



MODUL

SPACEFRAME

THE FORM THAT YOU IMAGINE ...

THE IDEA YOU CREATE...

THE STRUCTURE WE BUILT...

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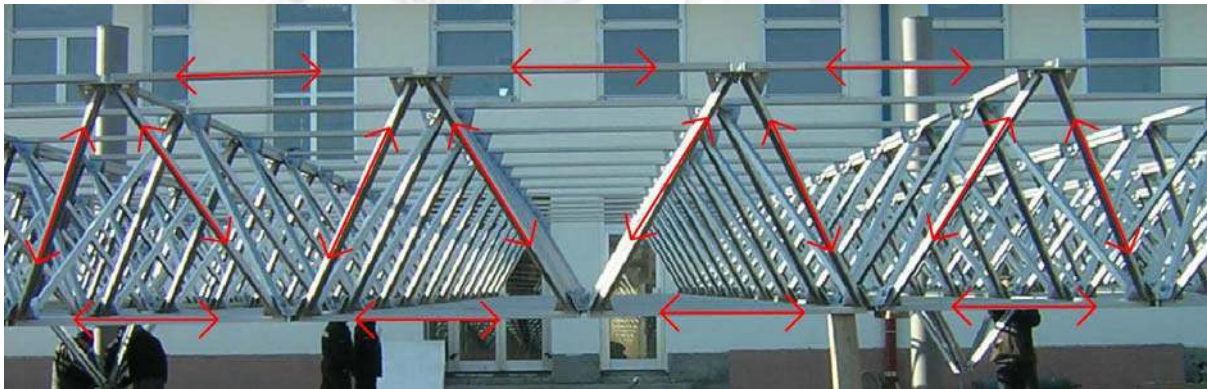
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• INTRODUCTION

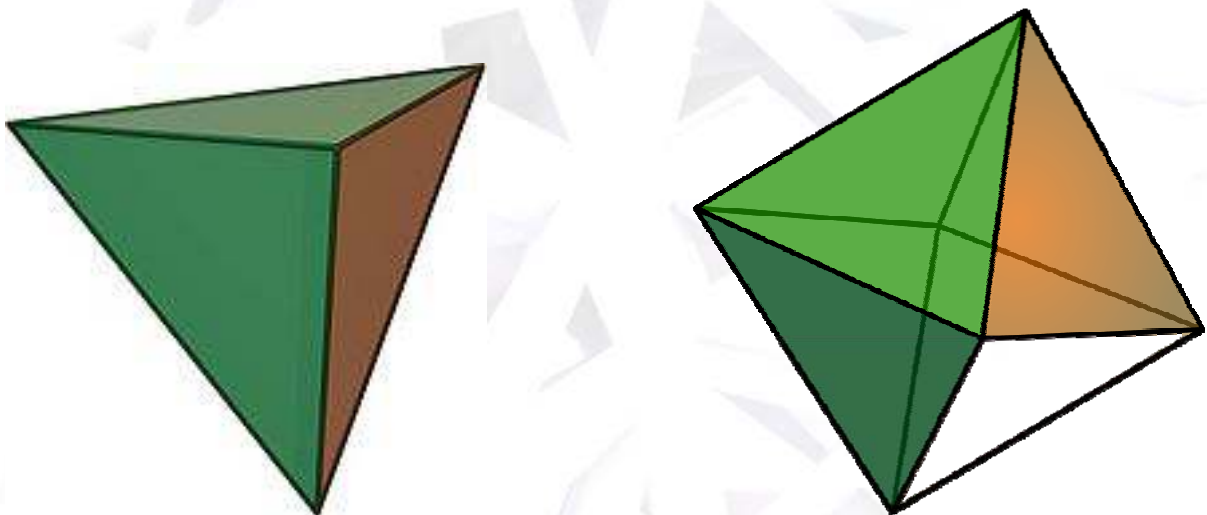
What is space frame, application and features?

Space frame

A space frame is a truss - like rigid structure constructed from interlocking struts in a geometric pattern. Space frames usually utilize a multidirectional span, and are often used to accomplish long spans with few supports. They derive their strength from the inherent rigidity of the triangular frame - flexing loads (bending moments) are transmitted as tension and compression loads along the length of each strut. The system of the space frame is known as the common space lattice, the octet truss, or the octahedron - tetrahedron complex.

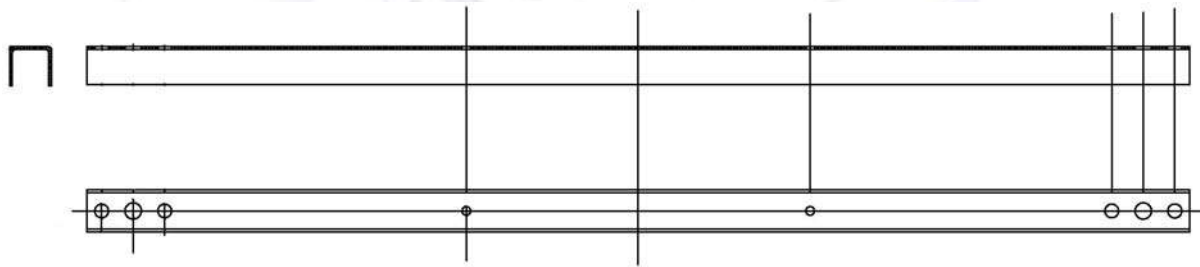


- Triangular frame - transmitting loads as tension and compression along the length of each strut

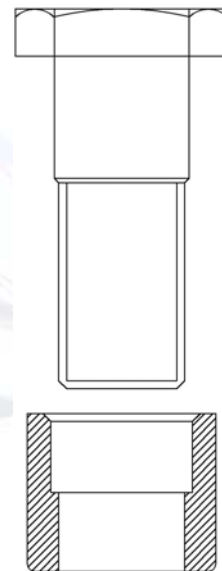
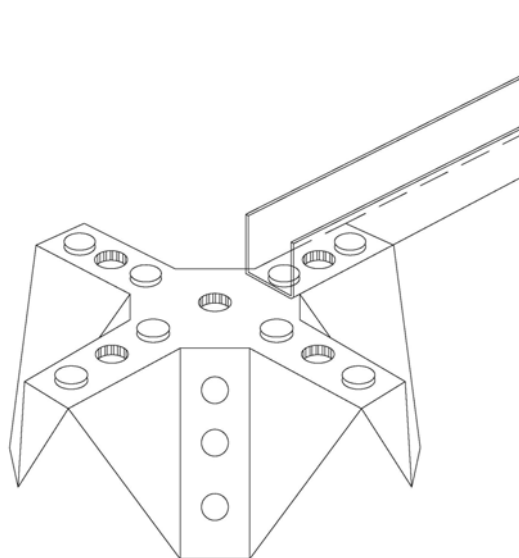


- The octet truss, or the octahedron - tetrahedron complex.

