گروه طراحی و تضمین کیفیت سازان

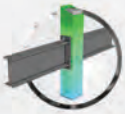
SAZAN Design & Quality Assurance Group

- The structural design of tall and special buildings
- Optimization in structural design
- Quality assurance
- Structural design control

www.SazanCo.com

Fall 2016

Some of Our Carried-out Projects



CFTB Technology

R&D Publication Books & Articles

Sazan Software Based Solutions

Sazan Design & Quality Assurance Group

Sazan design and quality assurance group has attended in many structural projects. in this way, main achievement of these worthwhile experiences is the reality that there is no boundary for structural engineering.

Sazan group has a widespread scope of structural engineering consultants such as structural design, structural redesign with optimization approach, design control, rehabilitation and retrofit of existence buildings and quality assurance.

Small or large plans, low- or high-rise structures and simple or complicated architectural designs all are included in the projects that are provided because the flexible knowledge-based approaches of the group let us to accompany with the client's visions in all situations. Besides, the considered systematic approaches provide the ability to be on schedule and have a good interaction with all participants of the project.

The main mission of Sazan group is to develop optimum structures which means the most economical safe structure, in other word, a standard structure with the least amount of wasted materials. The required platform has been provided to achieve this goal by using professional experts and developing Sazan specialized software. This mission has led to formation of a group consists of earthquake engineers, structural engineers, geotechnical engineers, mechanical engineers, material engineers, construction and project managers, programmers and researchers.

Our group activities are adjusted to the most recent structural engineering science of the world. In this regard, research and development (R&D) section of the Sazan has been organized to keep the group technical knowledge up to date. It should be noted that these findings are published for individual topics occasionally in Iran. We always try to deliver the most possible perfect project in both design and quality assurance field by considering all the details, so coordination between different parts of group is one of our principals by which all construction points are considered in design steps.

Group Members

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Specialized Softwares

Through years of practice and study in the field of structural engineering calculations, Sazan design and quality assurance group have developed self-programmed software code for the modelling, design and optimization.

module	functionality
Sazan Control	Evaluation and control of codes and standard provision
Sazan Steel	Optimization of steel structures
Sazan Concrete	Optimization of Concrete Structures
Sazan Drawing	Structural drawings
Sazan Connection	Designing of steel structure connections
Sazan Linkage	Providing a communication network between engineering programs
Sazan Loading	Automatic loading or user defined loading on structures
Sazan Baseplate	Design of biaxial loaded baseplates based on biaxial-moment interaction surface

Sazan optimization software product, benefited from complex algorithms based on energy method and balancing the energy required by construction elements, provides the best layout for the structural elements, while taking into account the regulative controls in general.

Sazan linkage provides the ability to monitor all the structural design procedures, from modeling to automatic structural mapping.

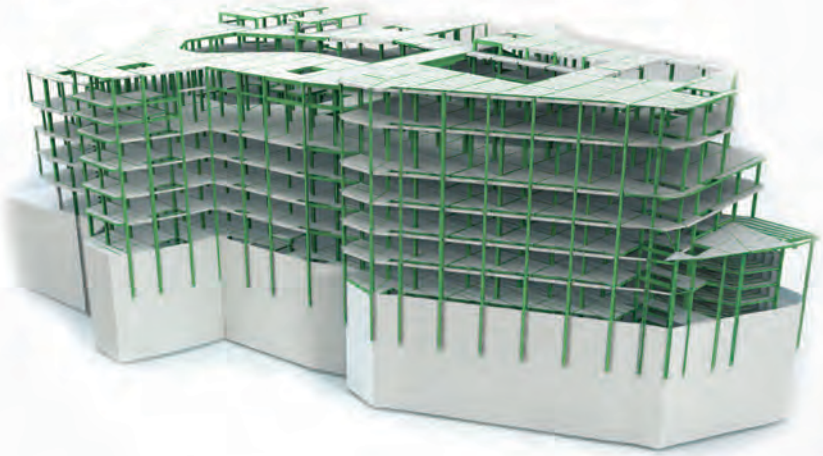
Publications

Permanent attempts of Sazan group have been in knowledge-based activities and it always reflects possible changes in its activities as per the latest findings in the world.

