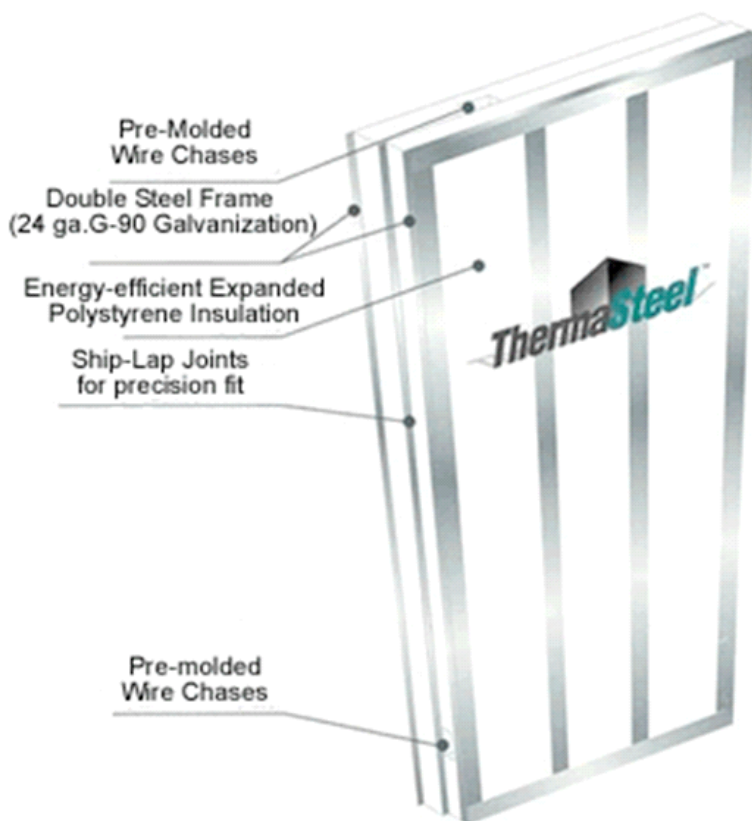




ThermaSteel Answers the Challenges

Architects and Owners have asked Engineered Assemblies if in addition to Cladding does a solution exist for infill and structural steel stud walls that speeds up construction, ensures straight walls, superior R value and is compatible with the EA RVRS (Rear Ventilated Rain Screen) façade solutions.



- Exceptional Strength to Weight Ratios
- Insulated Interior-Exterior Walls, Roofs, Ceilings and Foundation Panels, Infill Panels.
- Cuts Building Time by at least 50%
- Available in 14,16,18,20 and 24 gauge or combinations of
- R-Values which exceeds code
- Insulation R-Value Increases as Temperature Drops
- Reduced HVAC sizing
- One High Tech Step That Works!

Engineered Assemblies Framing the Future

The following factors were considered Engineered Assemblies when reviewing the ThermaSteel Product.

- Insulation
- Metal Stud
- Engineering
- Environment
- Configuration
- Longevity
- Assembly/Speed of Construction
- Cost



ThermaSteel offers builders a pre-engineered, insulated, structural wall panel which is **nine** times more energy efficient than current construction methods, cost less & installs up to 60% faster. In the competitive world of new construction and the often difficult repair, redesign and installation of energy efficient renovation, *ThermaSteel* provides both cost savings and increased efficiency.

History

RADVA Corporation began the development of a structural panel utilizing expanded polystyrene and galvanized steel profiles bonded into a unitized panel by a heat activated adhesive in 1975. The panels were initially used for residential construction in the USA and a few years later, in Mexico. In 1985, RADVA sold substantially all of its rights to Atlantic Richfield (ARCO) and subsequently repurchased these rights in December 1987.

The operations were extended via joint ventures or license agreements into Mexico, Australia, Russia, South Africa, Poland, Guam, Philippines, and Turkey. In May of 1998, RADVA sold 95% interest with all intellectual rights in the Thermastructure Building System to ThermaSteel Corporation.

The Review

Insulation

ENGINEERED ASSEMBLIES reviewed Fiberglass, Cellulose, Icynene, Urethane, and Expanded Polystyrene (EPS) insulation systems. Reviewing and analyzing the R-Values, mold and water resistance, long-term performance, cost, and environmental impact, ENGINEERED ASSEMBLIES determined that EPS was the best solution for the insulation system of a pre-engineered steel framing system. Expanded Polystyrene is a closed-cell, lightweight, rigid plastic foam. The modified grade of EPS that ThermaSteel has selected contains a fire retardant to decrease the potential of fire spread from a small flame source. The grade of bead has been designed to meet domestic and international building codes

Type	R - Value per inch	Capacity to Recycle	Resistance to Mold	Resistance to Water
Expanded Polystyrene	4-6	Yes	Yes	Yes
Fiberglass	2.1-3.3	No	No	No
Cellulose	3	Yes	No	No
Icynene	4-5	No	Yes	Yes
Urethane	5-8	No	Yes	Yes

Outstanding Properties

Excellent Mechanical Properties - EPS provides resistance in compression and a capacity for dampening shocks caused by seismic and hurricane force winds.