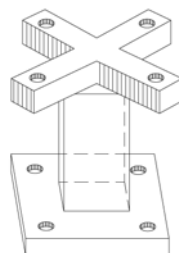
The struts used in this building system are acid resistant stainless steel, highly durable, prepared for numerous reassemblies and chemically immune to most conditions. The struts are bent in 60° angles for the tetraedar. They are assembled by hand using stainless resistant bolts and nuts that are tightened with a screwdriver. The seat fittings are used to connect the space frame to tops of supporting columns or column arms or sometimes bearing walls as called for on the shop drawing. The connectors could either be in - strut type or out - strut type depend upon detailing.



- Strut



- There are two types of connectors used in the space frame roof assembly. The **out-strut** type and **in-strut** type.
- Stainless resistant bolts and nuts



- The seat fitting

With help from Institute for engineering research in Civil Engineer faculty in Skopje, Keding conducted 2 series of loads tests on full size roof structures to determine the true behaviour of system under gravity and lateral loading conditions.

A number of laboratory tests were also carried out on individual 1.2 m and 1.5 m module space frame components.

The safety factor for the whole structure is for more projects, higher. In the MODUL space frame, deformation of any one part will not cause total failure. Stresses can seek many paths to the support if members in one particular path reach their ultimate capacity, members in neighbouring paths will co-operate and carry additional loads until finally entire structure is acting to its full capacity.

Application

The space frame construction can be applied in following constructions:

- **Commercial and industrial buildings**
- **Auditoriums**
- **Airport hangers**
- **Sport stadiums**
- **Sky lights**
- **Mosque**
- **Lighting towers**
- **Petrol pumps**
- **Canopies**
- **Exhibition hall**
- **Scaffoldings**
- **Traffic signs**
- **Malls**
- **Transport terminals**
- **Schools**
- **Pools**
- **Arenas**
- **Entertainment**

Salient features

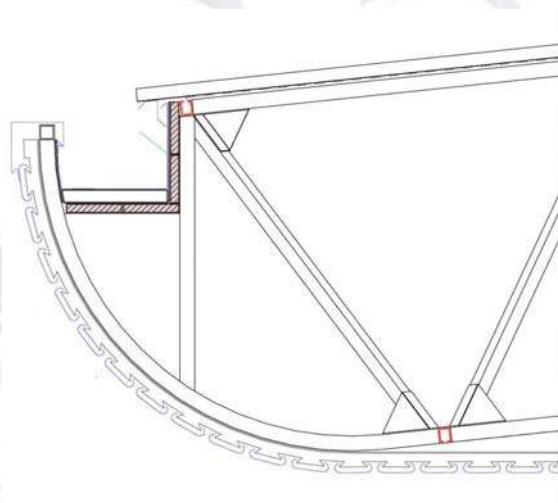
- 1. Enormous spanning capability**
- 2. Light weight**
- 3. High aesthetics**
- 4. High resale value**
- 5. Higher safety factor**
- 6. Extension with additional unit**
- 7. Free forms**
- 8. All service lines can run through frame**
- 9. Simple modification or dis - assembly for re - use**
- 10. Suit irregular support or plan geometry**
- 11. Pre - assembly allows project acceleration**

- **Geometry**

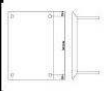
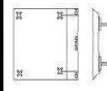
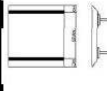
Spans, Forms, curvatures?

Span

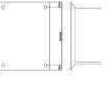

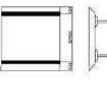
Tabular values represent the total uniformly distributed load capacity in Kg/m². Live - load capacity is determined by deducting from the total uniformly distributed load capacity to the weight of the space - frame, 24 Kg/m², and all other dead loads. Tabulated values are for 1.2 meter module symmetrically supported MODULSPAN space-frame; structures. These values also serve as a guide in estimating the load-carrying capacity of more multiple spans, random supported patterns, irregular shapes and combinations of support types. Exact strength data for such irregular structures require specific engineering analysis. Loads are based on a safety factor of two (0.5 of ultimate test loads) for individual members and connections. The safety factors for the whole structure, however, is higher. In the “MODULSPAN” space-frame, stresses can seek many paths to the support. If members in one particular path reach their ultimate capacity, members neighboring - paths will cooperate and carry additional loads. For lateral or wind loading, the MODULSPAN space-frame acts as a very stiff horizontal beam and requires no additional diagonal bracing within the roof. The MODULSPAN will deflect either downward or upward depending upon applied load, span and overhang relationships. Precambering cannot be accomplished with standardized component parts. Drainage of roof water can be accomplished by placing roof sumps at low points of the roof as determined by the behavior of the space-frame structure. Sloping the entire space-frame from one side to the other by varying support is another method of draining the roof. Still another way is to build up a sloping framework with adjustable screw jacks or posts of varying heights—that will direct the flow of water to predetermined locations.



- Drainage of roof water

		OH OVERHANG	L= SPAN IN METERS																									
			8,4	9,6	10,8	12,0	13,2	14,4	15,6	16,8	18,0	19,2	20,4	21,6	22,8	24,0	25,2	26,4	27,6	28,8	30,0	31,2						
			meters	modules	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26				
column supports		3	2 1/2	537	434	358	307	256	221	193	169																	
		4,2	3 1/2	460	374	313	265	288	198	173	153																	
		5,4	4 1/2	313	295	278	237	205	129	157																		
		6,6	5 1/2	194	186	179	173	166	161	155																		
columns with x-arm supports		4,2	3 1/2		1462	1209	923	734	564																			
		5,4	4 1/2		704	678	655	633	581	424	340																	
		6,6	5 1/2				373	362	351	340	293	266	221	185														
		7,8	6 1/2					229	222	216	210	204	199	194	151													
parallel wall supports		0,6	1/2	989	766	593	484	395	334	282	244	212	187	164	147	131												
		1,8	1 1/2	1187	879	659	527	424	354	296	255	220	193	169	151	134												
		3,0	2 1/2	1827	1250	848	642	494	402	330	279	237	206	180	159	141	127											
		4,2	3 1/2	950	950	950	950	659	505	395	325	269	230	197	173	152	135											
		5,4	4 1/2	579	579	579	579	579	579	539	417	330	273	228	196	169	149	131										
		6,6	5 1/2	389	389	389	389	389	389	389	389	389	354	282	235	197	170	148	131									