Projects

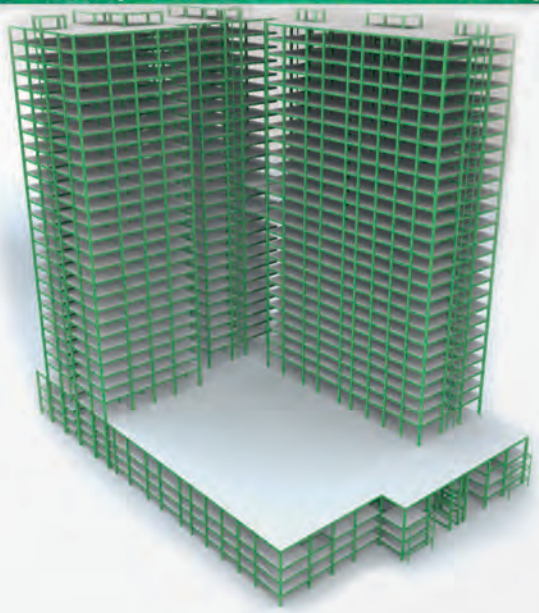
Some of Sazan group projects are introduced in the following:

Farmanie Multifunctional Complex

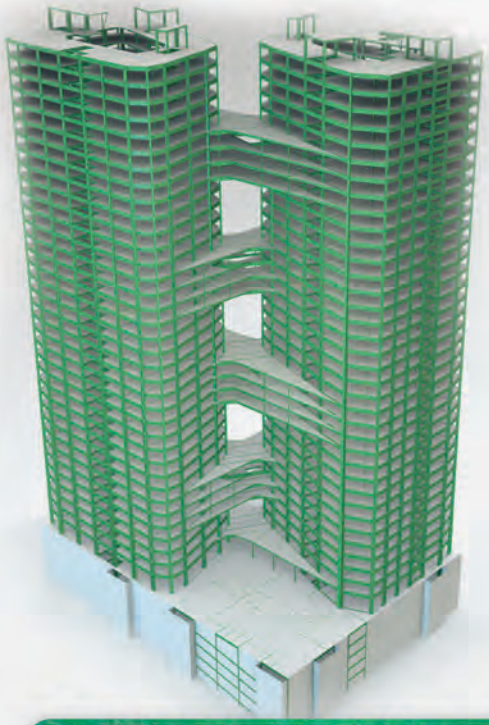


Total Area	170,000 sq.m.
Number of Stories	13 floors (50 m)
Building Type	Commercial, Cultural and Sporty
Type of Structure	Steel
Lateral Resisting System	Intermediate Moment Frame
Scope of Work	Design & Quality Assurance
Location	Tehran, Iran

M.D. Cooperative Residential Complex



Total Area	93,000 sq.m.
Number of Stories	30 floors (107 m)
Building Type	Commercial and Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design
Location	Tehran, Iran

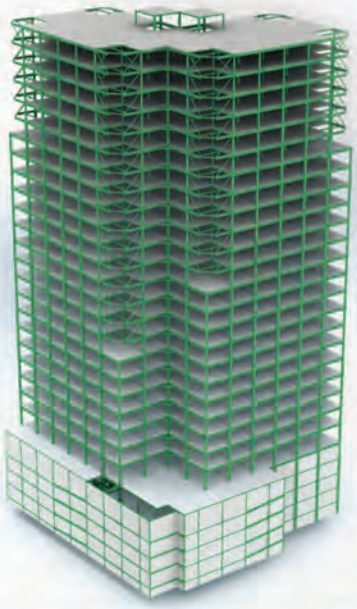


Marjan Residential Complex

Total Area	120,000 sq.m.
Number of Stories	41 floors (147 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Redesign and Optimization
Location	Tehran, Iran

