Pre-Engineered Advantages

Pre-Engineered Buildings offer significant advantages over Conventional Structural Steel Buildings

The term “Pre-Engineered Buildings” (P.E.B.) is not well known to the Engineering Groups who traditionally design their buildings with conventional structural steel using standard hot rolled sections from product manufacturers. The attached comparison is intended to introduce and inform Engineering Design Groups of the P.E.B. concept, its high versatility and practicality, and its disadvantages to Designers and Contractors.

The P.E.B concept is widely used in the United States, as well as in many of the industrialized countries. It consists of a complete steel-framed building system, with components pre-designed to fit together in a vast variety of combinations to meet the unique requirements of specific end uses. Sub-Systems include anchor bolts, structural framing, insulation, roof and wall cladding, mezzanines or floor including steel floor decking, windows, doors, ventilation systems, canopies, overhangs and fascias.

P.E.B can be used for permanent installations from around 400 square feet (36 square meters) upwards, for one story and two story construction.

Rigid Building Systems, located in Houston, Texas, U.S.A. produces 45 million dollars in shipments annually, not only in American market but also in the global market.

Several major Contractors and Designers who previously used conventional design exclusively adopted the P.E.B. formula and the savings have proven to be extremely high.

We design and we manufacture.

Please contact us for further technical discussions. We can make your job easier, and you can make your company more competitive.

The attached detailed comparison between Conventional Structural Steel and Pre-Engineered Building Systems will give you a precise idea of the advantages of P.E.B.

	PRE-ENGINEERED BUILDINGS	CONVENTIONAL STRUCTURAL STEEL
1) Design Criteria	A.I.S.C. / M.B.M.A. / A.W.S.	A.I.S.C. / A.W.S. / J.I.S. / D.I.N. / B.S.
2) Design	Quick and efficient since standardization of P.E.B. has significantly reduced design time. Basic designs are used over Specialized computer analysis and design programs reduce design time and optimize material required. Drafting is also computerized with minimal manual drawings. Design, detail drawings and erection drawings are supplied free of charge by the manufacturer. Approval drawings may be prepared within 10 days to 3 weeks. Consultant in-house design and drafting design is significantly reduced,allowing more time for coordination and review, and increasing margins in design fee savings.	Each conventional steel structure is designed from scratch by the consultant, with fewer design aids available to the Engineer. Maximum engineering required on every project. Generalized computer analysis programs require extensive input/output and design iterations. Drafting is manual or only partially automated.Much Consultant time and expense is devoted to design and drafting, as well as coordination and review.

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3) Weight	About 30% lighter through the efficient use of steel. Primary framing members are designed with tapered built-up plate sections with the most steel in the areas of highest stress, using high strength steel.Secondary members are light gage cold formed “Z” or “C” shaped members. Members are roll-formed for minimum weight and labor cost.	Steel member sizes must be selected from standard hot rolled sections, which in many cases are heavier than what is actually required by design. Members are the same cross-section along the entire length, regardless of local stress magnitudeSecondary members are from standard hot rolled “I” and “C” sections. In many cases members are heavier than required, and therefore are not as economical as cold formed members.
4) Base Material	Rigid Building P.E.B. System uses almost all steel to meet 50,000 P.S.I. minimum yield including the cladding.	In most of the cases (90%) Base Material is 36,000 P.S.I. minimum yield.
5) Foundation	Simple design, easy to construct and lightweight.	Simple design, easy to construct and lightweight.
6) Accessories *(Windows, Doors, Ventilation)*	Designed to fit the system, with standardized, interchangeable parts, including pre-designed flashing and trims.Mass produced for economy. All available with the building.	Every project requires special design for accessories and special sourcing for each.Flashing and trims must be uniquely designed and fabricated.
7) Delivery	Approximately 8 weeks.	Average 5 to 6 months.
8) Erection	Easy, fast, step by step. Erection costs and time are accurately known, based upon extensive experience with similar buildings.	Slow, extensive field labor required. Typically 20% more expensive than P.E.B. In most of the cases, the erection cost and time are not estimated accurately.
9) Architecture	Outstanding architectural design can be achieved at low cost. Conventional wall and fascia materials, such as concrete, masonry and wood, can be utilized.	Special architectural design requires research and high cost.
11) Sourcing and Coordination	Building is supplied complete with cladding and all accessories, including erection if required, all from one source of supply.	Building is supplied complete with cladding and all accessories, including erection if required, all from one source of supply.
12) Changes	Very flexible, tailor made, accepts changes and revisions easily. Future expansion simple, easy and cost effective. One supplier to coordinate changes.	Changes, revisions and additions can be difficult due to extensive redesign and coordination among suppliers and Sub-contractors.
13) Responsibility	Single source of supply results in total responsibility for one supplier,including design liability.	Multiple responsibilities can result in questions of who is responsible when components do not fit properly, insufficient material is supplied, or materials fail to perform, particularly at supplier interfaces. The Consultant carries total design liability.
14) Performance	All components have been specified and designed specifically to act together as a system, for maximum efficiency, precise fit-up, and performance in the field.The experience with similar buildings in actual field conditions world-wide has resulted in design improvements over time, which allows dependable prediction of performance.	Components are designed in general for possible use in many alternative configurations. Design and detailing errors are possible in assembling diverse components into unique buildings. Each building design is unique, so prediction of how components will perform together is uncertain. Materials which have performed well in some climates may not in other environments.