- Table of spans for strut length of 1,20 m

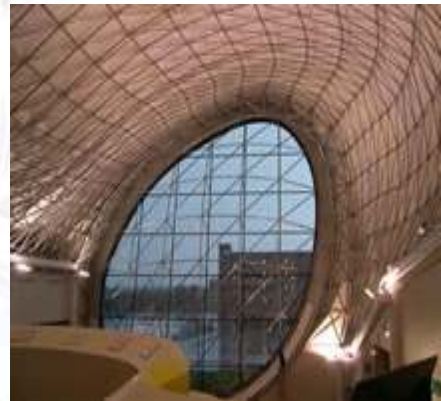
		OH OVERHANG	L= SPAN IN METERS																					
			7,5	9,0	10,5	12,0	13,5	15,0	16,5	18,0	19,5	21,0	22,5	24,0	25,5	27,0	28,5	30,0	31,5	33,0	34,5	36,0		
			meters	modules	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
column supports		3,75	2 1/2	572	434	341	275	227	190	162	140													
		5,25	3 1/2	341	314	292	238	198	168	144														
		6,75	4 1/2	227	212	198	187	176	150	130														
		8,25	5 1/2	144	138	132	127	122	118	113														
columns with x-arm supports		5,25	3 1/2				437	767	590	488	384													
		6,75	4 1/2				480	462	447	432	357	289	232											
		8,25	5 1/2						255	247	239	230	222	181	151	126								
		9,75	6 1/2							156	151	147	143	139	136	132								
parallel wall supports		0,75	1/2	1272	898	636	492	381	311	254	215	181	157	136	120									
		2,25	1 1/2	1908	1174	763	563	424	339	272	227	190	164	141	124									
		3,75	2 1/2	1246	1246	1246	803	545	412	318	258	212	179	152	132									
		5,25	3 1/2	648	648	648	648	648	610	424	324	254	209	173	148	127								
		6,75	4 1/2	395	395	395	395	395	395	395	395	341	267	212	175	146	126							
		8,25	5 1/2	265	265	265	265	265	265	265	265	265	265	265	227	181	151	127						

- Table of spans for strut length of 1,50 m

Forms

Free forms and shells

Keding can design and build the structure and cladding or glazing for almost any imaginable shape. Curvature often allows more efficient structural behaviour that results in economies in the frame mass and foundations. This technology creates affordable uniqueness for entrance canopies, luxury homes, museums, theme parks and any building where visual impact is desired.



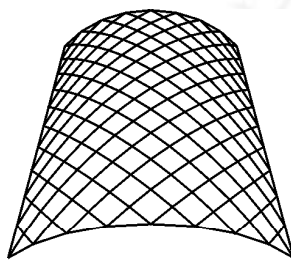
Toroids

Toroids are appearing in structural applications due to their aesthetic and structural benefits. However the structural efficiencies of this shape are also being applied by Keding in long-span ore stockpile enclosures. Toroid shapes are simply described as a double curved surface that resembles part of a tyre or inner-tube. The toroid shape has curvature in two planes and therefore can be designed as a shell. This results in less structure mass than linear designs and by controlling the angle of the structure wall at its base, footing reactions can be minimized. Overall structure curvature and member sizes must be designed to resist buckling and to restrain surface discontinuities, however these structures can be very economical and fast to construct.

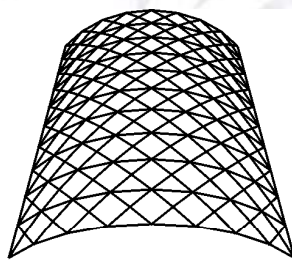


Hyperbolic Parabola

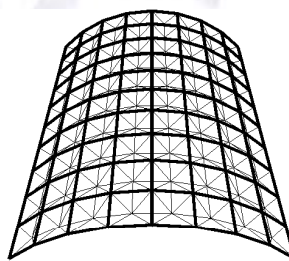
Hypars are structural shapes curved in two directions as Hyperbolic Parabola. They form part of a family of single layer shell structures (or double curved lattices) that cover long spans with a light-weight structural network, acting in tension or compression. The closely spaced tubes directly support cladding without the need for intermediate or secondary trusses. This results in a visually appealing roof profile, a very shallow roof depth and lower cost due to reduced material mass. Hypar roofs can be designed and built to any elevation or plan geometry and multiple structures can be combined to achieve a ribbon-like appearance. The edges of each Hypar are restrained and foundations are designed to resist thrust and overturning movement under all service conditions. Hypars also provide the aesthetics of tensile fabric structures, but with the added structural integrity needed in regions subject to hurricane or snow loads.



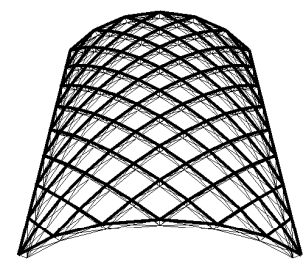
(a) Lamella (diagonal) barrel vault



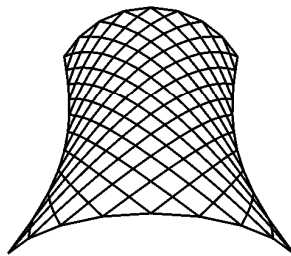
(b) Three-way barrel vault



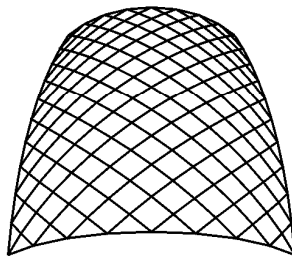
(c) Two-way on two-way double layer barrel vault



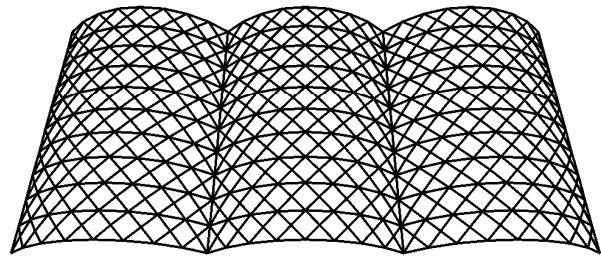
(d) Lamella (diagonal) truss barrel vault