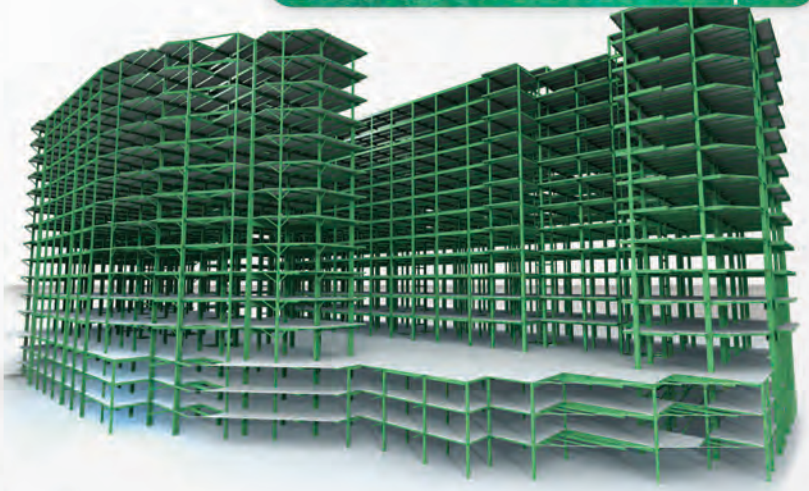
Tehran Construction Engineering Cooperative Company Complex

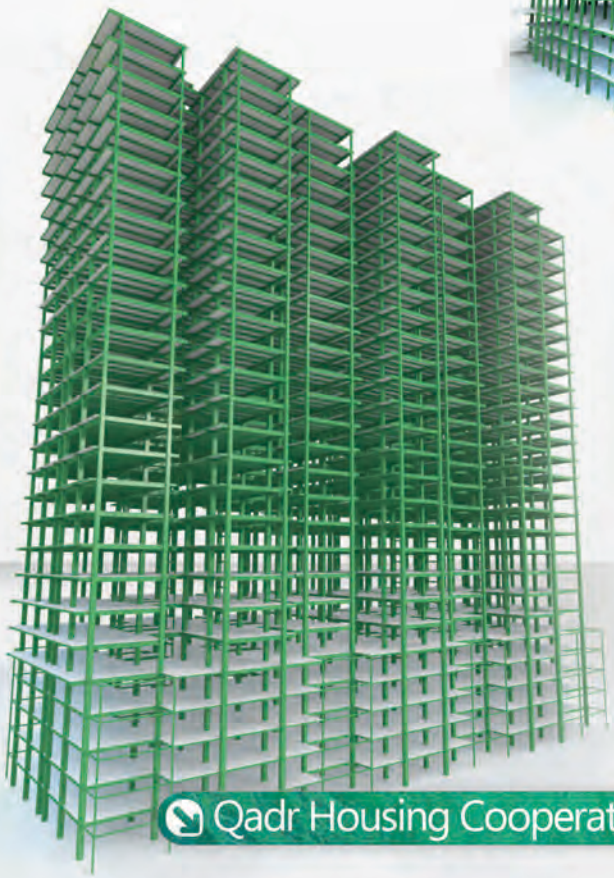
Total Area	36,000 sq.m.
Number of Stories	28 floors (100 m)
Building Type	Commercial and Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design
Location	Tehran, Iran



Shahed Residential Complex

Total Area	80,000 sq.m.
Number of Stories	15 floors (50 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Intermediate Moment Frame
Scope of Work	Optimum Design of Structure
Location	Tehran, Iran

