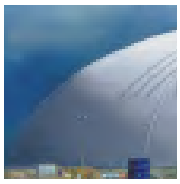
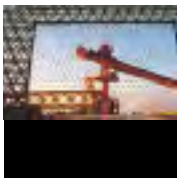
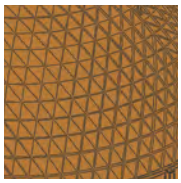
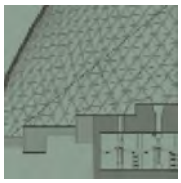
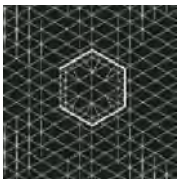
Geometrica®



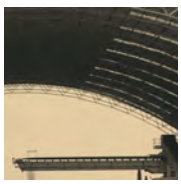
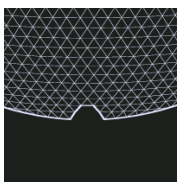


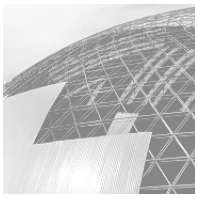





Statement of Qualifications



COMPANY PROFILE

Geometrica

Basic geometric shapes provide the most efficient and elegant templates for man-made forms.

Since 1992, Geometrica has applied and refined that principle with a single goal: To bring economical and innovative structural solutions to industrial and architectural applications.

We specialize in large column-free enclosures for a range of commercial uses. With Geometrica structures around the world, we continue to expand our capabilities through the development of new technologies and advanced design software.

Our credentials include:

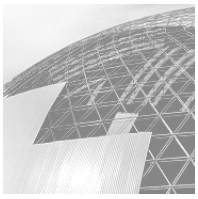
- Creation of Freedome® Structure technology
- An automated manufacturing facility
- The world's longest industrial domes
- The world's largest aluminum domes

This binder presents a summary of Geometrica's product advantages and procedures, its clients and its people.

We look forward to the opportunity to be part of your team.

ADVANTAGES

The System
Freedome®
Economy
Long Span
Materials
Environment



ADVANTAGES

The System - *Engineering elegant solutions*

The Geometrica system uses three unique components that set its structures apart from the competition.

Geometrica's patented connector is one of the strongest and most versatile mechanical joints known. A simple, weld-free mechanical connector, its strength comes from its moment resistance and its ability to effectively transfer stresses and distribute forces. It permits construction of an unlimited variety of geometric surfaces, from elliptical and double curved to the completely free-form Freedome® designs which Geometrica pioneered.

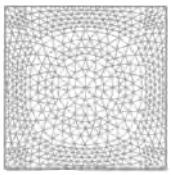
Geometrica's proprietary software program, an advancement over anything else in the field, can master even the most complex geometric surfaces. Using algorithmic theories originated by Dr. Douglas Wright and further developed by Wright and Francisco Castaño, the program is designed to determine the most efficient structural form, and to maintain control of manufacturing integrity.

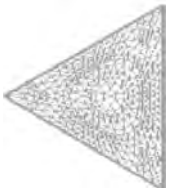
The Geometrica connector and design software combined make the third unique factor of the system possible: Freedome® Technology.

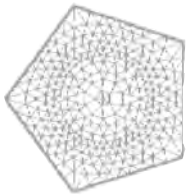
ADVANTAGES

Freedome®

Unlimited choices beyond the spherical dome







Freedome technology makes it possible to cover areas of any shape: circular, rectangular or even freestyle. The structure may spring from the ground, or it may rest on material containing walls, and the supporting edge may vary in elevation, curvature or continuity. Over 300 meters of clear span may be achieved with this remarkable technology.

By analyzing geometrical variations in plan and profile, and in the pattern and configuration of structural members, Geometrica can identify the most efficient form for any site and application. The Freedome technology developed and used exclusively by Geometrica allows the covering of surfaces of any geometric shape; true free form.

ADVANTAGES

Economy

Geometrica has developed revolutionary ways to increase architectural economies, gaining maximum useable space while using less time and material.

Construction: Geometrica domes are completely prefabricated, self-scaffolding, and in most cases require no welding or special tools. They can be assembled in a short time by local, unskilled personnel, trained on-site.

Weight: Geometrica uses a minimum of materials to construct lightweight domes. Its' sophisticated software can generate the minimum surface area to cover the required clearance. This provides economies of cost.

Materials: The galvanized steel used in most Geometrica domes is initially cost-effective and its strength and corrosion resistance provides future economies as well.

Time: Geometrica assembly methods are practical, fast and non-invasive. A minimum of space and equipment is required, permitting other subcontractors to work on site simultaneously. Various assembly methods accommodate all new construction situations.

ADVANTAGES

Long span - *Soaring, column-free expanses*

The vast, column-free long span enclosures built by Geometrica have reached dimensions as long as 224 meters, a record-breaking expanse. This incredible advance in clear-span construction is achievable because of the unique synergy of Geometrica's innovative thinking, rigorous research and advanced technology.

Breaking away from rectangular forms, Geometrica has created single and double-curved shapes. These galvanized steel and aluminum structures range between 50m to 300m in span or diameter. The breathtaking, fully clad latticed shells often weigh one third of comparably sized conventional steel structures.

ADVANTAGES

Materials - *Removing weight, adding strength*

cost efficient

Galvanized Steel

As the most cost-effective material available for dome construction, galvanized steel for tubing and cladding is durable and economical. Since Geometrica's unique technology allows the construction of large structures using a minimum of materials, weight is not a factor and galvanized steel is the preferred choice because of the advantages its provides. It is popular aesthetically in all types of applications. A wide variety of industrial applications have been built using galvanized steel tubes, including: transmission towers, guard rails, gates, hoppers, piping. bulk storage buildings, fencing, and many others. And it provides an economical, controlled enclosure that meets a range of requirements.

durable

Aluminum

Because of its light weight and superior corrosion resistance, aluminum has been a material of choice in many dome applications for the last three decades. Geometrica uses aluminum as an alternative material when its advantages outweigh the need for economies of cost. Corrosive environments such as swimming pools, water treatment facilities, and other locations with aggressive environments are ideal applications for aluminum.

ADVANTAGES

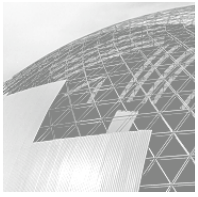
Environmental Protection

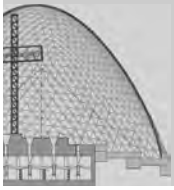
Stockpiles in open air produce large amounts of dust and affect water quality when rain or sprayed water filters through them. With air and water quality standards being tightened worldwide, both existing and new facilities are being covered to protect the surrounding environment.

One of the most important considerations for a new or existing bulk storage facility is its respect for the surroundings. Geometrica structures are designed to help reduce environmental impact on air and water quality with the most economical solution. Most often, by simply containing the largest source of dust, emission can be greatly reduced, without the use of sprays or chemicals.

PROCEDURES

Engineering
Manufacturing Capabilities
Specifications
Assembly Methods
Options





Engineering

Geometrica's engineering department produces project drawings and a design report for each structure. This information is submitted to the customer for review and approval. All changes will be reflected on the returned approval drawings and design report. Fabrication of materials begins upon receipt of a copy of the drawings and design report bearing a customer approval signature.

Geometrica structures are designed to meet the requirements in the contract documents and the provisions of applicable local, national and international building codes, as requested by the customer. Unless otherwise specified, the designs are based on the following:

- Steel Components: American Institute of Steel Construction, *Manual of Steel Construction, Allowable Stress Design Code*
- Aluminum Components: Aluminum Association, *Aluminum Design Manual*
- Concrete Components: American Concrete Institute Standard 318, *Building Code Requirements for Structural Concrete*

PROCEDURES

The engineering of Geometrica structures generally follow this sequence:

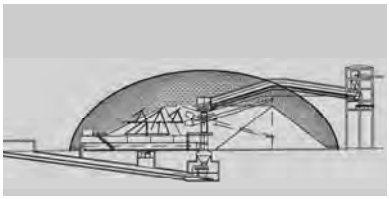
A geometry generation program is used to create the computer model. This model includes information on node coordinates and orientation, bar connectivity, section properties, loads, load combinations and support conditions.

The model is then used to calculate deflections and forces using a linear stiffness analysis with six degrees of freedom at each node. The results are used to select sections for each element in accordance with the applicable design codes. The structure may then be re-analyzed using the stiffness of the selected sections and the design is verified with the new results. This sequence of design and analysis is repeated as required to optimize the structure. When the design is completed, tube detail drawings are plotted and design tables generated. A summary of the design tables are included in the project design report.