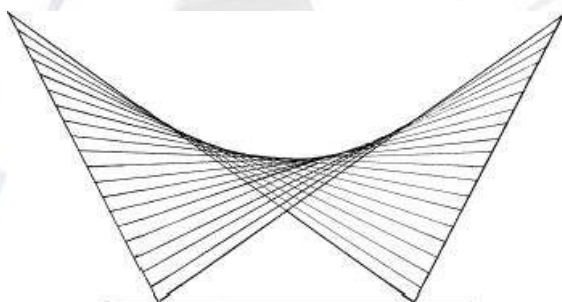
(e) Hyperboloidal lamella barrel vault



(f) Ellipsoidal lamella barrel vault



(g) Compound three-way barrel vault



Spheres

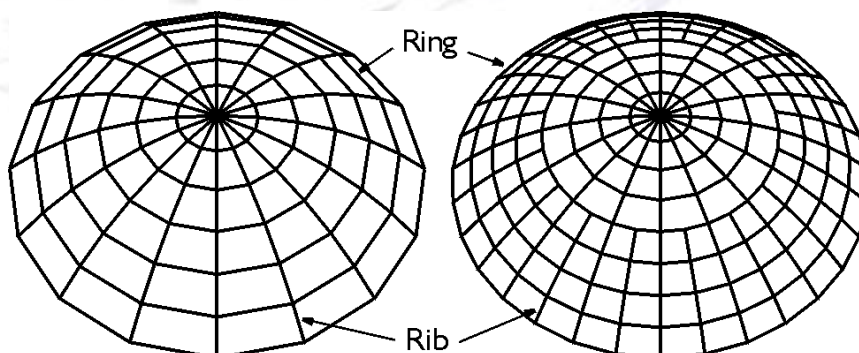


Spheres are a visually attractive, structurally efficient and an often found application in Theme Parks, Theatres, Religious Buildings, Malls, Building features and Signage. Various geometrical arrangements can be developed with a triangle as the basic structural element. Geodesic domes are arranged so that every line of members around the sphere divide it in half and all member and joints are identical. Modern technologies allow all shaped structures to be developed very economically with differing members and joints. Lamella geometry is often considered more aesthetically pleasing and is more practical to build. Schwedler geometry is sometimes preferred for small glazed structures. Structural design assumes loads are transferred axially through the shell which results in very efficient design-lighter structural members and less load on foundations. The ability to quickly construct Keding spheres in pre-assemblies also reduces cost and time.



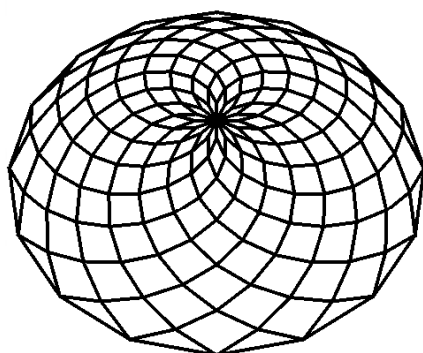
Domes

Dome roofs have offered great visual appeal and clear column-free spans in buildings for centuries. Modern materials, design, manufacturing and installation methods allow almost unlimited dome shapes. Our domes are designed as double curved shells which allow great structural and cost advantages in any span:rise ratio. Keding domes can be designed to accommodate concentrated and unbalanced loadings in any locations around the world. Dome roofs can be designed to suit square, rectangular or any plan shape. Componentized modular frame systems allow minimum material mass because the frame elements are optimized to match the stresses that apply in each discrete structure location. Keding design is based on extensive full scale testing and advanced analysis to prevent buckling.

