DTS's offsite solutions have lower embodied carbon than masonry.



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Net Zero Carbon

Using timber in construction is so important to help meet the net zero carbon targets set by government and industry bodies alike. Building sustainable homes is a key focus. Converting timber into a workable construction product uses far less energy and creates far less pollution than other primary materials such as brick and blocks, steel and concrete. Low carbon housing will help meet future energy needs and have a positive impact on addressing climate change issues.

Sigma® II homes have 6% less embodied carbon (4tCO₂e) than a PV Solution. Timber Frame has 30-45% less embodied carbon than masonry. Timber frames draw in carbon from the atmosphere and store it, with the largest potential for this achieved in external walls, intermediate floors, and roof structures.

In fact, on average, replacing just one cubic metre of concrete with timber in construction can save a tonne of CO₂ emissions. It takes very little energy to convert the wood from trees to the timber used in building. This means that the embodied energy in timber is low. Indeed, it is the lowest of almost all common building materials. Timber continues to perform well when compared directly with other materials.

Life cycle studies of timber frame homes show that they significantly outperform alternatives – timber saves about 40% of carbon emissions in comparison to concrete and about 30% compared to steel. According to the Committee on Climate Change, 'Using wood in construction to displace high-carbon materials such as cement and steel is one of the most effective ways to use limited biomass resources to mitigate climate change.'



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Using wood in construction is a cost-free solution to carbon capture – reducing CO₂ in the atmosphere.



More trees are planted and the size of the European forest carbon sink continues to grow.



Trees capture CO₂ from the atmosphere and store it as carbon.



Mature trees are harvested and their carbon is captured and stored in buildings and other wood products.



Using wood instead of other materials saves CO₂ emissions, through carbon captured and stored in the wood product and avoidance of alternative CO₂ intensive materials.



One of the simplest ways to capture carbon and reduce CO₂ in the atmosphere is by increasing the use of wood in construction.

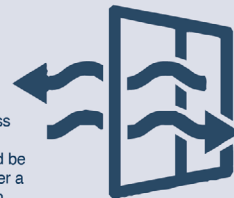
U-VALUES

The primary factor in any buildings thermal performance is the U-Value of the walls, floors and roof. We have a range of open and closed external wall panel options, with U-Values ranging from 0.32 to 0.13 ensuring we can provide a timber frame solution to suit any project specific requirements.



THERMAL COMFORT

Where low levels of airtightness are specified, the ventilation strategy for the building should be considered, which can be either a mechanical or passive solution.



AIR TIGHTNESS



Our range of open and closed wall panel solutions can be specified to achieve any level of air-tightness performance down to 3. Air-tightness values less than 3 are feasible, we can provide specialist advice.

STRUCTURE



All our build systems are structurally designed by certified structural engineers to comply with both regulatory requirements and your project specification and preferences.

THERMAL BRIDGING

All our systems meet the minimum thermal bridging requirements with SAP and accredited construction details. We can provide PSI values for the majority of our systems from our libraries.

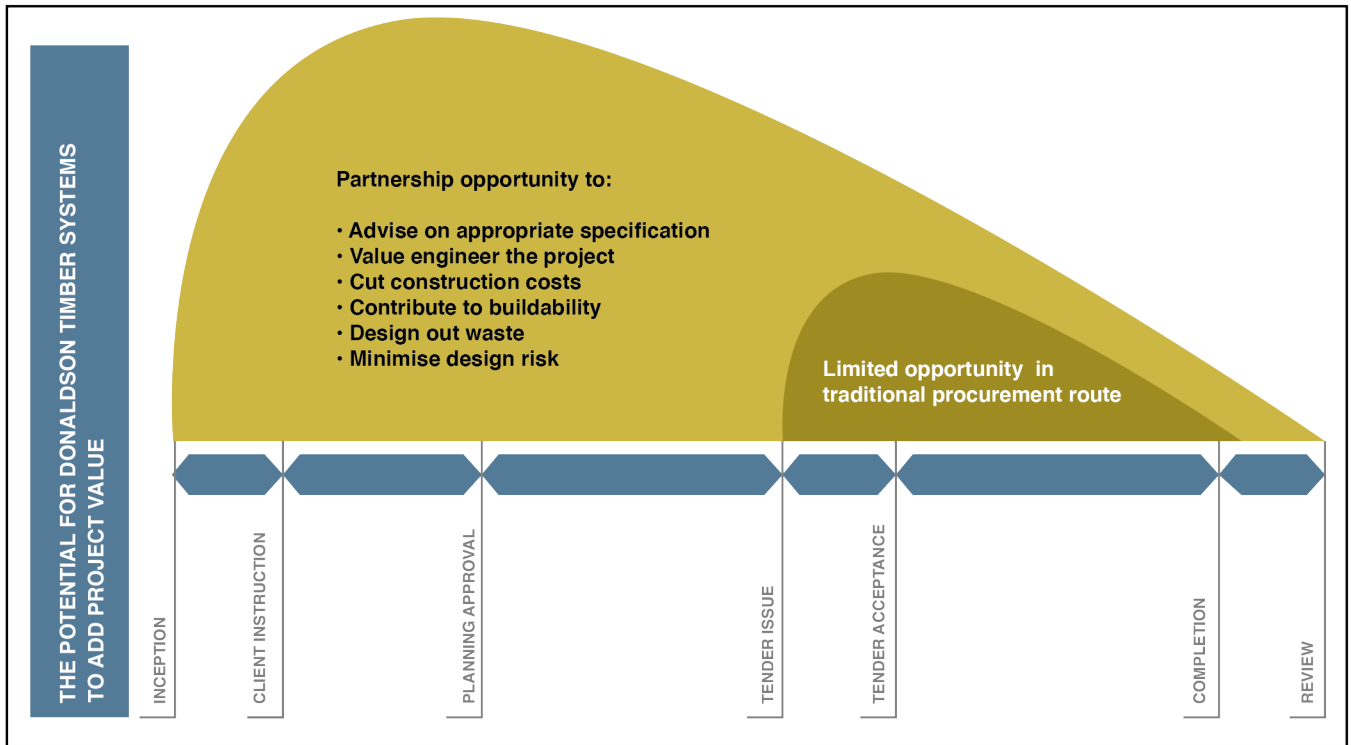


ACOUSTICS

Timber frame solutions for separating walls and floors can be designed to achieve, and exceed all current and future requirements for acoustic performance.



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