Buckling and dynamic effects are considered separately with special software that accounts for the nonlinearity of these phenomena. Components that are not part of the standard Geometrica system, such as edge beams, opening frames and columns, are also designed with custom software specific to the particular conditions faced.

PROCEDURES

Manufacturing Capabilities

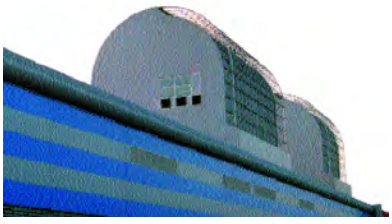


As a world leader in the manufacturing of large dome structures, Geometrica has manufactured some of the largest industrial domes in the world. The production of these type domes require state-of-the-art manufacturing coupled with expert design and analysis procedures. Geometrica's manufacturing capabilities include:

- Two fully automated space frame dome manufacturing lines for a combined production capacity of 12,000 MT or approximately 40 domes per year.
- One fully staffed steel fabrication shop to produce the various items required for any project.
- Two custom designed and built NC tube production machines, assuring the highest quality and precision available in dome manufacturing. Because of these high precision production lines, Geometrica is the only dome manufacturer capable of producing freestyle forms or Freedomes.
- 70 permanent shop and manufacturing department employees with the ability to expand to over 120 as demands require.
- 6000 m2 of shop floor space.

Our neighboring partner provides galvanized steel materials under ISO 9000 certification is equipped with:

- Two continuous hot dipped galvanizing lines.
- One pre-painting galvanizing line.
- Five mechanical tubing mills.



With this partnership, Geometrica has produced, in its own facilities within the last 12 months, over a half a million space frame tubes components for customers in all corners of the world.

SPECIFICATIONS

Geometrica structures are generally constructed of galvanized steel. We have included the typical structure specifications for a steel system. Specifications for special conditions and other materials would vary accordingly.

General Specifications

Work Covered by Geometrica

Provide all labor, material and supervision necessary for the design, engineering, fabrication, erection and final inspection of the Geometrica® Dome Structure (structure) in complete accordance with the contract drawings and all provisions of the specifications.

Related work specified elsewhere shall include; cast in place concrete, structural steel, insulation and waterproofing

Submittal of Engineering Details

Engineering Calculations: Submit two copies of design report prepared in accordance with these specifications and applicable building codes. Brief should include all reactions at supports for review of supporting structure by project engineer.

Engineering Drawings: one each sepia and three prints reviewed and sealed by an engineer registered in the state governing the project site. Drawings shall include dimensioned layout of the structure shown in relation to all adjacent work. All types of interface details with supports and attachments shall be included. Erection sequence shall be indicated.

Samples of typical tube end and hub with specified finish will be provided upon request.

Product Delivery, Storage and Handling

All components must be delivered and stored in sequentially numbered wooden crates or bundles, each containing no more than three (3) tons of material in order to be easily handled with a standard fork lift.

SPECIFICATIONS

Material Specifications

Materials

- All tube members shall be ERW steel tubing conforming to ASTM A500 GR B or equivalent. Tubes shall be sized by design loads from structural analysis.
- All purlin members shall be ERW formed steel tubing conforming to ASTM A569 or equivalent. Purlins shall be either fastened to or integral to top chord members. No secondary cladding support structure shall be permitted.
- All hubs shall be aluminum alloy AA6005-T5 or AA 6061.T6 solid extrusions with serrated connection slots for the required tube wall thickness.
- Bolts shall meet the requirements of either ASTM A-307 or A-449 as required by structural analysis and design.
- Seat fittings, washers and miscellaneous steel members shall be fabricated from hot rolled steel per ASTM A-36.
- Metal deck shall be galvanized steel sheet conforming to ASTM A-446 GR. B.
- Self drilling/self tapping screws shall be C1022 steel with anticorrosive fluorocarbon finish and with stainless steel, hex head shank on all exterior exposure fasteners.

Finishes

- Tube and purlin components shall be mill galvanized on both interior and exterior surfaces to ASTM A653 G-90.
- Bolts, washers and other steel hardware shall be hot dipped galvanized in accordance with ASTM A153 Class C.
- Miscellaneous steel fittings and edge framing material shall be hot dip galvanized to ASTM A653 G-90.
- Metal decks shall be coated with a baked on PVDF thermoplastic organic coating, 70% Kynar 500 to 1.0 total mils, ASTM D-1005.

Design Requirements

Design Criteria

The structure shall conform to the standards and requirements of the applicable national, regional and local building codes.

All drawings and calculations shall bear engineers seal prior to submittal.

The structure shall be engineered to withstand the specifications required of the following: Dead Loads of structure and cladding weight, mechanical load, accumulated load, Live Load, Wind Load, Temperature Range, Seismic equivalent horizontal acceleration, and any other loads required by the project

Load case combinations for analysis:

- D.L.
- D.L. + L.L.
- D.L. + W.L.
- D.L. + L.L. + W.L.

All tube components shall be designed to resist bending stresses induced by transverse loads. The greater of the following shall be considered: Cladding support loads, 75 kg at mid span and accidental or maintenance loads.

Manufacturers

Details and specifications have been prepared based on Geometrica designs. Other products must be approved by the engineer prior to bid through the issuance of an addendum. Any other manufacturers of products included in the fabrication or erection of the dome may be requested or specified after contract agreement.

Execution

Examination

The erector shall examine the structure supports, work areas and conditions under which the dome is to be installed prior to assembly and erection. If the supports area or conditions are unsatisfactory, erection shall not proceed until satisfactory corrections have been made.

Installation

Erection of the structure and related accessories shall be in complete accordance with the manufacturer's erection drawings as approved by the architect. All framing work shall be true to line, level and plumb. Adequate care shall be taken during the erection sequences to insure members are not positioned by undue force or erected in any manner that cause secondary stresses. Adequate temporary bracing and supports shall be provided to insure structure stability during erection. When necessary protective wrap shall remain on the tubes through the erection process.

Clean-Up

Upon completion of installation, erector will remove all protective wraps where necessary, leave all work and work areas clean and in satisfactory condition. Any touch up work necessary will immediately be performed. Upon completion and inspection of structure work, it shall be the responsibility of the general contractor to protect the structure from damage during the remainder of construction on the project and until owner acceptance.

Inspection

The completed Geometrica Structure (structure) shall undergo a full and complete final inspection by our assigned engineer and shall be certified in writing that the finished product has been erected in accordance with its approved drawings and any contract documents. Certification shall bear the seal of Geometrica’s assigned engineer.

SCHEDULE

Typical Project Schedule

Every project follows a typical schedule of events although not exactly as shown here. Some applications may require special materials or unique design specifications. All structures are constructed with the following basics in mind to preserve the consistency and high quality our clients have come to expect from Geometrica.

Event	Time in weeks*
Contract Signature	0
Review operational drawings	1.5
Kickoff meeting	0
Engineering	24
Actions	3
Final design & drawings	7
Approval process	3
Procurement	19
Manufacturing	16
Production in sections	16
Shipping in sections	8
Civil Works (by others)	8
Mobilization	1
Delivery of Materials	8
Inspection and layout on sight	1
Assembly as required	12
Structure	8
Cladding	4
Civil works completion	1
Doors/hatches	1
Flashing	1
Other assembly required	1
Clean -up and inspection	1
Handover	0
Total approximate time from signing of contract to handover of structure	41

* Times are totals for each event and may overlap other events.

ASSEMBLY METHODS

In most cases construction of a Geometrica dome requires no special tools or equipment. Unskilled labor can be trained quickly for the installation on site. The construction materials are light and easy to handle, and assembly is safe, simple and quick.

Geometrica uses three exclusive assembly methods. The option selected for a project is determined by the specific requirements of the site and application.

Lift in place

Using this method, sections are assembled at ground level and lifted into place with a standard construction crane. As sections are added, the dome takes shape. Cladding can be installed after the shell is assembled, or on individual sections as they're put in place. This method works well when the dome is to cover a high structure. Most assembly can be done at ground level, and other subcontractors can work simultaneously inside the dome.

Perimeter self-scaffolding

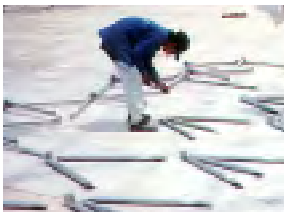
With this technique, workers assemble a section at a time, from the perimeter ring beam up. Successive sections are attached until closure at the apex. Self-scaffolding is an extremely practical assembly method, with no ground level equipment to interfere with plant operations. Structures can be built while the pile is in use, or while adjacent construction is going on, providing great savings in time and cost.