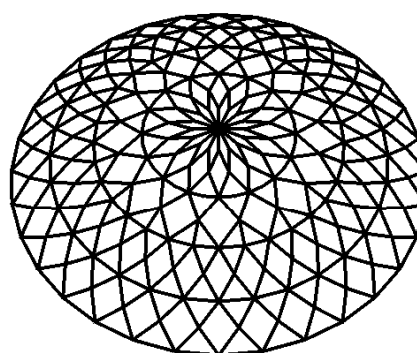


(a) Ribbed dome

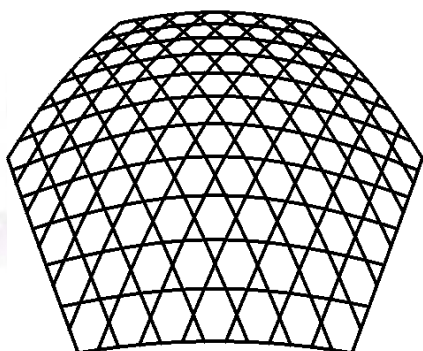
(b) Trimmed ribbed dome



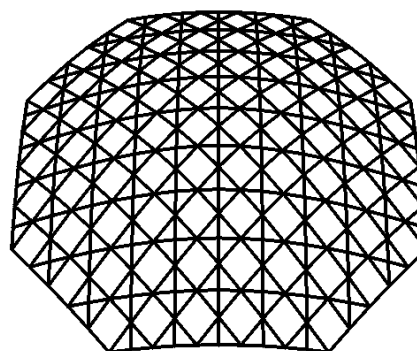
(e) Lamella dome



(f) Trimmed lamella dome



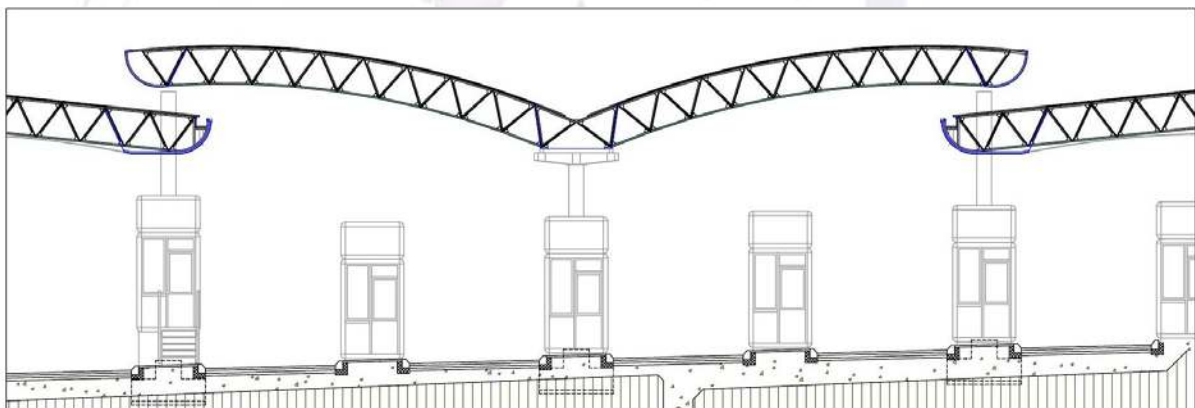
(i) Three-way grid dome



(j) Four-way grid dome

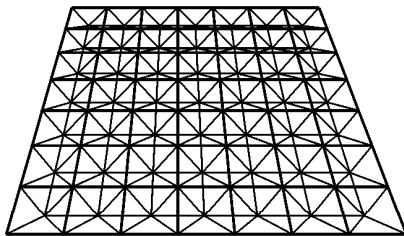
Barrel vaults

Curvature in building elements provides more than just visual appeal. It allows structural design to incorporate arching theory and the use of steel and aluminum offers great axial and bending strength so that long clear spans and low rise barrel vaults are possible for roofs, entrance canopies and curved glass walls. Keding designs each barrel vault specifically for the loads and geometry dictated at each location and to accommodate the support strength that is available. A low rise arch will exert higher horizontal forces at its supports which cannot always be restrained by ties. In retrofit applications such as the enclosure of an existing courtyard. Keding can design a minimum mass roof in steel or aluminum to suit whatever support locations exist. Advanced design allows some barrel vaults to be constructed as single layer or lattice structure depending on the span, rise and loads that apply. Barrel vaults can be built in place of scaffolding, or constructed as sub-assemblies and lifted into final position with or without cladding attached.

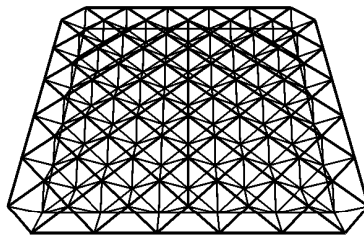


Spaceframes

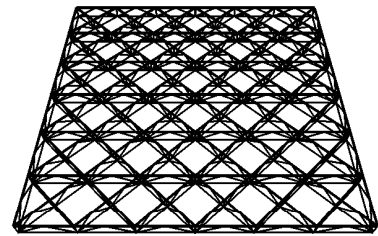
Spaceframes Applications: Malls, Transport Terminals, Schools, Pools, Arenas, Entertainment, Hospitals, Hotels, Corporate and Commercial Buildings, Convention Centers.



