
ATENA
STEEL MANUFACTURING

THE OPPORTUNITY TO ENHANCE

STATE-OF-THE-ART TECHNOLOGY

- Using the most progressive mill line machinery manufactured by the most renown international companies
- HSS manufacturing through cold forming method and Electric Resistance Welding (ERW)
- Using the modern high frequency welding machine made by EFD
- Cutting & Machining simultaneously by an advanced shearing machine called Milling Cutoff
- The capability of producing HSS with the thickness of up to 18mm

QUALITY AND SPEED IN PRODUCTION

- The Production speed of 30 meters per minute
- Achieving international standards including ASTM, EN, DIN, JIS, …
- Compliance with AWWA standard for producing water supply pipes
- Obtaining the certificate of the Iranian Housing and Urban Development Research Center
- The fully approved products by the well-known standards Thanks to the combination of high speed production and the outstanding quality of mill line machines

American Water Works Association

مرکز تحقیقات راه، مسکن و شهرسازی

BSI British Standards

DIN

ASTM INTERNATIONAL

JIS

ENVIRONMENT- FRIENDLY INDUSTRY

- The least environmental pollution due to our commitment not to use fossil fuels or any kind of industrial wastewater

INTRODUCTION

Foulad Gostar Atena (FGA) Company was established in 2008 with the aim of manufacturing Hollow Structural Steel Sections (HSS) through Cold Forming and Electric Resistance Welding (ERW) method. In order to promote the quality level of different industries such as construction, Oil and Gas, Petrochemical, Water and Wastewater and many other industries, high quality HSS are produced in various sizes.
ATENA's factory is located in a 6-hectare area at ILAAM-IRAN with a production capacity of 150,000 tons per year.
We studied market demands and responded to current deficiencies by recruiting eminent and experienced technical consultants in this field with a hope to be one of the largest HSS manufacturers in Iran and the Region.

HSS AND APPLICATIONS

HSS stands for Hollow Structural Section that is a metal profile with a hollow cross section. Round, square and rectangular shapes of HSS profiles have many applications in various industries.

HSS profiles are being manufactured in 2 methods:

• Traditional production method
(welding and cutting by manpower)
• Modern industrial production method
(by fully automated and integrated machinery)

Traditional production has the following shortcomings:

• High percentage of workforce errors and thus less reliability
• Increased production time
• Increased required workforce
• Increased Production expense
• Considerable residual stress in welding zone

Modern industrial production method doesn't have the above shortcomings.

LIFE IS PRECIOUS, MAKE IT SAFER

BEYOND THE BORDER OF THE FUTURE

WHY HSS?

HSS has many various applications in different industries such as Construction, Oil and Gas, Municipal Engineering and many other industries.

Steel Advantages vs. Other Construction Materials

• Steel construction is naturally faster than concrete or masonry
• Due to its strength, structures built using steel are usually lighter than those made of other materials
• Steel is fully recyclable
• Due to its strength, construction using structural steel generally provides more room for open spaces, which is desirable in terms of architecture and aesthetics
• Due to higher strength, steel is known to provide the best strength-to-weight ratio compared to other construction material such as concrete or timber

HSS (produced by modern manufacturing) advantages vs. other structural steel sections

• Better strength-to-weight ratio
• Stronger in torsion
• Best for columns due to symmetry and material placement
• Better welding quality
• Useful in lightweight construction and better performance against earthquake forces
• Useful in space structures
• Better looking architectural exposure
• Decreased construction costs and being more economical
• Made to measure profile lengths
• Much easier composite construction by using concrete-filled members

Comparing HSS with the Other Structures Economically

The following table indicates why using HSS, leads to time saving, higher quality and lower costs.