Center-out

Constructed around a Geometrica Erection tower, the dome is assembled one ring at a time. As each progressively larger concentric ring is formed, the tower lifts the structure to accommodate its new height. The dome grows outward and upward gradually forming the shell.

Connector Assembly

Once structure design is completed, manufactured components are sorted, matched and shipped in separate containers to the site.



Sorting

All construction techniques begin with the sorting and grouping of tubes. Structures are shipped in a specific order with complete materials for assembling each section.

Connector and Tube matching

Using coded labels, local labor can match Geometrica connectors with the corresponding tubes. Once matches have been secured assembly begins.

Assembly

The advanced design of the Geometrica connector is simple. The manufacturing process determines the exact angles that tubes fit into the connector. Wooden or rubber mallets are used to fit the tube ends into the connector. Washers and bolts are used to secure the tubes. Using this simple procedure, “spiders” are assembled for attachment to the structure.

Spider Assembly

Assembly Order

Depending on the assembly method in use, the pre-assembled "spiders" are again grouped in the order they are added to the structure.

Pre-Assemble & Lift

Pre-assembled spiders are lifted to the workers using cables. The spider is then joined to the rest of the structure using the same simple tools.

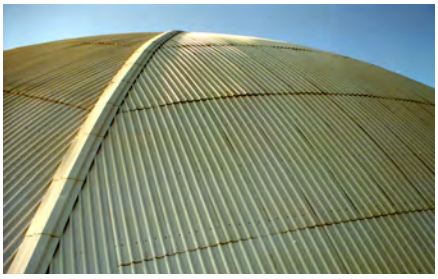
Lift and Place and Center-Out Methods

Most assembly work is done at ground level for these two methods. Spiders are joined to sections or to the perimeter of a Center-Out assembly.

Cladding

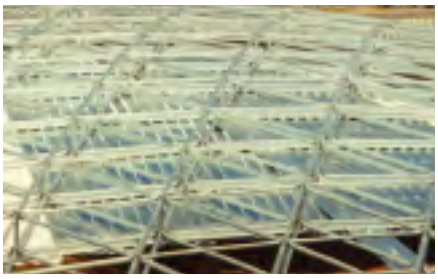
Galvanized steel or aluminum formed-metal panels are most commonly used as cladding materials. Translucent panels can be combined with these to produce aesthetic patterns and provide natural light. Geometrica offers the advantages of two cladding methods, external and internal.

External Cladding



External cladding is the method most used on Geometrica structures. For economy and speed, R-type external cladding system is used. For a perfect seal, standing seam cladding provides a waterproof enclosure, as well as a smooth, elegant surface popular in architectural applications.

Internal Cladding

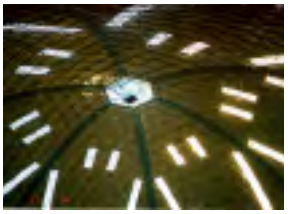


The storage of coal, fertilizer and other combustible materials presents the risk of fires and explosions when dust accumulates on beams and in crevices. Internal cladding provides a sealed, gap-free surface that resists dust accumulation and minimizes potential hazards. R-type profiled cladding is waterproof and provides uniform strength, excellent drainage and low deflection.

OPTIONS

Accessories

Geometrica domes are engineered for flexibility. Bulk storage structures are customized to suit each projects specific storage requirements, operating systems, site requirements and design preferences.



Natural Lighting

Translucent panels contribute natural lighting, energy cost savings and additional beauty to our structures. The customized symmetrical patterns we create, distinguish our designs. Geometrica's cladding and translucent panels are designed with compatible profiles. Their installation is a continuous process. No special framing or equipment is necessary. The result is a continuous surface that provides effective sealing and water drainage, and efficient natural light.

Conveyor Openings

Among Geometrica's options for material handling equipment are dome apex and side penetration openings. Penthouse enclosures may protect top loading conveyors, while flashing protects side penetrations. When necessary, domes can be engineered to partially support the conveyor, or allow independent conveyor movement.

OPTIONS

Ladders and Walkways

Ladders and walkways provide access to electrical and ventilation systems, mechanical penthouses, conveyors, galleries and safety exits. Our galvanized steel ladders are built for safety, using personnel cages and non-slip steps. Our galvanized steel walkways are provided with OSHA-approved guide rails and non-slip-grading floors.

Ventilation and Access Openings

Our structures can be designed with access openings of any shape or size for fans, equipment, vehicles and personnel. Apex and circumferencial openings are practical ways to provide natural ventilation. We can provide customized doors, frames, canopies and hatches for all openings.

Anchoring

Another versatility factor associated with Geometrica domes are the choices for anchoring the dome or structure to the foundation or existing structure. Supports can be steel or concrete columns, new or existing, concrete retaining walls or, most commonly, a short ring beam. The Geometrica structure can be welded to the support, welded to embedded plates or embedded in a second concrete pour. Any of these choices presents an economical yet strong connection. This connection is very beneficial in the wind resistance of the dome.

CLIENTS

Clients & Collaborators
Project Reference List
Letters of Recommendation
Recognition
Project Highlights

CLIENTS AND COLLABORATORS

Adamov Projects
Alstom
Black and Veatch
Boeing/McDonnell Douglas
Cementos Bio Bio
Cementos de Chihuahua
Cemex
Cimsa
China Petrochemical Development Corp.
ESSROC
Empresa Minera Mantos Blancos
Fluor Global Services
F.L. Schmidt
Galvak
Gobierno Federal de México
ICA/Fluor Daniel
Jacksonville Electric Authority
Krupp Polysius
Kvaerner Metals
Italcementi
Loma Negra C.I.A.S.A.
Lucky Cement Corp.
Puerto Rico Telephone Company
MVT
Nesher Cement
Nemak
Nissan Cumbres
Penta Engineering
Siam Cement
Svedala
Taiwan Power
Tecnológico de Monterrey
Tequila Cuervo
Tuntex Group
University of Texas at El Paso
Yolles Partnership

Geometrica has engineered projects for a multitude of industries and applications, and has served a distinguished list of clients worldwide. Following are several letters of recommendation from the adjacent sample list.

Geometrica is proud to be a part of some of the largest structures in the world, from the 224 m span of Modular Nemak's 4 manufacturing plants to the 126 m diameter span of Taiwan Power's 4 Hsin-Ta coal storage domes. The following page represents a summary reference list of projects we have completed or are currently constructing.

PRINCIPAL PROJECTS

Project		Application	Maximum Span (m)	Covered Area (sqm)
Star Cement, UAE	Circular dome	Limestone Storage*	104	8,494
IMAX Theater, Chile	Circular dome	Spherical Theater *	28	615
Ruwais, UAE	Circular dome	Aluminum Suphur Storage Dome *	134	14,100
Aguas Teñidas, Spain	Circular dome	Two Copper ore storage *	58	2,650
Broceni Cement, Latvia		Two longitudinal domes for aggregates *	58	19,294
Iglesia Eben-Ezer, Honduras	Circular dome	House of Worship *	77	4,656
Foro de las Culturas, Mexico	Circular dome	Spherical Theater	23	415
CEMEX Merida, Mexico	Circular dome	Limestone Storage Dome	86	5,809
Barrick Zaldivar, Antofagasta, Chile	Circular dome	Crushed Ore Storage Dome	95	7,088
Cementos Alfa, Asturias, Spain	Circular dome	Coal Storage Dome	65	3,318
Terminal de Transporte Barquisimeto, Venezuela	Circular dome	Shopping Mall & Transp. Teminal *	93	6,793
The Siam Cement Public Company Ltd., Kampot, Cambodia	Circular dome	Limestone Storage Dome	86	5,809
Corporación Integral de Comercio Exterior, S.A. C.V., Veracruz, Mexico	alum clad	Urea Longitudinal Storage	52	6,240
Sociedad Punta del Cobre, S.A., Copiapo, Chile	Circular dome	Copper Storage Semidome	76	4,537
Lafarge Lichtenburgh Domes, Lichtenburgh, South Africa	Circular dome	Two Limestone Storage Domes	113	10,029
Velódromo CNAR, D.F., Mexico		Freedome® for a Velodrome	73	6,790
Atrium Hotel Hyatt Cancún, Cancún, Mexico	Circular dome, alum	Dome for Atrium	36.5	1,046
Hsin-Ta Power Station, Taiwan	Circular, alum clad	Four Coal Storage Domes	126	49,876
Modular Nemak , Garcia, N.L., Mexico		Ford Motor Unit aluminum casting factory	224	17,900
Mauritanian Copper Mines, Inc., Akjoujt, Mauritania	Circular dome	Crushed Ore Storage Dome	68	3,632
Minera Escondida Limitada, Antofagasta, Chile		Copper Storage Semidome	99	2,735
Polysius de Mexico, Puebla, Mexico		Longitudinal Coal Storage	51	11,730
Polysius de Mexico, Puebla, Mexico	Circular dome	Limestone Storage Dome	104	8,495
Cimento Sanayi ve Ticaret A.S., Kayseri, Turkey	Circular dome	Cimsa Limestone Dome	68	3,632
Cementos Nacionales, San Pedro de Macoris, Dominican Republic	Circular dome	Limestone Storage Dome	100	7,910
State Government of Zacatecas, Zacatecas, Mexico		Space Frame for Manuel Felguerez Museum	25	600
Compañia Minera El Tesoro, Antofagasta, Chile	Circular dome	Copper Storage Dome	55	2,350
Volcan Soccer Stadium , Guadalajara, Jal., Mexico		Pre-design of Space Frame Roof	290	49,000