Insensitivity to water - EPS will not warp, twist, rot, delaminate, or break down.

Capacity to Recycle - The very nature of polystyrene as a thermoplastic allows it to be continuously melted and reformed making EPS a highly recyclable product.

Biodegradability - EPS will not biodegrade allowing a building to perform with the benefits of solid mass insulation indefinitely.

Inorganic - EPS contains no food value for termites, ants, or other insects. Mold is also not attracted to EPS.

Waste to Energy - Expanded polystyrene, when converted in state-of-the-art incineration systems, will yield 17,000 to 18,000 BTU of energy per pound, which is more than coal. Expanded polystyrene consists solely of hydrogen and carbon. Its complete combustion yields only carbon dioxide and water vapor. In fact, EPS may well be the cleanest incineration source of energy.

Contaminants - EPS contains no chlorofluorocarbons (CFC's), HCFC's, or Formaldehydes.

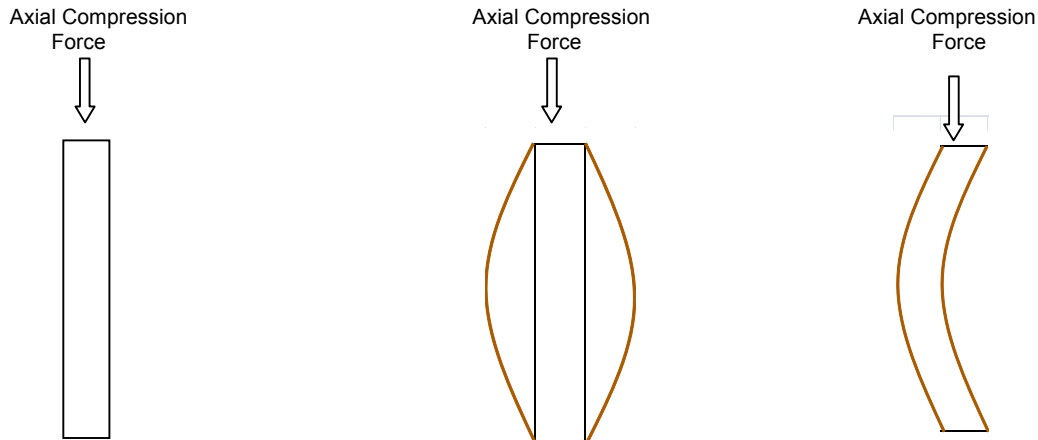
Metal Stud

Through extensive review of alternative building system design analysis, ENGINEERED ASSEMBLIES evaluated all forms of alternative system concepts, designs, and configurations. Insulated Concrete Forms (ICFs), Straw Bale, "sandwich" Structural Insulated Panels (SIPs), and Aerated Concrete Block were evaluated. Based on the analysis, it was determined that the ThermaSteel System was the only choice.

ENGINEERED ASSEMBLIES avoided the "sandwich" metal and wood skin panel concept because of the limits to customization of plumbing and electrical services, risk of delaminating, and most importantly, when exposed to fire the sandwich panel insulation can weaken causing structural failure and risk of injury. ICF construction was also avoided because of cost, construction limitations, and moisture creation in volatile climate zones. The through-wall structural framing approach with thermal studs was the best approach for developing a system to support over six story construction. The approach allows any engineering firm to design without proprietary knowledge, and safety factors can be reduced resulting in less steel requirements and lower construction costs.

Engineering

ThermaSteel has developed a Structural Thermal Efficient Panel (STEP) construction. The rationale to this approach is to provide additional structural protection where other systems stop. Unlike most alternative systems, ThermaSteel has dual structural resistant technology. Structural EPS is injected into a structural panel encasing the thermal studs.

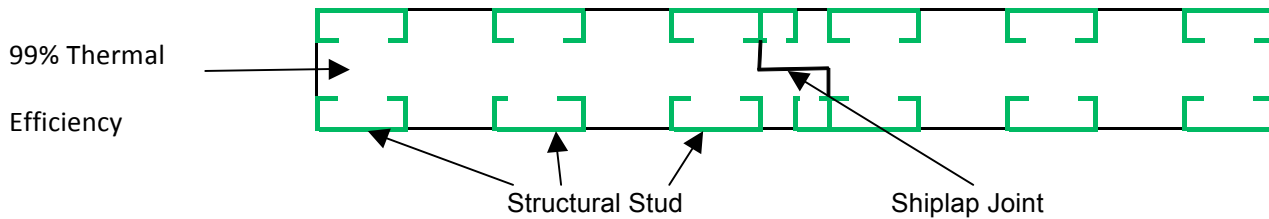


ThermaSteel no Movement

Structural Delamination
Adhesive bonded sandwich panels wood and metal clad.

Lateral Deflection

The result is a building system that when exposed to fire, wind, and seismic forces will stand fast as most systems fail. The structural stud reinforcement of ThermaSteel increases the overall performance of the panel well beyond the competition.