	Comparing with Built-up Steel Structures	Comparing with Concrete Structures
Time	Decreasing the period of Fabrication and Installation of Steel Frame up to %40	Decreasing the period of Concrete Structure Construction up to %70
Weight	Limited Reduction in Dimension and Thickness of Columns	Reduces the Dimension of Columns up to %30
Cost	Leads to Cheaper Columns up to %20 and Cheaper Steel Frame up to %10	More economical due to remarkable decrease of construction time in Concrete Structures and Faster Return on Investment
Quality	1. Much higher quality due to Controlled Electric Resistance Welding (ERW) Instead of Submerged Arc Welding (SAW) 2. Much higher quality due to Residual Stress Reduction (Welding Line)	Much higher quality due to elimination of numerous Human mistakes and environmental Factors affecting on the construction quality

These comparisons are made in a 5 storey building with relative irregular plan and 2.5 up to 7.5 meter span (Including steel moment frame in X-direction and concentric brace (CBF) in Y-direction). Although the above-mentioned percentages may vary in different structures, it is expected that the advantages of HSS utilization are remarkable in all kinds of structures.

PRODUCTS
(SPECIFICATIONS AND STANDARDS)

ATENA manufactures HSS using non-alloyed carbon steel which are either mild (ST-37),(ST-44) or high strength (ST-52), in round, Square and Rectangular shape through cold forming and Electric Resistance Welding (ERW) method.
These sections are made of hot rolled coils with yield strength ranging from 240 to 360 mpa, and ultimate tensile strengths ranging from 370 to 520 mpa.This corresponds to an ultimate elongation of about 15-17 percent.
After cold-working process, yield strength and ultimate strength increases which is one of the advantages of the production method and arises from strain hardening in stress-strain curve.

STRUCTURAL DESIGN REGULATIONS

For designing cold-formed steel structures, we may practice according to the North American Iron and Steel Institute (AISI) Standard. The allowable thickness of mild cold-formed steel using in structures is up to 25.4 mm (1 inch) in AISI.

Product Specification	Equivalent Standard
Cold Formed ERW Structural and Mechanical Tubing of Non-Alloy Steels	ASTM A500, ASTM A1085, EN 10219, DIN 59411, JIS G3466
Steel Water Pipes 6- inch (150 mm) and Larger	AWWA-C200

PUSHING THE BOUNDARIES OF PROTECTION

PRODUCTION PROCESS

Our Mill Line technology has been designed and manufactured by reputable manufacturers such as KUSAKABE (Japan), SIEMENS (Germany), and EFD (Norway) wich is able to produce HSS using the state-of-the-art technology.
The production process at a glance is according to the pictures below:



1

Forming

The flat sheets are formed to round shapes and then welded. Finally, an additional forming process leads to perfectly shaped circular, square and rectangular hollow sections.

2

Welding

The High Frequency (HF) welding machine, made by EFD Norway, is able to continuously weld the longitudinal edges using the high quality Electric Resistance Welding method (ERW) without Electrode.

3

CutOff

Two circular milling saws cut the products sharply with no kind of bending at the edges compared to the traditional shearing machines, it also machines the surface simultaneously thanks to its advanced mechanism.

4

Quality Control

- Hollow Structural Sections

Product samples are selected randomly and tested through standard quality control experiments. These procedures ensure that the end products meet the requirements of any specification, such as those of ASTM, EN, DIN, and JIS as required by customers. They also ensure that no defective products are shipped to the end users.

- Water Supply Pipes

In order to obtain AWWA standard, all required tests such as online Ultrasonic Testing will be done to meet the standard requirements.

PRODUCING WHAT WILL MATTER IN THE FUTURE

TABLE OF PRODUCTS:

● Round Tube

6 inch ~ 16 inch , Thickness: 4.5 ~ 18 mm 

Thickness (mm)		4.5	5	6	8	10	12	15	18
Outside Dimension (mm)	168.3	(18.1)	(20.0)	(23.9)	(31.4)	(38.8)	(46.0)		
	193.7	(21.9)	(24.4)	(29.2)	(39.0)	(48.7)	(58.4)		
	219.1	(24.8)	(27.5)	(33.0)	(44.0)	(55.0)	(66.0)		
	244.5		(30.2)	(36.2)	(48.3)	(60.4)	(72.5)	(90.6)	
	273		(32.8)	(39.3)	(52.0)	(64.5)	(76.8)	(94.8)	
	323.9			(46.7)	(61.9)	(76.9)	(91.7)	(113.5)	
	355.6			(51.4)	(68.1)	(84.7)	(101.0)	(125.2)	
	381			(54.7)	(72.9)	(91.1)	(109.3)	(136.6)	(164.0)
	406.4			(58.9)	(78.1)	(97.1)	(116.0)	(143.9)	(171.3)