PRINCIPAL PROJECTS

Project		Application	Maximum Span (m)	Covered Area (sqm)
Dome for Hulhumale Mosque, Malé, Maldives	Circular dome, alum	House of Worship	28	593
Hermanos Serdan Baseball Stadium, Puebla, Mexico		Stadium Freedome® Roof Engineering	200	25,000
Naval Submarine Station, Kings Bay, GA, USA		Canopy Space Frames	21	1,213
Codelco Chile, Division El Teniente, Rancagua, Chile		Copper Concentrate Storage Freedome®	26	1,008
Cementos Moctezuma, Cerritos, S.L.P., Mexico	Circular alum clad	Cement Bag Storage Building	44	9,200
State Government of Queretaro, Queretaro, Mexico		Fire Station Roof	21	750
State Government of Tlaxcala, Tlaxcala, Mexico		Elliptical Dome for Convention Center	64	1,810
Planta Tepetzingo, Morelos, Mexico		Coal Storage Dome	70	3,849
Duke Solar Energy, NC, USA	alum	Solar Collector Units	N/A	N/A
State Government of Queretaro, Queretaro, Mexico		Dome for the State Cultural Center	30	650
Cementos Moctezuma, S.L.P., Mexico	Circular, alum clad	Coal Storage Dome	70	3,849
Cementos Moctezuma, S.L.P., Mexico	Circular, alum clad	Clay Storage Dome	60	2,894
Cementos Moctezuma, S.L.P., Mexico	Circular, alum clad	Limestone Storage Dome	87	6,041
Swift Aviation, Phoenix, AZ, USA		Aircraft Hangar	46	2,845
Cintermex, Monterrey, Mexico		Convention Center	27	9,104
CNIM/Geris Marchwood Waste to Energy, Marchwood, UK	Circular, alum clad	Incinerator Dome	110	9,300
Queretaro State Education & Cultural Center, Queretaro, Mexico		Cultural Center Fascia Wall	-	8,493
Mira Mesa High School, CA, USA		Cafeteria Space Frame Roof	12	260
Potash Corp. of Saskatchewan, Yumbes, Chile	Circular dome	Two Potasium Nitrate Storage Domes	61	5,845
Columbia Metropolitan Airport, Columbia, SC, USA		Airport Terminal Space Frames	15	450
Fougerolle / Cements du Sahel, Kirine, Senegal	Circular dome	Limestone Storage Dome	73	4,185
Grupo Cementos de Chihuahua S.A. de C.V., Chihuahua, Mexico		Two Coal Storage Longitudinal Enclosures	56	10,920
Rassini Frenos, S.A., Puebla, Mexico		AutoParts Manufacuturing Freedome®	112	12,344
Fluor Daniel / Northside Repowering, Jacksonville, USA	Circular, alum clad	Two Coal Storage Domes	122	23,390

PRINCIPAL PROJECTS

Project		Application	Maximum Span (m)	Covered Area (sqm)
Iglesia Nuestra Señora , Monterrey, Mexico		House of Worship Freedome®	40	1,256
Svedala Chile, S.A., Antofagasta, Chile		Coarse Minerals Storage Dome	53	2,206
Zanadu Development Corp., Kaohsiung, Taiwan		Ski / Recreation Freedome Engineering	153	13,400
JVC Convention Center, Guadalajara, Mexico		Convention Center Freedome Engineering	220	31,000
Mexicana de Cananea, S.A. de C.V., Cananea, Mexico	Circular dome	Copper Storage	88	6,082
Federal Government of Mexico, Nuevo Laredo, Mexico		International Port - Space Frame Buildings	25	39,508
Sistemas Ecológicos de Drenaje, Monterrey, Mexico		Manufacturing Plant	28	1,736
Penta Engineering / Loma Negra CIASA, Olavarría, Argentina	Circular dome	Limestone Storage	110	9,503
Essroc San Juan / Italcementi Group , San Juan, USA		Raw Material Storage	50	8,213
Kung Fu School / TriumStar, Hsin-su, Taiwan	alum clad	Natatorium	40	1,812
ESSROC Canada Inc., Picton, Canada	Circular dome	Clinker Storage	60	2,827
AZE/Cimento Sanayi (CIMSA), Mersin, Turkey	Circular dome	Two Raw Material Storage Domes	68	7,260
Cemento Cruz Azul, Aguascalientes, Mexico	Circular dome	Limestone Storage	90	6,362
Modular Nemak , García, Mexico		Ford Motor Unit aluminum casting factory	224	17,900
Ciments du Maroc - Italcementi Group, Safi, Morocco	Circular dome	Limestone Storage	79	4,902
Nesher - Israel Cement Enterprises Ltd., Ramla, Israel	Circular dome	Limestone Storage	111	9,677
Cementos Bio Bio S.A., Curicó, Chile		Aggregate Storage Extension	52	2,626
CESSA - ICA/Fluor Daniel, El Ronco, El Salvador	Circular dome	Limestone Storage	76	4,536
Kvaerner Metals/Cerro Colorado, Antofagasta, Chile	Circular dome	Fine ores storage parabolic dome	56	2,463
Cementos Bio Bio S.A., Curicó, Chile		Limestone Storage	52	3,486
Cementos Bio Bio S.A., Curicó, Chile		Cement/finish product storage	54	2,072
Siam Cement Public Company, Surat Tani, Thailand	Circular dome	Limestone storage elliptical dome	125	13,499
CPDC/IAE, Hsin-su, Taiwan	Circular dome	Coal Storage dome	66	3,421

PRINCIPAL PROJECTS

Project		Application	Maximum Span (m)	Covered Area (sqm)
Galvak, San Nicolás, Mexico		Manufacturing Plant	23	2,760
Cementos Bio Bio S.A., Curicó, Chile		Pozzolana Storage	50	7,020
Modular Nemak , García, Mexico		Chrysler Motor Unit casting factory	224	17,900
Empresa Minera de Mantos Blancos, Antofagasta, Chile	Circular dome	Fine ores Storage Freedome®	70	1,896
Empresa Minera de Mantos Blancos, Antofagasta, Chile	Circular dome	Copper ores storage Freedome®	60	2,905
Tuntex/Integrated Automation Eng., Tai Nan, Taiwan	Circular dome	Coal storage dome	65	3,318
Lucky Cement Corp., TungAo, Taiwan	Circular dome	Limestone storage dome	104	8,365
Modular Nemak , García, Mexico		Ford Motor Unit casting facility	224	17,900
Ready Mix, S.A., Nos, Chile	Circular dome	Aggregate storage	53	2,200
PRTC, San Juan, USA		Common area	n/a	n/a
Lucky Cement Corp., I-Lan, Taiwan		Coal storage Freedome®	60	3,800
Monterrey Tech University, Monterrey, Mexico	alum clad	Aluminum Freedome®	30	1,080
Politecnico, Mexico City, Mexico		Central court cover	30	1,500
Cementos Chihuahua, S.A., Samalayuca, Mexico		Hematita storage barrel vault	65	9,500
Cemex, Monterrey, Mexico		Aircraft hangar	60	1,500
MAVESA, Guayaquil, Ecuador		Multiuse facility	n/a	n/a
Medica Sur (Hospital), Mexico City, Mexico		Central court cover	25	650
Cementos Chihuahua, S.A., Samalayuca, Mexico	Circular dome	Limestone storage	84	5,440
NASA/UTEP, Houston, USA	alum	Space Station Research	n/a	n/a

* In progress

幸福水泥股份有限公司 LUCKY CEMENT CORPORATION

廠址:[illegible] PLANT SITE: 51, TUNG-YO RD, TUNG-YO VIL, NAN-AO
電 話:(03)9986110-7 KEEN COUNTY TAIWAN REPUBLIC OF CHINA
傳真機:(03)9986066 PAINT TEL: (03) 9986110-7 FAX:(03) 9986067
公 司:台北市松江路237號15樓 HEAD OFFICE: 15TH FL, NO.237 SONG JIANG ROAD
電 話:(02)5092188 TAIPEI TAIWAN REPUBLIC OF CHINA
傳真機:(02) 5090782 - 5075258 TEL: (02) 5090782 FAX:(02) 5090782, 5075258