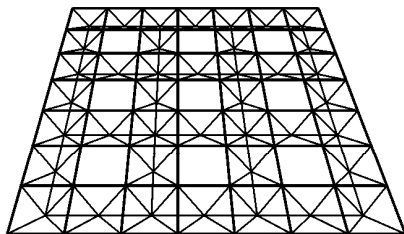
(a) Two-way on two-way grid



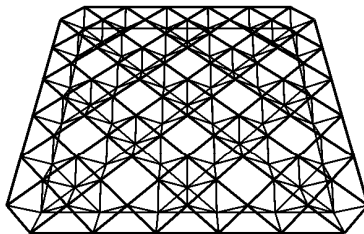
(b) Diagonal on diagonal grid



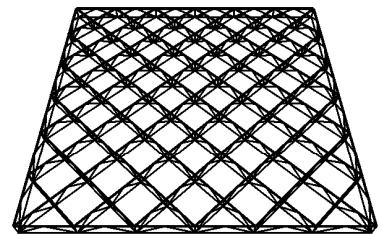
(c) Three-way truss grid



(d) Reduced two-way on two-way grid



(e) Reduced diagonal on diagonal grid



(f) Diagonal truss grid

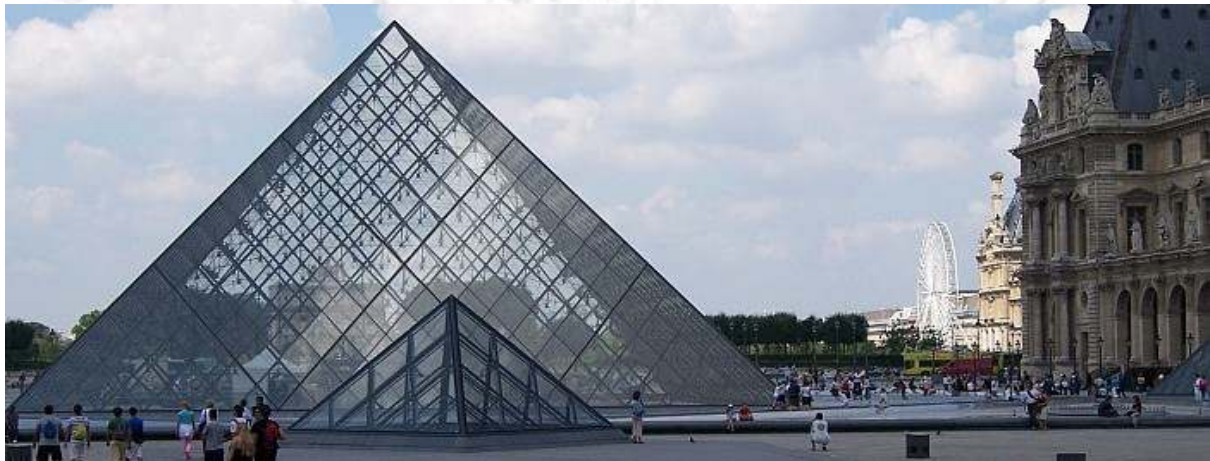




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Pyramids



Scaffoldings



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Traffic signs

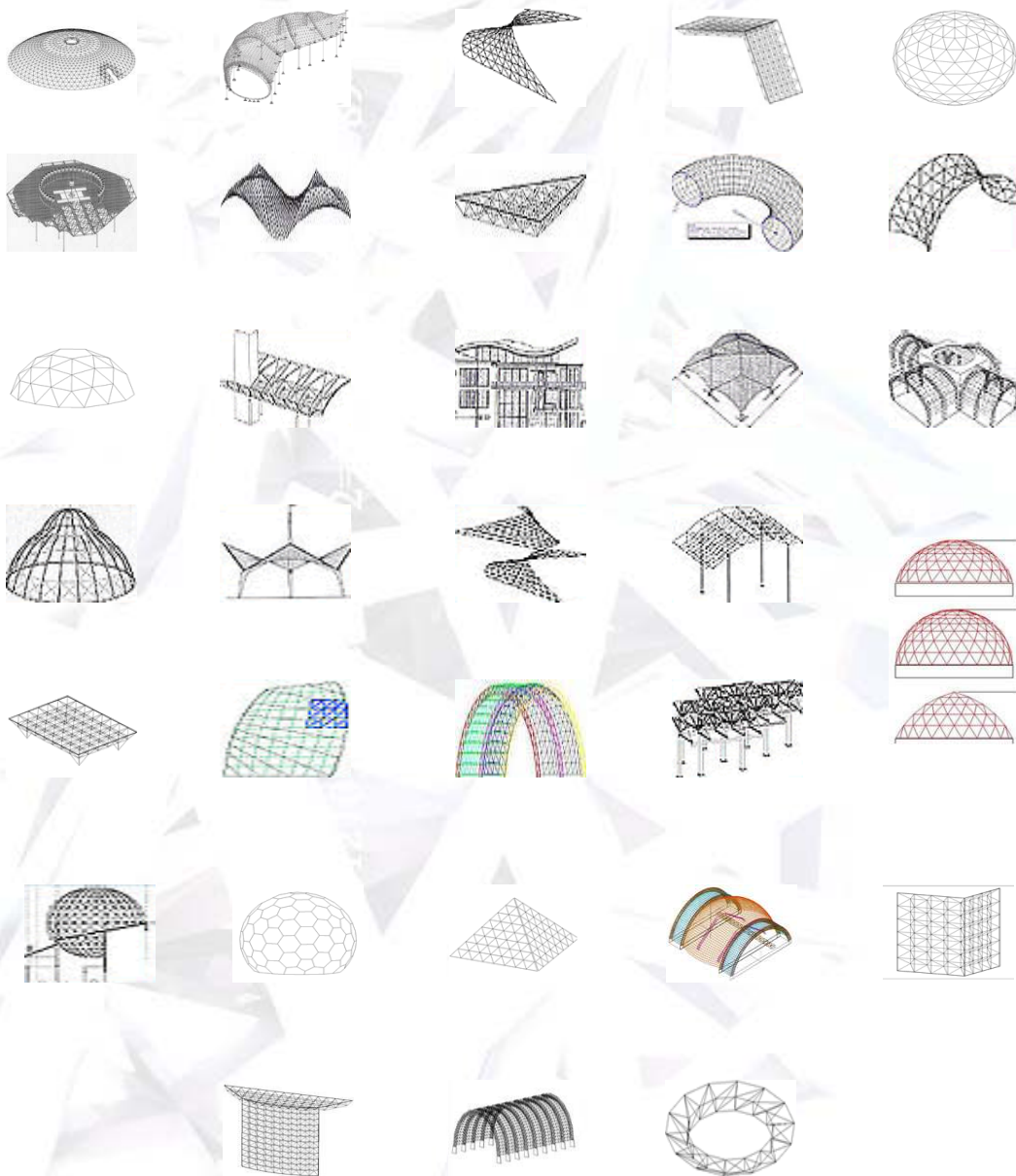


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Other geometries

Novel building shapes are possible with space frame designs by combining the basic geometries shown here. All of these can also be altered to suit your aesthetic preference or to align with adjacent buildings or support locations. Building design often develops around rectilinear spaces and the benefits of curved roofs and walls can be overlooked. Modern space frame design methods allow us to expand the edges of domes (or any curved shape) to land on square, rectangular or any plan geometry. Advanced spaceframe manufacturing and construction techniques have made curved and complex shapes very competitive against more traditional linear roofs and walls.



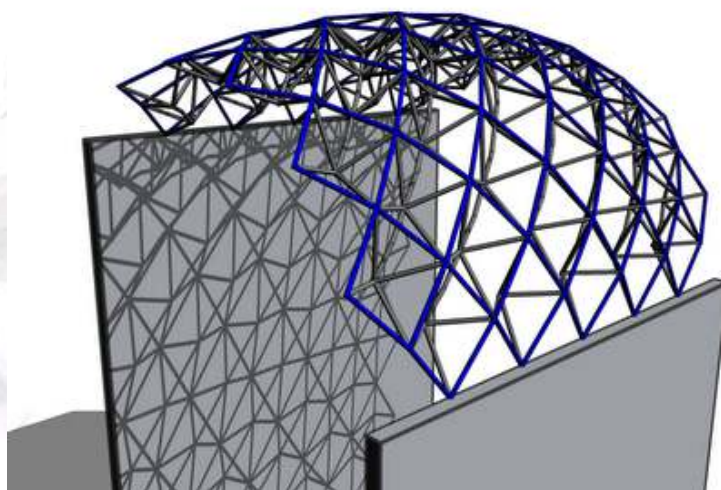
Curvature

The success of striking architectural building spaceframe designs is reflected in higher market value, rental, tenancy, and visitor attendances. The world's most successful museums are those where the building itself attracts visitors. Noteworthy building designs increase public and industry recognition for the architect. Often a decorative entrance or roof-top canopy or feature achieves a visible improvement to an aging building when a limited budget makes a complete new facade impossible.

Enclosures for ore stockpiles can be designed with less steel and to conform more closely to the pile angle of repose. The structure shape can be designed to minimize horizontal thrust imposed on the foundations. Domes are designed with tension rings to also restrain base horizontal loads. The use of double curvature can allow some structures to be designed as single layer shells which offer higher cost-effectiveness.

Curvature in structural design often reduces member stress, structure mass and costs. A dome shaped building roof requires 1/3 the structure mass versus a pyramid or pitched roof. A barrel vault requires less steel than a flat roof.

Curvature in two directions (e.g. Hypars, toroids, spheres) allows structures to be designed as shells often as a single layer or lattice frame. Lightweight roofs can also be pre-assembled more rapidly at ground level and lifted into final position. Reduced roof weight means supports and foundations can also be reduced. The Keding structural system is economical because we can discretely use the optimal member size in every location. Where stresses concentrate we can increase the tube diameter, use thicker wall tube, shorten the module length, or add more tubes or structure layers. This versatility and the precision of our design software always results in minimum structure mass. The Keding joint is fully efficient in axial and bending condition and allows superior structural capacity and reliable single layer shell and free-form structures.