Rigid building systems utilize state-of-the-art computer aided fabrication equipment and technology to assure customers of high-quality steel products at very competitive prices.

Building Maintenance Guide

Building Exterior

We recommend that you follow our simple maintenance schedule. By following our recommendations you will be assured of the maximum trouble-free lifespan of your building.Periodic maintenance of the exterior will depend on the location of your building.The following table gives recommended periods but can be varied to suit particular environments based on local or practical experience.

Building Location	Maintenance Period
(a) Up to 5 km from the sea	2 Months
(b) High Pollution industrial area	2 Months
(c) Medium pollution industrial area	3 Months
(d) Areas of high humidity	4 Months
(e) Low pollution industrial area	4 Months
(f) Dry, desert areas	8 Months

Preventive maintenance should commence immediately after a project is erected, modified or repaired.

1. Check for any debris that may have been left on top of panel or trim.

Examples of this are ferrous items such as screws, pop rivets, nails, drill sward, sheet metal off-cuts, tin cans, etc. Large or heavy items should be removed by hand to avoid damaging the paint or zinc layer on the panel. The remaining smaller items may be swept off with a soft nylon brush. Please note this check should be made after any trade has worked on the building, e.g., electricians, plumbers, air conditioning technicians, and steel erectors.

2. Check for sand or dirt build up. These retain salt and moisture and will rapidly breakdown the paint and zinc layers resulting in corrosion of the base metal.

3. The most vulnerable areas of the building are:

- √ Gutters.
- √ Roof Sheets.
- √ Sheltered Areas.
- √ Top portion of walls sheltered by roof overhangs or gutters.

Sand and dirt should be washed off with clean desalinated water and a soft nylon brush. Clean from top to bottom and give a final rinse with desalinated water when completed. Ensure no water is trapped anywhere.

4. If the building is in an area of industrial pollution or close to a marine environment then water alone may not be enough. Salts and other deposits build up at the formed corners of panels and quickly breakdown the paint and zinc layers and finally corrode the base metal. As such deposits build up, the hardness of the layer increases making removal more difficult. In this case, the period between maintenance operations should be shortened and a mild detergent should be added to the initial washing water.

The Following is a Recommended Solution:

- ♦ 1/3 cup detergent
- ♦ 2/3 cup tri-sodium phosphate (e.g., Soilex).
- ♦ 1 quart sodium hypo chlorite - 5% solution (e.g., Clorox).
- ♦ 3 quarts water

Wash down the panel with the above solution and a soft nylon brush. A final rinse of clean desalinated water should follow.

Caulking compounds, oil, grease, tar wax, or similar substances can be removed with mineral spirits. Follow this by cleaning with the detergent solution and clean desalinated water rinse.

CAUTION:
Avoid solvent and abrasive type cleaners as they can do more harm than good by wearing both the paint and zinc layers.

5. Check the base of wall panels to ensure the ground level is at least 150 mm below the bottom of the panel. If wind blown-sand has built up at the base of the wall, It should be removed. If plants/shrubs etc., are around the building, make sure they are not touching the wall panel, particularly Thom-type bushes.

6. Check all equipment which is located through or adjacent to any panel (Roof or Wall). Ensure there is no moisture build up on or near the panel. If there is, then corrosion is inevitable. If this condition exists, then make modifications to avoid it.

The Following situations are examples of conditions to be avoided:

- Water run-off from water services or air conditioners.
- Copper pipes fastened directly to the steel panel.
- Open water storage tanks or ponds adjacent to the panel.
- Steam outlets adjacent to the panels
- Acid storage areas adjacent to the panels.

7. Standard gutters and Valley gutters.

- Regular checks should be made and all rubbish and sand should be removed.
- Flush the waters with gutters.
- Check that downspouts are clear.
- Check that downspouts have adequate drainage away from the building.

8. If minor damage occurs to the sheeting or trims, and paint touch-up is required, then the following procedure should be followed:

- Abrade the affected area.
- Clean down with a solvent.
- If based metal exposed, apply one coat of a zinc chromate primer. If base metal is not exposed, then the primer is not required.
- Apply one coat of available touch-up paint.

SAFETY

Roofs

Extreme caution should be exercised when working on roofs.

- Use only ladders which are long enough to reach one meter above the step off point.
- Always secure the ladder to the building and make sure it is on a firm base.
- Do not step on skylight panels.
- When walking on the roof, step on the low corrugations, not on the high corrugations. Stepping on the high corrugations can damage the sheets.Walk along the screw line where possible.

Cranes

- When maintaining overhead cranes or associated parts, immobilize the crane before commencing work.