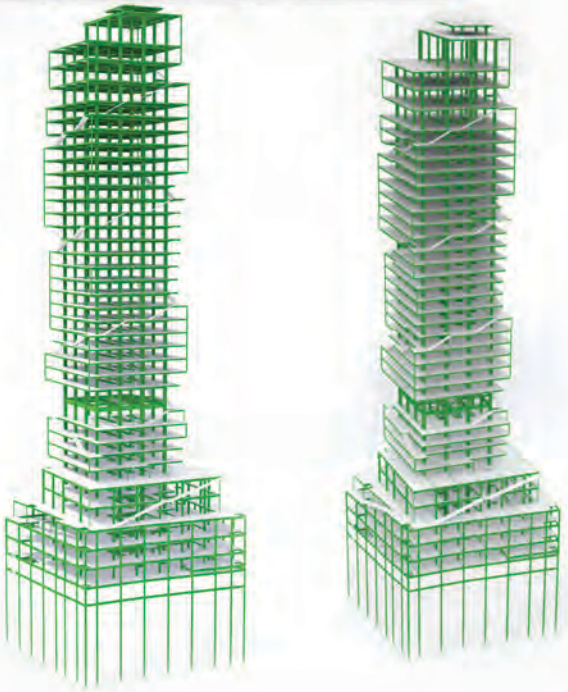




Total Area	65,000 sq.m.
Number of Stories	27 floors (93 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Redesign and Optimization
Location	Tehran, Iran

Qadr Housing Cooperative Complex

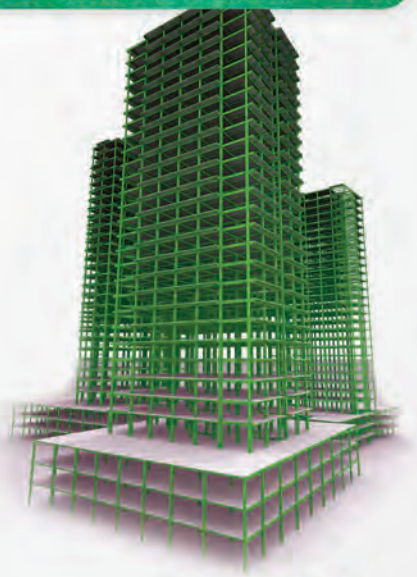
Sepehr-e-Elahiye Complex



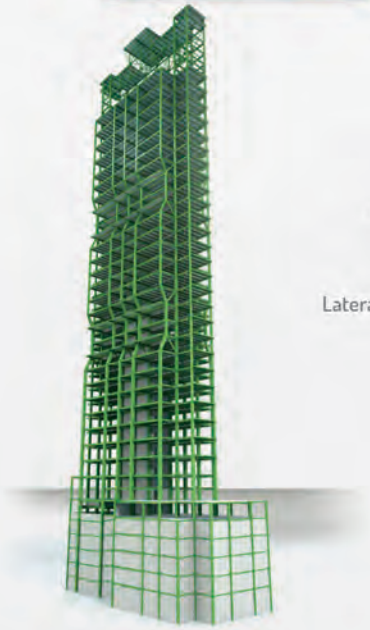
Total Area	74,000 sq.m.
Number of Stories	44 floors (180 m)
Building Type	Commercial and Administrative
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design Control
Location	Tehran, Iran

Towers of Shahid Kharazi Town

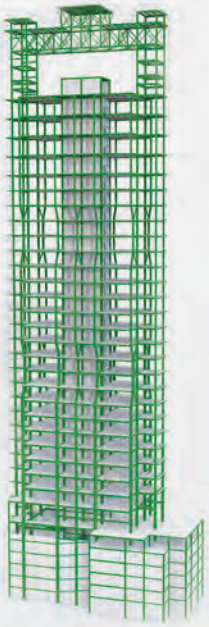
Total Area of each tower	37,000 sq.m. (Total area of the site is over 1 million sq.m.)
Number of Stories	34 and 28 floors (107 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame + Concentrically brace Frame
Scope of Work	Design Control and Quality Assurance
Location	Tehran, Iran



Hafez Tower



Total Area	22,000 sq.m.
Number of Stories	32 floors (140 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame + Special Concrete Shear Wall
Scope of Work	Design Control
Location	Tehran, Iran



Phoenix Tower (Qoqnous Tower)

Total Area	56,000 sq.m.
Number of Stories	18 floors (99 m)
Building Type	Commercial and Hotel
Type of Structure	Concrete
Lateral Resisting System	Special Moment Frame + Shear Wall
Scope of Work	Redesign and optimization
Location	Semnan, Iran

Parvaneh Sharghi Residential Complex

Total Area of each tower	33,000 sq.m.
Number of Stories	15 floors (48 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Moment Frame
Scope of Work	Redesign and Optimization
Location	Tehran, Iran