- **Design**

Seismic, Snow/ Ice loads, fire codes, environmental advantages!

We design in strict accordance with applicable standards in each location. We have many structures providing excellent service in a wide variety of locations including Earthquake zones and locations subject to excessive snow and ice loads. Sprinklers, drywall barriers or intumescent paints can be used.

Keding design engineers will stamp the design wherever they are registered. In other locations we engage a locally registered professional engineer and instruct them on the technology and design.

Engineers recognize that every structure in existence, when over-stressed, has at least one critical mode of failure. Keding has been designing and building tube structures for over 20 years in all locations and loading situations. Full-scale testing to failure has been performed for Keding structures and reliable load limits are adhered to, with prudent safety factors, for all combination of tube/nub dimension and material. Coupled with finite element analysis, an endless variety of structure shapes can be predictably designed for any loading combination.

In space frame and curved structures, over-stress of any single member is resisted by the unused axial and bending capacity in the other connecting members. This inherent redundancy is illustrated in Keding structures that afford structural integrity before assembly is complete.

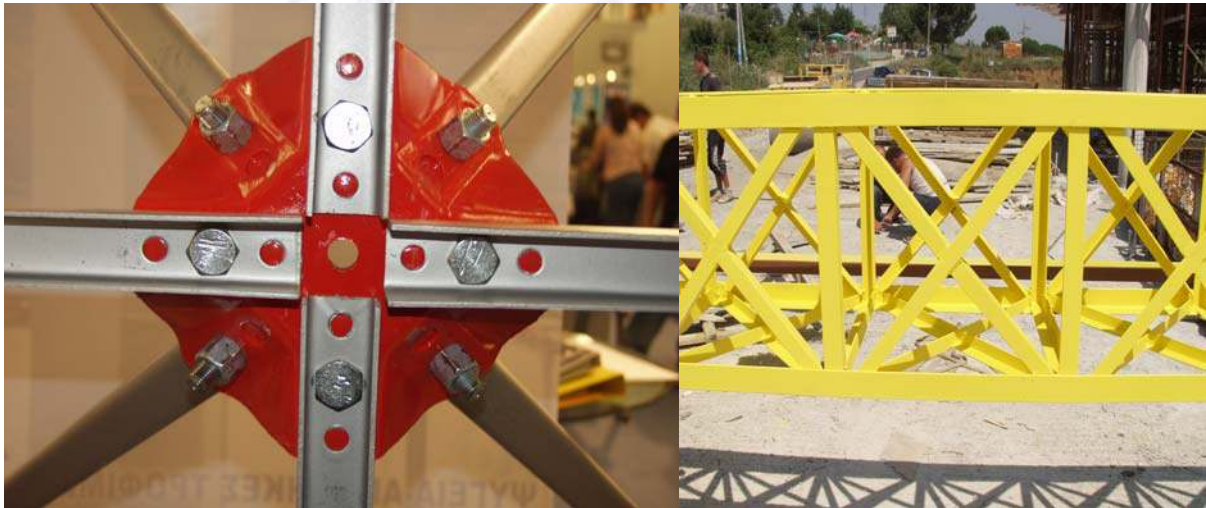
Unlike bolted and welded connections that are not fully efficient and concentrate stress on thin gusset plates, the Modul joint is actually stronger than the frame members. In our structures the tube section dimension at each joint is increased in the plane of maximum bending, and the tight keyway connection in the node effectively eliminate slip to provide increased bending strength with no loss of axial capacity. Rotation about the minor stress plane would require simultaneous failure of all members at the joint, which is physically impossible given that they radiate at different angles, carry different loads and in many cases have different section property. The behavior of steel structures, with high degrees of redundancy, under excess load is to redistribute stress concentrations until equilibrium is restored. Stress will always disperse to the stiffer members. (The comfort of every chair we sit on, or every hammock we relax in, illustrates this principle very well).

Keding's vigilance in ensuring a safe working environment is illustrated by zero lost time injuries or serious incidents on any of its construction sites throughout its history. We have developed and maintained safe and proven construction methods, properly trained personnel. No component exceeds the lifting capability of individual workers. In-place assembly is achieved using man-baskets with every worker properly tethered. Wherever possible, ground-level pre-assembly allows the structure, with or without glazing or decking to be crane-lifted into final position, thereby minimizing hazards to other trades on site.

- **Cladding**

Cladding or glazing

Keding has been supplying domes and other complex curved building roofs for over 20 years. We have many proven cladding/glazing arrangements available in galvanized/painted steel, anodized aluminum, stainless steel, glass, polycarbonate, timber and tensile fabric. We have typical drawings of these arrangements or will develop details appropriate to the constraints at each site. Ceilings are fixed via a conventional purlin system, however often the framing is left exposed as an aesthetic feature and to allow good access to ducting and service lines. Whenever it is advantageous, Keding will supply the complete structure. On some projects where other suppliers are separately contracted, we will act as a "frame-only" sub-contractor.



- **Durability and warranties**

Modul Framing is available in Galvanized steel and stainless steel. Each serves particular service environments. Factory finishes include polyester, powder-coating, chromating, kynar which offer a range of added aesthetics and durability. The majority of structures are supplied in powder-coated galvanized steel or anodized aluminum for most environments including salt and chlorine atmospheres. Stainless steel is required for highly corrosive conditions e.g. Potash processing.

Keding galvanized steel structures incorporate an aluminum connector. Zinc and Aluminum are so close on the electromechanical scale that insufficient potential is available to induce significant corrosion. Laboratory testing, industry codes and decades of in-field structures (incorporating these materials in contact in framing, cladding and fasteners), confirm the compatibility of these metals in almost all environments. In aggressive environments, factory-applied coatings have also extended structure service life in thousands of applications around the world.

Keding operates in accordance with ISO Quality Management principles and over the last 20 years it has never experienced design or performance deficiency in its products. We match industry standards by offering a one year warranty on materials and workmanship. Other warranties may be offered when dictated by project or legal requirements.

- **Fabrication and delivery**

In Macedonia Keding material can typically be expected on site 4 weeks after order and drawing approvals. International freight is subject to shipping schedules, but because the product components containerize very compactly, transport difficulties are rarely encountered. Unusual material finishes may be accelerated via pre-payments.