Accessories

Walk Doors

- Occasionally lubricate the hinges and lockset.
- Removed any dirt or grit from the threshold.
- Make sure the door is not allowed to swing back against the wall, this can sprain the hinges, and damage the panel.

Sliding Doors

- Regular cleaning of the bottom door guide by removal of stones and sand will ensure smooth running.

Roll-up Doors

- Occasionally clean and lubricate chains and reduction drive gears.
- Lightly grease the vertical guides.
- Operate with caution.

Power Vents

- Periodically clean the blades to avoid build up of dust and dirt.

Buildings with Cranes

- Every 3 months check that diagonal rod bracing are tight.
- After one month of operation check that the high strength bolts on the crane beams are tight.
- Every six months check the high strength bolts in the crane beams and main frame connections.

Glossary

Accessories
Additions to the basic building, such as doors, windows, louvers, ventilators etc.

Anchor Bolts
Hooked bolts cast in concrete foundations for anchorage of structural members.

Base Angle
Continuous angle fixed to floor slab or grade beam for attachment of all panels.

Base Plate
The plate of a column or beam which rests on the supporting surface.

Beam
Horizontal structural member.

Brace Rods
Rods placed diagonally in roof and walls for transferring wind loads

Bridge Crane
Overhead traveling crane supported on beams and rails.

Built-up Member
(B.U.) Structural member formed by welding together web and flange plates.

Caulking
Sealant used in making watertight joints.

Clear Span
Building without internal columns.

Closure
(Foam Closure) Profiled foam material used inside or outside profiled roof or wall panels to form weather tight seal.

Cold Formed
Various steel shapes manufactured by roll - forming or pressing.

Column
Vertical structural member.

Crane Beam
Support for overhead traveling bridge crane.

Crane Rails
Rails welded or bolted to crane beams to form the track for bridge crane wheels.

Curb
Raised flashing around roof openings to form waterproof opening.

Damper
Baffle plate in a ventilator.

Dead Load
Weight of the structure.

D.S.D.
Double slide door.

Eave
Top of the sidewall.

Eave Height
Height from top of eave strut to finished floor level.

Eave Strut
Structural member at the eave which supports roof and wall panel.

Expansion Joint
A break in the construction to allow for thermal expansion.

Flange Brace
An angle from the flange of columns or rafters to girts and purlins to provide lateral support and stability.

Girt
Secondary horizontal member to which wall panels are attached, usually cold formed “Z”

Grout
Non-shrinking sand cement mixture used under base plates to obtain uniform bearing surface.

Haunch
Intersection of column and rafter.

Header
Horizontal member over an opening in a wall.

H.S.B.
High strength bolts.

Hot Rolled
Steel shapes formed while the steel is semi-molten.

Jack Beam
A beam used to support a rafter instead of a column.

Jamb
Vertical member at the side of a wall opening.

Joist
Horizontal member for supporting floor or roof decking.

Knee
See Haunch.

Liner Panel
Interior wall sheeting.

Live Load
Any variable temporary load on the structure.

Main Frame
Primary members which support secondary members.

Mastic
See caulking-sealant.

M.B.
Machine bolt.

Mezzanine
Intermediate floor between ground floor and first floor or roof.

Mono-Slope
Single slope roof.

Beam-Column
Building with intermediate columns.

Parapet
Vertical wall extension above the eave line.

Partition
Internal wall.

Pitch
Slope of the roof.

Pop Rivet
Used for joining flashing and light gauge metal trims.

Portal Frame
Column and beam bracing used in lieu of standard rod bracing, to provide clear access.

Post & Beam (P&B)
Light endwall framing.

Primer Paint
Factory applied paint to structural members providing protection during shipping and erection.

Purlin
Secondary horizontal member to which roof panels are attached usually cold formed “Z”

Rafter
Primary member supported on columns.

Ridge
Peak of gabled building.

Rigid Frame (R.F.)
Main frame of the building comprising columns and rafters.

Sag Rod
Tie rods used to support flanges of girts or purlins.

Sealant
See mastic-caulking.

Secondary Framing
Secondary members or framing such as girts, purlins, eave struts etc.

S.D.S
Self drilling screw - used for attaching panels and trims to girts and purlins. Pre-drilling is not necessary.

S.T.S
Seld tapping screw. Same function as S.D.S. but needs pre-drilled holes.

Shims
Small steel plates used to level base plates or packing between structural members.

Sill
The bottom horizontal member of a door or windows opening.

Skylight
Translucent fiberglass panel used in the roof to transmit natural light.

S.S.D.
Single slide door.

Soffit
Underside of canopy, fascia or roof extension.

Span
Distance from out to out of wall girts.

Splice Plate
Plate used to connect two members.

Stiffener
Plate welded to a member to prevent buckling.

Stitch Screw
Used to fasten side laps of panels.

Truss
Structural member made up of several individual parts welded or bolted together, the completed unit acting as a beam.

V.G.
Valley gutter.