Tehran Pars Sepehr Complex

Total Area	36,000 sq.m.
Number of Stories	12 floors (50 m)
Building Type	Administrative and Commercial
Type of Structure	Concrete
Lateral Resisting System	Special Moment Frame
Scope of Work	Redesign and Optimization
Location	Tehran

Kamranie Residential Complex

Total Area	12,000 sq.m.
Number of Stories	30 floors (78 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design
Location	Tehran, Iran

Fereshteh Residential Tower

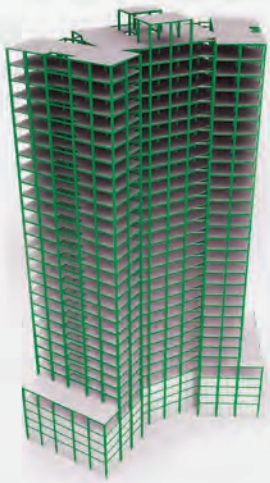
Total Area	46,000 sq.m.
Number of Stories	27 floors (108 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design Control
Location	Tehran, Iran

Noor Complex

Total Area of each tower	22,000 sq.m.
Number of Stories	21 floors (77 m)
Building Type	Commercial and Administrative
Type of Structure	Steel
Lateral Resisting System	Intermediate Moment Frame
Scope of Work	Design
Location	Tehran, Iran

Almas Complex

Total Area	29,000 sq.m.
Number of Stories	15 floors (56 m)
Building Type	Commercial
Type of Structure	Concrete
Lateral Resisting System	Special Moment Frame
Scope of Work	Design Control
Location	Kerman, Iran



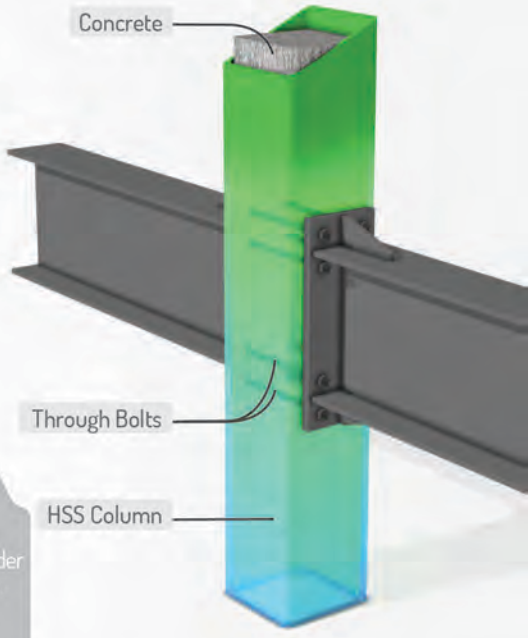
E6 Residential Block

Total Area	46,000 sq.m.
Number of Stories	27 floors (108 m)
Building Type	Residential
Type of Structure	Steel
Lateral Resisting System	Special Moment Frame
Scope of Work	Design Control
Location	Tehran, Iran

CFTB (Concrete Filled Tubes with Through Bolts)

Sazan group is the first Iranian company which has carried out the use of concrete filled HSS (Hollow Structural Section) columns with extended stiffened end plate moment connections in designing and developing steel projects. Bolts in this connection are through bolts. In CFTB, continuity plate has been removed and project time reduced due to the high speed of frames erection in comparison to similar lateral load resisting steel frames.

CFTB structural system consortium is an association consisting of the Sazan design and quality assurance group as designer, the FooladMachine Company as constructor and the Nikan Tech Iranian Company as producer of bolts and nuts, with a focused approach on design, construction and fabrication.