Mass (kg/m)

● Pipe (For Water Supply)

6 inch ~ 16 inch , Thickness: 4.5 ~ 8 mm 

Thickness (mm)		4.5	5	6	8
Outside Dimension (mm)	168.3	(18.1)	(20.0)	(23.9)	
	193.7	(21.9)	(24.4)	(29.2)	
	219.1	(24.8)	(27.5)	(33.0)	
	244.5		(30.2)	(36.2)	
	273		(32.8)	(39.3)	
	323.9		(39.1)	(46.7)	
	355.6		(43.0)	(51.4)	(68.1)
	381		(45.5)	(54.7)	(72.9)
	406.4		(49.2)	(58.9)	(78.1)

Mass (kg/m)

Square Tube

125 × 125 ~ 320 × 320 mm , Thickness: 4.5 ~ 18 mm

Outside Dimension (mm)	Thickness (mm)	4.5	5	6	8	10	12	15	18
	125×125	(16.7)	(18.4)	(21.8)	(28.4)	(34.5)	(40.4)		
	140×140	(18.8)	(20.7)	(24.6)	(32.1)	(39.2)	(46.0)		
	160×160	(21.9)	(24.4)	(29.2)	(39.0)	(48.7)	(58.4)		
	180×180	(24.8)	(27.5)	(33.0)	(44.0)	(55.0)	(66.0)		
	200×200		(30.2)	(36.2)	(48.3)	(60.4)	(72.5)	(90.6)	
	220×220		(33.2)	(39.6)	(52.1)	(64.2)	(76.0)	(92.9)	
	250×250			(45.2)	(59.6)	(73.5)	(87.2)	(107.0)	
	280×280			(50.8)	(67.0)	(82.9)	(98.4)	(121.0)	
	300×300			(54.7)	(72.9)	(91.1)	(109.3)	(136.6)	(164.0)
	320×320			(58.3)	(77.0)	(95.4)	(113.4)	(139.7)	(165.3)

Mass (kg/m)

Rectangular Tube

200 × 120 ~ 400 × 200 mm , Thickness: 4.5 ~ 18 mm

Outside Dimension (mm)	Thickness (mm)	4.5	5	6	8	10	12	15	18
	200×120	(21.9)	(24.4)	(29.2)	(39.0)	(48.7)	(58.4)		
	200×150	(24.8)	(27.5)	(33.0)	(44.0)	(55.0)	(66.0)		
	250×150		(30.2)	(36.2)	(48.3)	(60.4)	(72.5)	(90.6)	
	260×180		(33.2)	(39.6)	(52.1)	(64.2)	(76.0)	(92.9)	
	300×100		(30.2)	(36.2)	(48.3)	(60.4)	(72.5)	(90.6)	
	300×200			(45.2)	(59.6)	(73.5)	(87.2)	(107.0)	
	350×250			(54.7)	(72.9)	(91.1)	(109.3)	(136.6)	(164.0)
	400×200			(54.7)	(72.9)	(91.1)	(109.3)	(136.6)	(164.0)

Mass (kg/m)