敬啓者:

很高興有機會跟 您提及美國 Geometrica 公司的鋼鉚釘情。

我們曾在 1996 年向他們購買一套以覆蓋 3800 平方公尺的現有開放式儲煤場，由於場地情不規則形狀而且四週兩度落差大。所以在設計上相當的困難，所幸 Geometrica 解決了所有問題，在 1997 年 2 月完成。使用後我們改善了環境品質也提高了儲煤的效率，因此我們在 1997 年又買了第二套，用來覆蓋 103 公尺直徑的石灰石儲倉，完工後我們穩定了水泥原料的品質，同時也消除了漫天的塵霧。

我們非常滿意 Geometrica 的設計、製作及施工的安裝指導，也願意在此推薦給 您，如果 您需要大跨距的建物，選擇 Geometrica 相信 您已踏成的踏上成功的第一步。

(倘有其他問題，也請不吝賜電指教)

此 敬 頌 時 祺

幸福水泥股份有限公司
福里業廠長

吳安康 敬上

Jan. 1998

幸福水泥股份有限公司
LUCKY CEMENT CORPORATION

LETTER OF RECOMMENDATION

To Whom It May Concern,

I am very glad to have this opportunity to talk to you about Geometrica® galvanized steel structures.

In 1996 we purchased from Geometrica® one dome to cover an existing open-air coal storage area covering 3,600 m2. Since the area is irregular in shape and has large differences in elevation around the perimeter the design was a difficult task. Geometrica, however, solved it, and the structure was completed in February 1997.

After covering the area we improved the quality of the environment as well as raised the energy efficiency of the coal, and we therefore bought a second dome in 1997. This dome was for covering a limestone storage with a diameter of 103m, and after completion we have raised the quality of the cement raw materials at the same time as eliminating the cloud of dust that used to cover the skies.

We are very pleased with Geometrica's design, manufacturing and responsible technical supervision, and would here like to recommend them to you. If you need a large free span structure, choose Geometrica and I am sure that you will be very pleased to have taken the first step on the road of success .

(If you have any other questions, please do not hesitate to call me for further information)

Respectfully yours,

Lucky Cement Corporation
Plant Manager and Advisor to the President

Signed
Ankang Wu
Jan. 1998

NEMAK

UNA EMPRESA DE ALFA

García, N.L. a 08 de Enero de 1998.

A Quien Corresponda:

Por medio de la presente deseamos hacer constar que la compañía Geométrica de México, S.A. de C.V., obtuvo dos contratos de nuestra parte, Modular Nemak, para diseñar, fabricar, suministrar e instalar dos estructuras geodésicas Freedome® para las plantas III y VI ubicadas en nuestras instalaciones en García, Nuevo León a 30 minutos de la ciudad de Monterrey.

Las dimensiones de ambas cubiertas son de 85 m de ancho y 220 m de largo. La primera fue entregada en Diciembre de 1996 y la segunda en Noviembre del año pasado.

Para ambos casos seleccionamos esta organización como proveedor de nuestras cubiertas por su competividad, tecnología y profesionalismo. Geométrica ha trabajado a lo largo de ambos proyectos de una manera profesional y ética. Las estructuras Geométrica® cumplen satisfactoriamente nuestros requerimientos y los códigos locales de construcción.

Por lo anterior, recomendamos a Geométrica en cualquier proyecto que requiera cubrir áreas con grandes claros.

Esperamos que esta carta sirva a sus necesidades y estamos a las órdenes para cualquier información adicional que necesiten.

Atentamente,

Ing. Armando Enríquez
Director de Proyectos

Lizeth O.

NEMAK, S. A.
APDO. 6-100 MONTERREY, N. L. C. P. 64361 MEXICO
TEL. (8) 318-52-00 TELFAX (8) 318-52-26

NEMAK
UNA EMPRESA DE ALFA

LETTER OF RECOMMENDATION

January 8, 1998, Garcia ,N.L.

To Whom it May Concern:

We hereby wish to confirm that we granted Geometrica de México,S.A. de C.V. two contracts on our behalf, Modular Nemak, S.A de C.V., for the design, manufacture, supply and installation of two Freedome® geodesic structures for our plants III and IV, both located at our facilities in Garcia, N.L., 30 minutes from Monterrey City.

The dimensions of both covers are 85m width and 220 m length. The first structure was finished on December 1996, and the second one on November of last year.

We selected this company for the supply of our covers because of its technology, competitiveness and professionalism. Geometrica® structures comply satisfactorily with our requirements and all local construction regulations.

For all the above, we recommend Geometrica® for all projects requiring long span roof covers.

We hope this letter is useful to your needs. If you require further information, please do contact us.

Best Regards,

Ing. Armando Enríquez
Project Manager

Kvaerner Metals

Santiago, 19 de Agosto 1996

CERTIFICADO

Certifico que Geométrica suministró un domo parabólico de 56 m de diámetro para el ecopio de material fino de cobre en la ampliación de la planta que Minera Cerro Colorado tiene en Mamiña, Iquique, Chile.

El suministro consistió en la ingeniería y diseño del domo (incluyendo accesos y soportes), fabricación de estructura y revestimiento, transporte y asesoría durante la instalación. El domo se adaptó a ciertas restricciones de terreno y maquinaria, y fue diseñado para una carga puntual en la cleve de 30 Ton. vertical y 8 Ton. horizontal correspondiente al apoyo de la banda de transporte, la cual apila el material fino de cobre en el interior del domo.

El armado del domo tomó alrededor de seis semanas, incluyendo la instalación de las láminas y la plataforma de soporte. El proceso fue rápido y seguro, cumpliendo las normas chilenas de construcción.

Estamos satisfechos con el trabajo y desempeño de Geométrica. El domo geométrico representa un símbolo de vanguardia para esta nueva planta y creemos no habernos equivocado al seleccionar esta empresa, por su avanzada tecnología y experiencia.

Por último, no nos cabe duda que para estructuras que requieren salvar grandes luces, el sistema geométrico tiene una solución adecuada.

Todo lo anterior mencionado en nada puede alterar los compromisos contractuales vigentes a la fecha de emisión del presente certificado.

Ricardo Sáinz Goyenechea
Gerente Construcción
Kvaerner Metals Chile

Kvaerner Metals

LETTER OF RECOMMENDATION

Santiago, August 19, 1998

I certify that Geometrica has supplied a parabolic dome of 56 m in diameter for the storage of fine copper material in the expansion of the plant that Minera Cerro Colorado has in Mamiña, Iquique, Chile.

The supply consisted of the engineering and design of the dome (including access and supports), manufacture of the structure and cladding, transport and consulting during the installation, The dome is adapted to certain restrictions of terrain and machinery, and was designed for a point load at the keystone of 30 tons vertical and 6 tons horizontal respective of the support of the conveyor belt, which piles the fine copper material in the interior of the dome.

The installation of the dome took around six weeks, including the installation of the cladding sheets and the support platform. The process was fast and safe, fulfilling Chilean standards of construction.

We are satisfied with the work and the performance of Geometrica. The Geometrica dome represents a vanguard symbol for the new plant and we believe we have made no mistake in the selection of this company for its advanced technology and experience.

Finally, there is no doubt that for structures requiring large-span covering, the Geometrica system has an adequate solution.

All of the preceding mentioned in no way alters the remaining contractual obligations at the date of issue of the present certificate.

Signed by:

Ricardo Sainz Goyenechea
Construction Manager
Kvaerner Metals Chile

บริษัท ปูนซิเมนต์ไทย จำกัด (มหาชน)
THE SIAM CEMENT PUBLIC COMPANY LIMITED

Jan. 27, 1998

TO WHOM IT MAY CONCERN:

We here by wish to confirm that we have granted Geometrica, Inc. one contract for the design, manufacture, supply and installation consulting for a Limestone Storage Dome at our Thung Song, Thailand plant.

The dimensions of this structure is 125 M diameter x 37.4 m high. The order was placed in the first quarter of 1997 and is currently under construction.

Geometrica has fulfilled all our requirements, and we recommend it for any project that need to cover area with long span.

We hope this letter suits your needs, if you need further information, please feel free to contact us.

Best Regards.

The Siam Cement Public Company

Nopadon Boonburndarn.