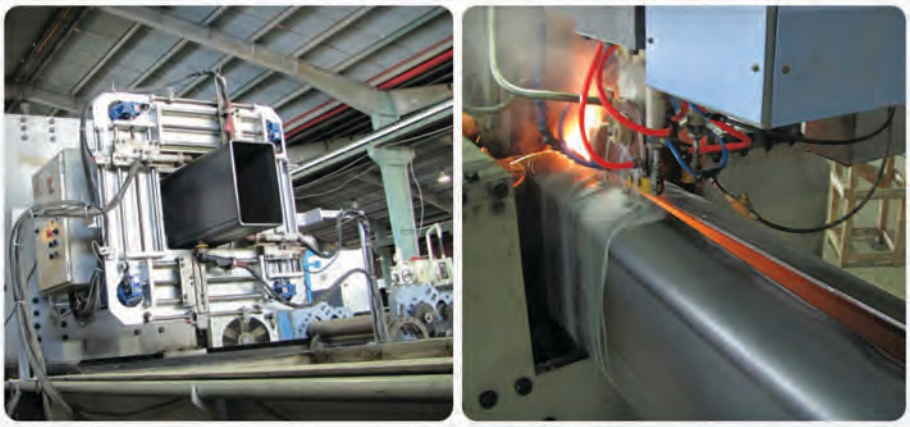


1 Negotiation & Contract
- Receive architectural plan and engineering value of project
- Contraction with **FoladMachine Co.** as the representative of the consortium.

2 Design
- Structural design by **Sazan group**

3 Construction
- Produce HSS columns and I-shape beams in **FooladMachine Co.**
- Through bolts: **Nikan Tech Iranian Co.**

4 Erection
- Construction procedure under **Sazan group** supervision

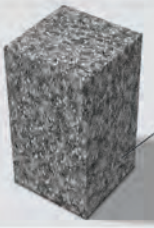


Production line of HSS in FooladMachine Co.

Using of HSS columns with one weld seam

CFTB Comparison

Economical comparison of a sample 7 stories residential building with horizontal structural regularity and 6 m spans (moment frame in both directions)



Concrete structure

Costs: formwork, reinforcement, concrete

CFTB structure is %26 more economical

CFTB structure (54 kg consumed steel per sq.m including beams, columns and bolted connections)

Costs: design, construction and installation in addition to consumed steel and bolts

Steel structure (75 kg consumed steel per sq.m including beams, columns and bolted connections)

Costs: design, construction and installation in addition to consumed steel

CFTB structure is %39 more economical

Comparison

Comparison of CFTB system with steel and concrete structures

Advantages of CFTB system in comparison to concrete structures	Advantages of CFTB system in comparison to steel structures
Project time saving up to 60%	Project time saving up to 30%
Reduction of the column's size up to 50%	Reduction of the column's size up to 25%
Increase in the space of parking up to 10%	Fireproofing of columns
Increase in the concrete specified strength due to confinement	Increase in the structural ductility

It should be noted that this system is being recommended for low-rise structures with horizontal structural regularity.

Comparison of CFTB system with columns dimension of steel and reinforced concrete in a sample structure with 7 stories residential building with horizontal structural regularity and 6 m spans (moment frame in both directions)

CFTB Sample Project

Eynaksazan Complex

Total Area	4,400 sq.m.
Number of Stories	9 floors (29 m)
Building Type	Commercial and Residential
Type of Structure	CFTB
Lateral Resisting System	Intermidiate Moment Frame
Scope of Work	Design
Location	Tehran, Iran

Quality Assurance

Construction quality issues not only concern the building contractors and clients, but they also have the owners and users as beneficiaries. Therefore, some arrangements should be taken into consideration for enhancement of the quality assurance and its appropriateness for the serviceability conditions in accordance with public rights. Traditional methods of assessment, measurement and quality control without any planned structure and preset instructions, could easily put quality and durability of structures at risk.

Quality assurance begins with a knowledge-based planning and quality requirement determination, and ensuring the implementation of them complete the operation of quality assurance. Quality assurance consists of recording the whole information, technical specifications, consumed materials, the necessary measures to both present and future structure and obtaining the related approvals. It also includes awareness of design basis and familiarity with used regulations, standards and acceptance criteria, and in other words providing ID books or structural engineering guide for the structure.

All the forms, tables, and diagrams required for project records and registrations are started by quality assurance department, and once undergone the specified procedures, are completed and recollected and documented in the quality assurance department as technical ID or engineering booklet.

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