Freight costs are a very small part of the overall cost and our delivery times are often a fraction of alternatives. Our design software and manufacturing equipment is closely linked and purpose-built to ensure product precision is consistently achieved. The result is assembly speed and structural integrity in service. Our operations comply with ISO quality procedures and therefore all materials are procured only from pre-approved suppliers who have demonstrated consistent conformance to our material tolerances and specifications. Local supply of cladding and glazing is contracted when advantageous.

- **Construction and insulation**

Modul frames are very simple to assemble. Typically unskilled labor, engaged at the construction site, achieve high efficiency using hand tools. All components can typically be lifted by hand, are uniquely identified and assembly drawings indicate correct location and sequence of construction, and crane-lifting locations. Keding has assembly crews available when necessary and experienced supervisors are available to oversee local crews on each project.

Keding is advantageous in remote locations, sites with difficult access, poor ground conditions, poor weather or limited availability of skilled labor or equipment. Keding structures can be completed as sub-assemblies in place or separate from final position under cover or where site conditions are suitable. Modul components pose no hazard on site when containerized and ground-level assembly minimized work at height or above other site activities.

Modul domes are unique in that they can be assembled from the base perimeter towards the apex. Pre-assembled roofs are frequently lifted into final position, sometimes with cladding/glazing installed, with minimal interruption to other activities below.

In many situations, where space permits, increasing crew size can shorten the assembly duration. Good crane accessibility also allows more assembly options which can help to accelerate construction. Keding will normally propose the most feasible, expedient and safe assembly plan at the start of each project. Keding offers alternative systems designs for both thermal and acoustic insulation that will best apply for each project. Both bat and sprayed insulation products have been used. Some of these arrangements are shown on typical drawings included elsewhere in this website. Where high R-value insulation is required, we increase the cladding/frame separation to provide the required insulation depth. These spaceframe structures typically are designed with long clear column free spans. Display structures utilize a smaller version of the Keding joint that is also modified to ease assembly and disassembly.

Keding will propose the most realistic construction program based on site conditions such as access, staging space, ground condition, equipment availability, and concurrent site work. Project acceleration sometimes is possible by increasing crew size or altering the pre-assembly/lifting sequence. In cases of poor weather or unavailability of cranes, construction of spaceframe sub-assemblies can proceed under cover.

By the producing of elements for canopy-space truss are accepted all condition from the design, all valid standards and rules for this kind of works in Republic of Macedonia.

Producing elements who are accepted , mainly are adopt with open cross section U in accordance with statics dimensioning and knot(conector) who is used for space connecting of profiles by special construct bolt and nut.

- Profile (chord) with it's dimensions is produced in accordance with static solution given in this case with suitable details. Sheet for this profile is 3mm and processing is by cold treatment.
- Conector who has spacial form is made from sheet with thickness 6mm. The processing the form of conector is made by hot treatment.
- Protection from the corrodion is made by galvanizing, paint with special primer coat for galvanized stell sheet. And at least to paint with colour like investor wish.
- Bolt and nut are with special dimensions are made with quality in accordance with all technical regulation .We galvanized bolts and nuts for protection from the corrodion.
- Other details who are in our space truss are same protectet like all others.
- Instaling the space truss is made on the ground level and than we lift with autocrane. In our expiriance we lifted the biggest space truss with 970m² in once.
- With good preparation of area we can instal and lift 100m² per one day with premature instalation of columns.

For other questions and details we are ready to answer any time.



- Assembly can avoid human walking through the frame



- Crane accessibility also allows more assembly options



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- **Cost and application**

Our objective is always to satisfy all the project requirements at lowest cost. Every architectural structure is custom designed and the variety of structure shapes, materials and site conditions will affect price. Keding is respected for providing reliable installed structure estimates and our responsive, free preliminary space frame design service. Our competitiveness is best illustrated by our long and successful history and through every project won against local steel fabricators and modular frame systems in each location around the world. E-Mail or Fax your preliminary requirements and we will quickly respond with a priced proposal and construction program.

In architectural applications, aesthetic demands require greater attention to finish and often the structure shape and cladding/glazing system will be chosen for good appearance through the life of the building. These spaceframe structures can be of any shape or size and are typically used for building roofs, glass walls and entrance canopies.

Industrial Tanks and stockpile enclosures are typically spaceframe domes, barrel vault or toroid structures supplied in galvanized steel, (or stainless steel in aggressive environments). The structure shape is determined by functional aspects of the plant and curvature is introduced to minimize cost.



• Portfolio

1. **Border station for trucks and transport vehicles "Blace"** - Republic of Macedonia, Civil engineering
2. **Border station for trucks and transport vehicles "Tabanovce"** - Republic of Macedonia, Civil engineering
3. **Border station "Kafasan"** - Republic of Macedonia, Civil engineering
4. **Border station "Novo Selo"** - Republic of Macedonia, Civil engineering
5. **"EFTA", Athens** - Greece
6. **Payroll in Tetovo and Gostivar** - of Macedonia, Civil engineering
7. **"Airport Tivat"** - Monte Negro
8. **Ingusetia "Luk Oil" petrol stations** - Russia
9. **Samarkand Uzbekistan "Luk Oil" petrol stations** - Russia
10. **Aktjubinsk Kazakhstan "Luk Oil" petrol station** - Kazakhstan
11. **Bus station in the town Uzice Serbia and Montenegro** - Serbia and Montenegro
12. **Petrol station "Bunar Petrol" Gostivar** - Republic of Macedonia
13. **Petrol station "Petrol Ohrid"** - Republic of Macedonia
14. **Petrol station "Bama Petrol" Skopje** - Republic of Macedonia
15. **Petrol station "Mak Oil" Skopje, Kocani** - Republic of Macedonia
16. **Petrol station "Goding Petrol" Gostivar** - Republic of Macedonia
17. **Petrol station "Blagoevgrad" Bulgaria** - Republic of Bulgaria
18. **Petrol station "Mimi Petrol" Lesok Tetovo** - Republic of Macedonia
19. **"Post office" at the border station Bogoodica** - Republic of Macedonia
20. **"Association of drivers" Ohrid, station for technical control** - Republic of Macedonia
21. **"Braka Petrol", Tirana** - Albania
22. **"High Medicine School", Tetovo** - Republic of Macedonia

- Gallery



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- **About Us**



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