Nopadon Boonburndarn

Design Department Manager

สำนักงานใหญ่ 1 ถนนปูนซิเมนต์ไทย บางซื่อ กรุงเทพฯ 10800 **Headquarters** 1 Siam Cement Road, Bangsue, Bangkok 10800, Thailand
ตู้ ป.ณ.ณ. 572 กรุงเทพฯ 10501 **G.P.O. Box** 572 Bangkok 10501, Thailand
โทรศัพท์ 02-586-3333, 02-586-4444 โทรสาร 02-587-2190, 02-587-2201 **Tel.** 662-586-3333, 662-586-4444 **Fax.** 662-587-2190, 662-587-2201
โทรเลขย่อ ไทยซีเมนต์ กรุงเทพฯ **Telegram** Siam Cement, Bangkok
ทะเบียนเลขที่ บมจ. 558

נשר מפעלי מלט ישראליים בע"מ
NESHER ISRAEL CEMENT ENTERPRISES LTD.

ENGINEERING DIVISION RAMLA PLANT
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ת.ד. 5 רמלה 72100
טל:08-9271700 פקס: 08 -9271870
e-mail : EngDept@nesher.co.il

4 February 2002

To Whom it May Concern

I would like to briefly describe our experience with the Dome built by Geometrica Inc. for Nesher Cement in 1998.

During the development and construction of our cement dry line No. 2, we had the need for a Raw Materials Storage facility to store and pre-blend 50,000 MT.

After investigating the various technologies for column-free structures, our decision was taken for the Geometrica technology, which was proven in other similar cement facilities around the world. This proposal was taken even though we have built a few years earlier a similar dry line including a pre-blending facility dome, made of concrete.

The Geometrica Dome at our Ramla plant in Israel has a diameter of 111m with 36m Maximum height at the apex.

Geometrica had proven to us a cost-effective solution, advanced design, able engineering capabilities, on-time manufacturing & supply and erection hands-on supervision. The Geometrica technology enabled Nesher Cement to continue machinery erection works within this dome perimeter under strict safety regulations, which were kept on site during all erection work phases.

Since this dome was hand-over to us in 1998, it has performed satisfactorily under continuous operation.

We can only say that Geometrica has been standing behind their words and we recommend them for any long span dome application.

Sincerely,

Simon Kubo
Engineering Division Manager
Nesher Cement Israel - Ramla Plant

LOMA NEGRA

LOMA NEGRA

April 19, 2001

TO WHOM IT MAY CONCERN:

On behalf of LOMA NEGRA C.I.A.S.A, I appreciate the opportunity to recommend Geometrica's galvanized steel structures.

In 1999 we purchased from Geometrica a Dome for raw material storage and preblending at our new L'AMALÍ cement plant located in Olavarría, Argentina. It was finished successfully in November, 2000 and has a storage capacity of approx. 60,000 tons.

We are very pleased with Geometrica's design, high manufacturing quality and responsible technical supervision displayed throughout the execution of the project.

The selection and installation of this Dome provided Loma Negra with an efficient storage capability, an improved environment control which is of concern to all of us, low maintenance cost, and superior aesthetics.

Our experience with Geometrica's structure and qualified staff has been very pleasing, and we have no hesitation in recommending them to industries with similar needs.

Ing. Ubaldo Ciminieri, P.E.
Manager of Engineering and Projects
LOMA NEGRA C.I.A.S.A, ARGENTINA

Bouchard 680 C1106ABJ Buenos Aires
T| 011 4319 3000 F| 011 4319 3001
loma.internet@lomanegra.com.ar
www.lomanegra.com.ar

duro felguera
plantas industriales s.a.

Noviembre 05, 2007

A quien corresponda:

Por medio de la presente, hacemos constar que la compañía Geométrica de México, S.A. de C.V. obtuvo un contrato de parte de Duro Felguera Plantas Industriales S.A. para el diseño, fabricación, suministro Ex Works y consultoría para instalación de un Domo circular para almacenamiento de coque, en la Planta Cementos Alfa, ubicada en la provincia de Cantabria, en la localidad de Mataporquera, España.

Las dimensiones de la estructura son de 65 m de diámetro y 22.5 m de altura. La instalación del Domo fue satisfactoriamente concluida en el mes de junio de 2007.

Como proveedor, Geométrica de México S.A. de C.V. es una empresa competitiva que cumplió con todos los requerimientos trabajando de manera profesional y se distinguió no solo por su calidad y alta tecnología, sino también por su servicio, ética y responsabilidad durante la ejecución y supervisión del proyecto.

Así pues, recomendamos ampliamente a la compañía Geométrica de México S.A. de C.V. para cualquier proyecto que necesite cubrir áreas destinadas a este tipo de almacenamientos.

Extendemos la presente esperando que cumpla con los fines del interesado y quedamos a sus órdenes para cualquier referencia adicional.

Atentamente,

Pedro Floriano Fernández
Director de Proyectos

duro felguera
plantas industriales s.a.

LETTER OF RECOMMENDATION

November 5, 2007

To Whom It May Concern:

We hereby confirm that the company Geométrica de México, S.A. de C.V. was granted with a contract from Duro Felguera Plantas Industriales S.A. for the design, fabrication, Ex Works delivery and consulting services for the installation of one circular Dome structure for Petcoke Storage, located in the Cementos Alfa Plant, located in Mataporquera, Cantabria Province, Spain.

The structure spans 65 m in diameter and has a height of 22.5 m. The installation of the dome was satisfactorily concluded in June 2007.

As a provider, Geométrica de México S.A. de C.V. is a competitive company that covered all the requirements, with a professional work and it distinguishes not only for their quality and high technology, but for their service, ethics and responsibility during the execution and supervision of the project.

Therefore, we highly recommend Geométrica de México S.A. de C.V. for any project that may require a cover for this type.

We extend the present hoping to fullfil the purposes of Geomerica and we remain for any additional reference you may require.

Best Regards,

Pedro Floriano Fernández
Project Director.

Una Empresa
de ThyssenKrupp
Technologies

Polysius de México, S.A. de C.V.

Carta de Referencia

Proyecto: PALMAFA
Cliente Final: CYCNA de Oriente, S.A. de C.V.
Subcontrato: Domo Circular y Almacén Longitudinal

México D.F., 5 de Noviembre de 2007

A quien corresponda:

Por medio de la presente, hacemos constar que Polysius de México, S.A. de C.V. encargó a la compañía Geométrica de México, S.A. de C.V. para la provisión del diseño, fabricación, suministro e instalación de un Domo Circular para parque de premezclado de caliza de 104m de diámetro y un Almacén Longitudinal para almacenamiento de Petcoke y Carbón de 51m x 230m, en la fábrica de CYCNA de Oriente, S.A. de C.V., ubicada en Hacienda de la Noria, Municipio de Palmar del Bravo Km 16, Estado de Puebla, México. Dichas obras recibimos satisfactoriamente en el mes de Mayo de 2006.

En el transcurso del proyecto Geométrica de México, S.A. de C.V. se acreditó como proveedor de confianza, cumpliendo impecablemente las obligaciones del contrato. Con un trabajo profesional se distinguió no sólo por su calidad y alta tecnología, sino también por su servicio y responsabilidad durante la ejecución del proyecto.

Estamos muy contentos con los resultados de la cooperación con la compañía Geométrica de México, S.A. de C.V. y estamos seguros que su profesionalidad y fiabilidad resultará en un crecimiento exitoso.

Atentamente,

Ing. Daniel Greune
Gerente Técnico

Polysius de México, S.A. de C.V.

Polysius de México, S.A. de C.V.
Sierra Gamón # 120, 8° Piso
Lomas de Chapultepec
11000 México, D.F. / México

POLYSIUS

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Polysius de México, S.A. de C.V.

LETTER OF RECOMMENDATION

México D.F., November 5, 2007

To whom it may concern:

We hereby wish to confirm that Polysius de México, S.A. de C.V. ordered from Geométrica de México, S.A. de C.V. the provision of the design, fabrication, supply and installation of a Circular Dome for the Limestone Prehomo park of 104 m diameter, as well as a barrel vault for Petcoke and Coal Storage (51 m x 230 m), located at CYCNA de Oriente, S.A. de C.V. plant, in Hacienda de la Noria, Municipio de Palmar del Bravo Km 16, Puebla, Mexico. We received the structures mentioned above in May 2006.

During the process of the project, Geométrica de México, S.A. de C.V. accredited itself as a trusty provider, perfectly covering their contract obligations. With a professional work, they stand out not only for their quality and high technology, but for their service and responsibility during the execution of the project.

We are very pleased with the results of the cooperation with Geométrica de México S.A. de C.V., and we are sure that their professionalism and trustworthiness will result in a successful growth.