HSS AGAINST EARTHQUAKE

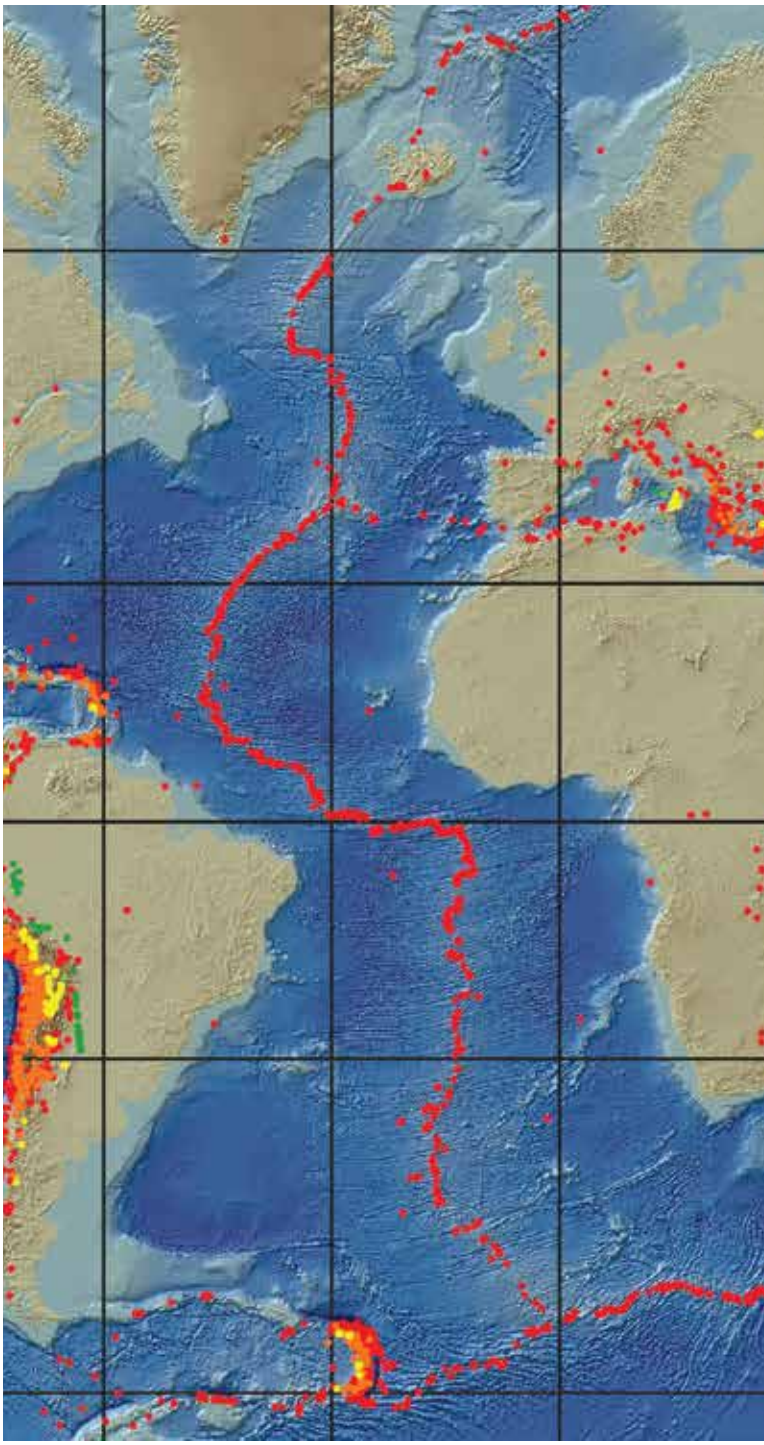
As indicated before one of the most important applications of HSS is in the construction industry. Generally, using steel structure is more beneficial than other structures and construction materials such as concrete, and with no doubt HSS is one of the bests among them. Having two or more axes of symmetry and large radii of gyration, HSS profiles are the most suitable choices as columns or beam-columns of the main load resisting systems of structures.