Each ThermaSteel panel has trim metal on both top and bottom. This trim metal is to provide protection of the EPS during the install so that it will easily slide into the structural bottom and top track.

The approach to framing:

1. Set perimeter wall moisture sealer
2. Anchor structural bottom track
3. Mark track with panel widths
4. Set ThermaSteel panels to each mark
5. Install structural top track
6. Screw or nail fasten track to panel studs

Panels are bundled per wall group and delivered on a flat bed trailer for ease of off-loading.

Panels are light weight and do not require the use of cranes or lifts. A typical panel weighs the same as a sheet of 3/4" plywood.

Engineering was a major focus in Engineered Assemblies choice of ThermaSteel. Too many alternative framing systems were focused on being as unique as possible resulting in proprietary testing requirements. Furthermore, ENGINEERED ASSEMBLIES found that engineers were leery in designing structures that were not manufactured to standard construction practices, especially in high-risk zones.

ThermaSteel takes the approach to remove the reliance on composite testing requirements and to focus on developing a building system that met conventional building and engineering standards. ThermaSteel has simply replaced conventional construction framing with an inorganic highly energy-efficient building system that any engineer can design within any region of the world.

An engineer only needs to design a metal stud framed building with the appropriate gauge, size, and spacing. ThermaSteel will panelize to the exact engineering specifications. This further reduces construction risks by delivering a pre-fabricated, pre-engineered building system for commercial, institutional and residential applications. Furthermore ThermaSteel has developed for engineers a simple load conversion chart which allows engineers to select a panel number based on width, height and load requirements. ThermaSteel also provides detailed shop and installation drawings reducing the engineering costs to end users.

Environment

Environment protection is the core of Engineered Assemblies mission in marketing building systems that support energy efficiency and sustainability. The focus was to develop a building system that was made of recycled products that can be virtually recycled indefinitely. ThermaSteel is prefabricated to eliminate jobsite waste. The system is designed with a zero-waste manufacturing approach and has been designed to reduce the carbon footprint of buildings supporting the Leadership in Energy and Environmental Design (LEED®) green building goals.

For an investor in a building endeavor, it is important to determine the proper selection of building materials to maximize future return on investment. We have to look beyond today and plan on building for the future buyers of homes and office buildings if we want to maximize resale value. With the tremendous push towards "Green", energy/efficient, environmentally responsible building products, deciding to construct today with traditional building materials can be viewed as a step back. **Traditional products are not competitive with future construction trends and will only limit resale value; much like the value today of a 1986 computer.** ENGINEERED ASSEMBLIES is committed to marketing and developing both short and long-term returns.

Longevity

Maintenance - ThermaSteel requires minimal to zero maintenance for the life of the system.

Resistance - ThermaSteel is inorganic and therefore provides no food value for termites, wood ants, and other insects. Another benefit to its inorganic nature is that it does not support mold growth or the transference of mold.

Water Damage - Long-term resistance to water damage, mold, and rot will protect your structure for generations. This makes ThermaSteel one of the best building systems in the world for flood resistant construction. If a flood occurs, remove the interior veneer to flood level, let the wall system dry for 24 hours, then re-veneer the wall.

Fire - ThermaSteel is treated with fire retardant qualifying the system for fire-rated assemblies. Furthermore, during fires, the treated EPS has a health safety 2.5 times that of white pine.

Building Envelope - A sealed thermal envelope building provides an investor many benefits making building green affordable. First, energy demands are 30-80% less, requiring less solar panel investment. Second, the buildings typically require 1/2 of the HVAC mechanical tonnage. Third, windows can be cost effective double pane low-e.

Jobsite Waste - ThermaSteel is custom prefabricated to engineered specifications. The benefit is little to no waste on site. Builders have safer jobsites, generally with no need for dumpsters during framing stage, and rapid construction with limited noise pollution.

ThermaSteel will not warp, twist, or delaminate like other systems.

Investments - ThermaSteel is one of the most cost effective building systems that actually compete in cost to conventional building approaches. ThermaSteel is 1/3th to 1/5th the cost of other comparable alternative building systems.

Insurance - Constructing projects in metal provides builders with discounts in Builder's Risk insurance and workers compensation fees. Owners benefit with reduced permanent insurance rates that have annual increases less than traditional built structures.

Assembly/Speed of Assembly

The approach to framing:

1. Set perimeter wall moisture sealer
2. Anchor structural bottom track
3. Mark track with panel widths
4. Set Ultra Frame panels to each mark
5. Install structural top track
6. Screw or nail fasten track to panel studs

Panels are bundled per wall group and delivered on a flat bed trailer for ease of off-loading. Panels are light weight and do not require the use of cranes or lifts. A typical panel weighs the same as a sheet of 3/4" plywood. One four man crew can install 350 linear ft per day or enough to build a 3500 sq ft bungalow.

Cost

When a total value statement of building and life cycle are examined, the ThermaSteel system is by far more economical than current existing methods of construction.