Best Regards,

Ing. Daniel Greune
Technical Manager
Polysius de México, S.A. de C.V.

RECOGNITION

CNIC Award

Geometrica was distinguished with the 1997 CNIC Award (Premio de la Cámara Nacional de la Industria de la Construcción) for the structural design of it's Nemak manufacturing facilities. Each dome covers an area of 17,900m2 with no internal supports and are the record holders for being the longest industrial dome enclosures in the world.

1997 National Steel Award

Geometrica was awarded the 1997 National Steel Award in the category: Industrial Use of Steel for the structural design and construction of multiple manufacturing facilities for Nemak. Approximately 150 km of galvanized tubing and 30 thousand connectors were used in the construction of each dome. Column-free spans of 224m in their major axis make them the longest industrial domes in the world.

SECTION TITLE

2002 Powerplant Award

JEA's Northside facility (JEA, formerly known as Jacksonville Electirc Authority) received Power Magazine's 2002 Powerplant Award. This award recognizes JEA's success in converting existing oil/gas-fired steam plants to solid fuels to increase efficiency while reducing both emissions and the cost of electricity. Geometrica is JEA's supplier of the two aluminum storage domes that were built for this project. Each dome holds up to 60,000 tons of petcoke and measures 400 ft (122 m) diameter. Geometrica domes keep the fuel dry, safe and the air clean as JEA has a strong commitment to its community and environment.

The Houston 100®

Geometrica was recognized as a Houston 100 company. A program of the University of Houston, the recognition selects 100 private companies which make the greatest impact on Houston in the three years to 2001 and represents success in achieving outstanding sales growth.

PROJECT HIGHLIGHTS

Geometrica is uniquely qualified to assist in directing your bulk storage enclosure projects towards a goal that will serve your company's interests. We have been involved in numerous projects worldwide. Many of these projects have dealt with similar engineering issues that will be addressed on your projects. We possess the experience in planning and design to achieve a mutually agreeable solution that is both technically feasible and cost effective.

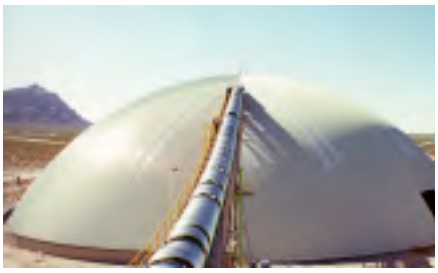
The quality and superior design of Geometrica enclosures is well documented. This documentation is provided in the form of repeat business with our clients as well as client referrals
The following pictures and project descriptions illustrate our technical and management approach on projects that are similar to those you might have.

PRE-BLENDING

Purpose: Limestone Pre-blending
Span: 125 m diameter Compound Parabolic
Industry: Cement
Location: Thung Song, Thailand

Siam Cement

This pre-blending dome presented a unique challenge to Geometrica design engineers because the dome apex needed to support a 70 ton load. The conveyor structure on the inside hangs from the dome apex and exits through the roof. Extra reinforcing along the bottom rings and at the apex was the solution for the extra load. The Geometrica system easily adapted to the needs of this dome.



Purpose: Limestone Storage
Span: 84m diameter, Elliptical
Industry: Cement
Location: Samalayuca, Mexico

Cementos de Chihuahua

Cementos de Chihuahua built this facility to satisfy a changing and demanding market with the highest quality cement product available. During the early stages of planning and development extensive environmental studies were conducted by Cemchisa, who decided that conveying, storing and material handling was to be done under cover to best protect the pristine desert ecosystem. The circular enclosure was approximately 40% less expensive than traditional alternatives and was able to accommodate traditional blending equipment. The dome was built in situ and coordinated with internal equipment and conveyor systems installation.

Purpose: Limestone Pre-blending
Span: 104 m diameter Elliptical
Industry: Cement
Location: I-Lan, Taiwan

Lucky Cement

The second Geometrica dome built for Lucky Cement, this pre-blending cover was one of the largest in the world at it's completion. Located off the coast of Taiwan, the dome has weathered several typhoons with no damage, keeping the pre-blending bed safe and dry. The beautiful chevrons of the cladding have become a symbol for Geometrica domes worldwide.

CIRCULAR

Purpose: Clinker Storage
Span: 60m diameter, Parabolic
Industry: Cement
Location: Picton, Ontario, Canada

Essroc Cement

The Essroc Cement-Italcementi Group clinker dome was another challenge met by Geometrica engineers. The dome needed to begin assembly while the retaining walls were still under construction. Geometrica's Lift and Place method was used to achieve this. By assembling portions of the dome on the ground and then lifting them into place, the area under the dome was free for other uses. In addition to this simultaneous construction need, the dome apex supports a gazebo containing equipment weighing 120 MT. This too was lifted into place.

Purpose: Raw material storage
Span: 2 domes, 68m diameter, Elliptical
Industry: Cement
Location: Ankara, Turkey

Cimento Sanayi

The two elliptical domes at the Mersin-CIMSA plant are 20 meters in height. This size allows ample clearance for the stacking/reclaiming machinery covered by the domes, as well as three vehicle entrances and conveyor openings in the dome roofs. Constructed of a double layered shell of tubing and covered in steel cladding, the storage domes cover a total area of 7264 m2. Assembly of the dome structures contained over 27,000 steel components and was performed by local labor. Both domes were completed in just over three months, structure and cladding.

Purpose: Fine Copper Ore Storage
Span: 56m diameter, Parabolic
Industry: Mining
Location: Iquique, Chile

Kvaerner Metals

This storage dome was also designed to support an apex load for the conveyor, 30 tons vertical and 6 tons horizontal. The ring beam is a standard 3 m in height and the dome includes a canopied opening. Material is delivered to the conical pile through a chute at the apex, which is surrounded by light filtering panels. The entire dome was completed in just over 6 weeks, including the cladding.

CIRCULAR

Purpose: Coal Storage
Span: 65 m diameter, Circular
Industry: Power
Location: Taipei, Taiwan

Integrated Automation Engineering/TUNTEX

The Taipei location is the first of two domes commissioned to Integrated Automation Engineering to cover the coal bed supply of two power plants. Climate fluctuations and moisture control were the key factors in deciding to cover the coal with a Geometrica dome. The lighter weight of the dome required a less expensive wall foundation. Openings for water cannons and personnel ladders were also a safety requirement designed into the structure.

Purpose: Raw Material Storage
Span: 53m diameter, Circular
Industry: Cement
Location: Santiago, Chile

Ready Mix S.A.

Ready Mix S.A. had a need to enclose stockpiled gravel to minimize dust and to keep the product dry. In addition, the structure had to accommodate openings for vehicles and material conveyance. The structure was built on a perimeter edge beam. Elegant translucent panels provide sun light for the interior of the structure. The conveyor opening was placed offset from the center apex for more convenient pile placement. Off white cladding panels cover the structural skeleton.

Purpose: Coal Storage
Span: 60 m span irregular shape
Industry: Cement
Location: I-Lan, Taiwan

Lucky Cement

Lucky Cement Corporation's I-Lan, Taiwan facility is located near Chilung, situated along the Pacific coast a few meters from the ocean. To use mineral coal as fuel to power the kiln for the cement production facility, Lucky Cement needed to comply with more stringent environmental laws as well as keep the coal drier in order to achieve greater efficiency during combustion. The existing coal bed was located between several buildings and a stream bed and could not be relocated. A Geometrica Freedome® was the ideal choice for covering the coal area while it was still in use.

Purpose: Fine Materials Storage
Span: 2 Freedome®s 60 m span
Industry: Mining
Location: Antofagasta, Chile

Empresa Minera de Mantos Blancos

The fine materials stockpile at this copper plant in Chile was producing excessive dust and material loss was great. The irregular area and uneven elevation required a Geometrica Freedome®. By designing the dome to fit the existing area, valuable money was saved in land moving costs. Assembly took place during normal plant operation, requiring no down time. The dome contained the dust, reduced dust emissions by up to 80% and generally improved the safety and health of the plant.

Purpose: Manufacturing Facility
Span: Freedome® 224 m x 85 m
Industry: Automotive
Location: Monterrey Mexico

Modular Nemak

This facility for Modular Nemak S.A. de C.V. houses a casting plant for manufacturing aluminum engine blocks to be supplied to most of the major automobile manufactures in North America. In the early stages of planning and development, Nemak engineers defined performance specifications to be incorporated into the final structure. These major considerations included the need to protect the surroundings as well as create a large work area with no intermediate supports that had a distinctive architectural image. A Geometrica Freedome structure was selected as the only alternative that could provide a cost effective covering of this large open space.