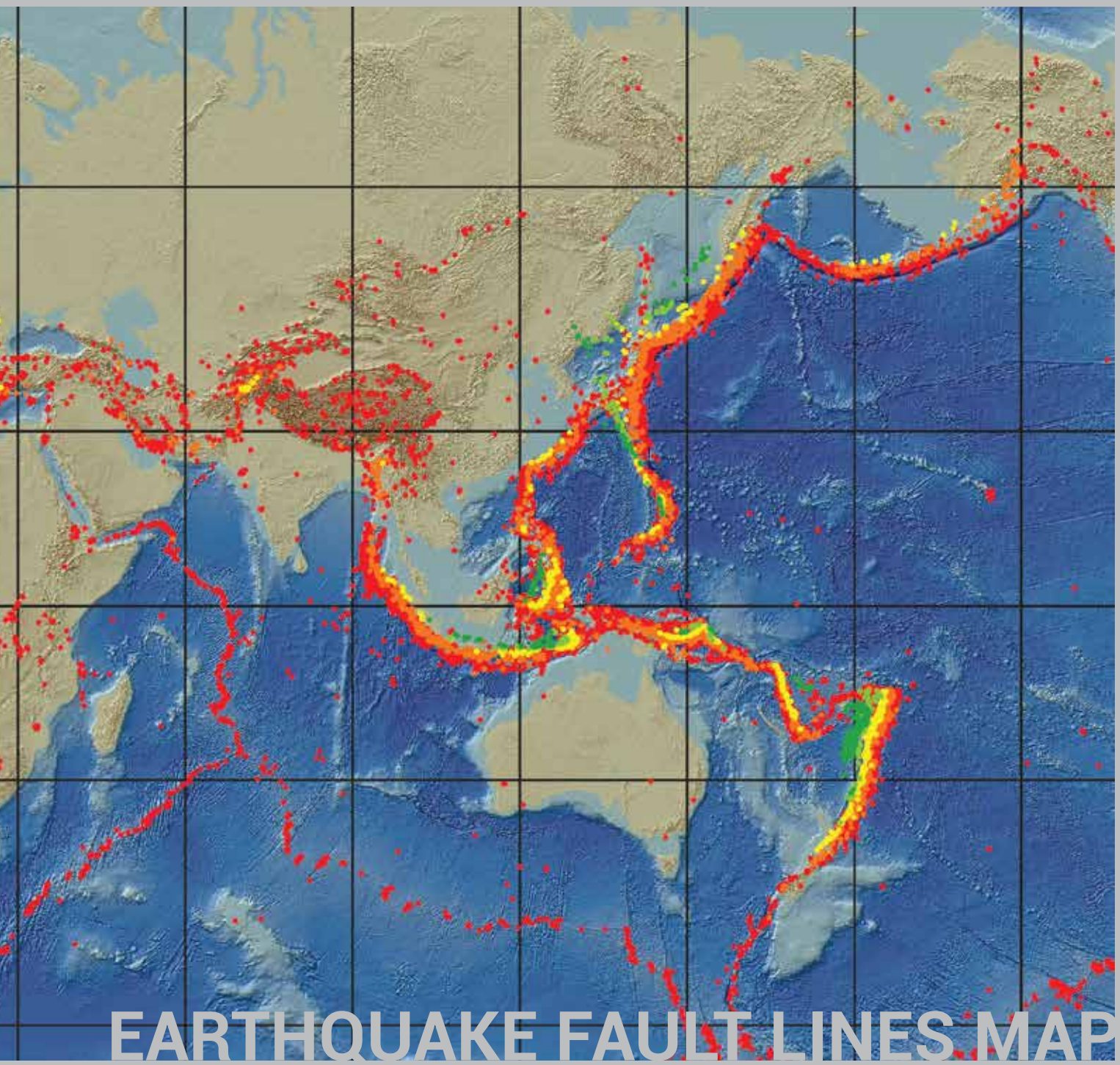
The tubular form of HSS is inherently strong and efficient compared to other steel profiles, since its material is the farthest from the centroidal axes. Furthermore, all section parts are considered “stiffened” according to AISC standards. Hence, HSS has a better strength to weight ratio, even when compared to other structural sections. A lower weight naturally leads to easier construction, reduced earthquake induced loads reduced erection and transportation costs, and more economical design of other structural parts such as foundations. This also makes HSS suitable for extension of existing buildings without overloading their foundations.

According to researches it is proven that concrete structures are the most earthquake prone. This arises from undeniable errors of workforces in built-up sections. Also the workshop errors in making steel structures are not negligible as there is high residual stress in the sections by this method resulting from several cutting and welding processes repeatedly which leads to structure vulnerability during earthquake.

Therefore, it is certainly essential to be more accurate in selecting resistant and reliable materials in many regions such as Iran which are exposed to earthquake hazards. HSS produced by modern industrial method is the safest and the most credible construction material against this natural disaster.

"For further information about structural connections and different explanations in technical and design instructions of HSS, a guidebook compiled by our engineering team is available at ATENA central office."




EARTHQUAKE FAULT LINES MAP