LONGITUDINAL

Purpose: Limestone storage
Span: 53m span x 175m long
Industry: Cement
Location: San Juan, Puerto Rico

Essroc Cement

Essroc's previous limestone storage building was damaged by a hurricane in 1998. With our experience in other storm prone regions, Geometrica was chosen to supply a new facility designed to resist the hurricane strength winds Puerto Rico is seasonally subjected to. To do this in the most economical manner a new system was installed, using structural steel arches for the barrel and Geometrica domes at the ends. The completed dome is designed to withstand 140 mph winds and is anchored to the foundation for extra strength. It contains two vehicle openings and three conveyor openings.

Purpose: Raw material & palletized storage
Span: 50 x 175m and 52 x 70m
Industry: Cement
Location: Curico, Chile

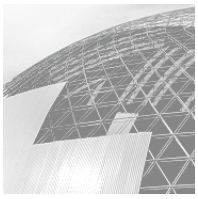
Cementos Curico S.A.

Cementos Curico S.A. (formerly Cementos BioBio) needed a complete storage solution for their cement plant in Curico. Two barrel vaults were needed for the raw materials storage and a third building for a palletizing area. Geometrica supplied all three buildings. One of the raw material storage buildings was even added to a year later, proving the versatility of the Geometrica system to satisfy Cementos Curico's enclosure needs.

Purpose: Raw material storage
Span: 65m span x 124m long
Industry: Cement
Location: Samalayuca, Mexico

Cementos de Chihuahua

After successfully completing the limestone storage area for Cementos de Chihuahua Geometrica was contracted to build a second dome for the homogenizing bed. The enclosure contained a rail system along one side and needed clearance for the reclaiming equipment. One end was enclosed to reduce dust emissions. The translucent panels throughout the length of the dome provide ample lighting. Two openings at the enclosed end allow vehicle and conveyor access. This design can also be added onto if Cementos de Chihuahua should ever need to expand their homogenizing bed.



PEOPLE

Key Personnel
Board of Directors
History

KEY PERSONNEL

Francisco Castaño, PE - Founder and CEO

Mr. Castaño has taken Geometrica from the start in 1992 to over 200 permanent employees worldwide. Castaño lead the engineering for the record-breaking Nemak freedomes. He holds several patents, an MBA from the University of Michigan, a Masters degree in Civil Engineering from the University of Waterloo and a Civil Engineering degree from the Tecnológico de Monterrey. He chairs Geometrica's Board of Directors and assembled its current operating team.

Dr. Raul del Toro: Engineering Director

Dr. del Toro holds a PhD from the Ecole Nationale des Ponts et Chaussées in Paris and is an expert in the design of long span metal structures. He heads a department with ten engineers and is fluent in French, English and Spanish.

Cecilio Zalba - Sales Director

Mr. Zalba is a Civil Engineer from Monterrey Tech with several years of experience in structural design and international sales and marketing. Mr. Zalba's oversees Geometrica's worldwide representation and sales network. During his tenureship, Geometrica has secured work in every continent.

Roel Castaño: Vice President

Mr. Castaño is co-founder of Geometrica. He is an Industrial Engineer from Monterrey Tech. He has led Geometrica through numerous projects, including the fabrication and installation of the 224m span Nemak domes and the startup of Geometrica's Taiwan plant. Before co-founding Geometrica, Mr. Castaño led the manufacturing department at a large steel fabrication company.

BOARD OF DIRECTORS

Dr. Douglas Wright

Dr. Wright originally developed the theories for the design of space frame structures in the 1960's. Since then he has been involved in the realization of many important works such as the skydome in Toronto, the sports palace in Mexico City, and the remarkable structures at Ontario Place, also in Toronto. Dr. Wright recently retired as president of the University of Waterloo in Canada after a dozen years of service. The University of Waterloo is recognized internationally for its research efforts on space frame structures. Among other awards, Dr. Wright received the Gold Medal Award of the Canadian Council of Professional Engineers and 1991 was appointed an Officer in the Order of Canada.

Dr. Carlos Ferregut

Dr. Ferregut is a Professor and Chairman of the Civil Engineering Department at the University of Texas at El Paso. He is also the Associate Director of the Future Aerospace Science and Technology Center for Structural Integrity of Aerospace Systems. Dr. Ferregut's research expertise is in structural reliability, structural damage assessment, risk analysis, expert systems, and neural networks.

Mr. Humberto J. Garza

Mr. Garza has a Civil Engineering degree from the ITESM. Until 1993 he occupied the position of President of the Industrial Division in Conductores Monterrey - Axa, S.A. de C.V. He is a member of the Board of Directors of Axa, also a member of the Board of directors of Universidad de Monterrey and of the Consulting Committee for USEM - Monterrey (Union Social de Empresarios Mexicanos - UNIAPAC)

BOARD OF DIRECTORS

Mr. Jose Maiz Garcia and Mr. Carlos Maiz Garcia

Both graduated as Civil Engineers and lead one of the largest construction firms in Mexico, Constructora Maiz Mier. Mr. Jose Maiz Mier established the business over 50 years ago. They have constructed thousands of buildings and several engineering projects throughout Mexico. The company has over 2,000 employees, and annual sales are near $100 million US dollars.

James L. (Jay) Tribble

Mr.Tribble received his Architectural Engineering degree from the University of Texas. In 1968 he founded and is Chairman or the firm Tribble and Stephens Co. which grew to over 1,000 employees. His company has worked in 14 different states and constructed in excess of US$ 2.0 billion of commercial and industrial building projects. They are currently operating at the $100 million per year level of completed construction projects. He has been guest lecturer at Texas A&M University, University of Florida, Auburn University and published articles in ENR.

Mr. Rafael Garza Martinez

Mr. Garza obtained a Civil Engineering degree and a Master in Science with a major in structures. Mr. Garza Martinez has 25 years of experience in the field of project management and actually is the President of Grupo PLATE, a group of companies that has been involved in big construction projects such as hospitals, stadiums, and high rise buildings in Mexico.

HISTORY

Dr. Douglas Wright - The Engineer

As a conceptual pioneer, Buckminster Fuller worked without the benefits, or the restrictions, of rigorous structural theories. It was Dr. Douglas Wright who analyzed Fuller's designs and formalized the theories for the safe construction of metal domes.

Dr. Wright was able to apply his space frame theories to the challenging designs of a number of large domed structures -- at a time before computers with the capability of modeling three dimensional structures were widely available.

Dr. Wright contributed his skills to the realization of such impressive buildings as Mexico City's Sports Palace, as well as the Skydome and the remarkable structures at Ontario Place in Toronto.

Dr. Wright is a founding director of Geometrica.

Francisco Castaño Sr. - The Builder

A Mexican engineer who initially specialized in building concrete shells, Francisco Castaño Sr. was first to realize the potential for enlarging the size of domed structures using Arthur Fentiman's unique connector.

Castaño introduced the use of the Fentiman connector in long span applications, gaining economies and flexibility. Castaño and his firm built the first metallic shells that deviated from the Geodesic sphere, introducing hyperbolic and elliptical paraboloids, and free-style structures. The work he completed from the 1960s to the 1980's was groundbreaking.

Castaño and Douglas Wright collaborated for many years, creating a body of work that remains the standard for originality, integrity and applicability in dome design and construction.

HISTORY

R.Buckminster Fuller - The Visionary

R. Buckminster Fuller embodied "the geometry of thinking." He conceived of nature as the starting point for man's ingenuity, and his influence extends far beyond architecture.

Fuller designed the Geodesic Dome by combining two basic shapes: the sphere, for efficiency, and the tetrahedron, for strength. Using a metallic skeleton of interlocking triangles to frame his construction, he created lightweight spherical structures of remarkable strength and stability.

In following years, scientists in other fields perceived that the pattern Fuller devised to construct his dome existed in the designs of cells and chemical compounds.

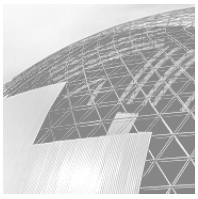
Arthur Fentiman - The Innovator

Buckminster Fuller taught us how to construct a complex of triangles to support wide expanses without using beams. In the late 1950s, Arthur Fentiman devised a metal connector that infinitely expanded the possibilities for dome construction, beyond Fuller's circular Geodesic form.

Each apex of interlocking metallic triangles is a critical convergence of structural forces and moments. Traditional bolted and welded connections are either costly, inefficient or unreliable.

Fentiman's design dovetails the end of a tube element into a matching connector. Material is displaced, not removed. End-angles of tubes can vary, opening the door for freedom of shape.

Geometrica has improved on Fentiman's original idea by optimizing the connector's engagement patterns, resulting in full transmission of the tube material strength through the joint.



APPENDIX

Some illustrations
of Geometrica work