



EliteComputed RefineMat Solutions

Steel Industry



AIC HOLDING

Listed on the Tehran Stock Exchange
(Main Board of the First Market)

The logo consists of a teal-colored stylized 'C' shape that is open on the right side. The word 'AICERS' is written in a bold, white, sans-serif font, with the 'C' shape acting as a large letter 'C' for the word.

AICERS

AICERS

Elite Computed Refinery Materials Solutions For **Steel Industry**

AICERS (the AIC Department of Elite Computed Refinery Materials Solutions) stands at the forefront of scientific innovation and applied industrial research.

As a center of research excellence, AICERS integrates advanced computational modeling, materials synthesis, and technical engineering to deliver high-performance catalysts, adsorbents, and process solutions for the steel industry.



AICERS is organized into three main divisions, providing a suite of interrelated services:

Elite Computational Center

- DRI Reforming Kinetic Modeling
- DRI Reforming Reactor Simulation
- ZnO Adsorbent Performance Analysis
- ZnO Adsorbent Lifetime Prediction

Refinery Materials Laboratory

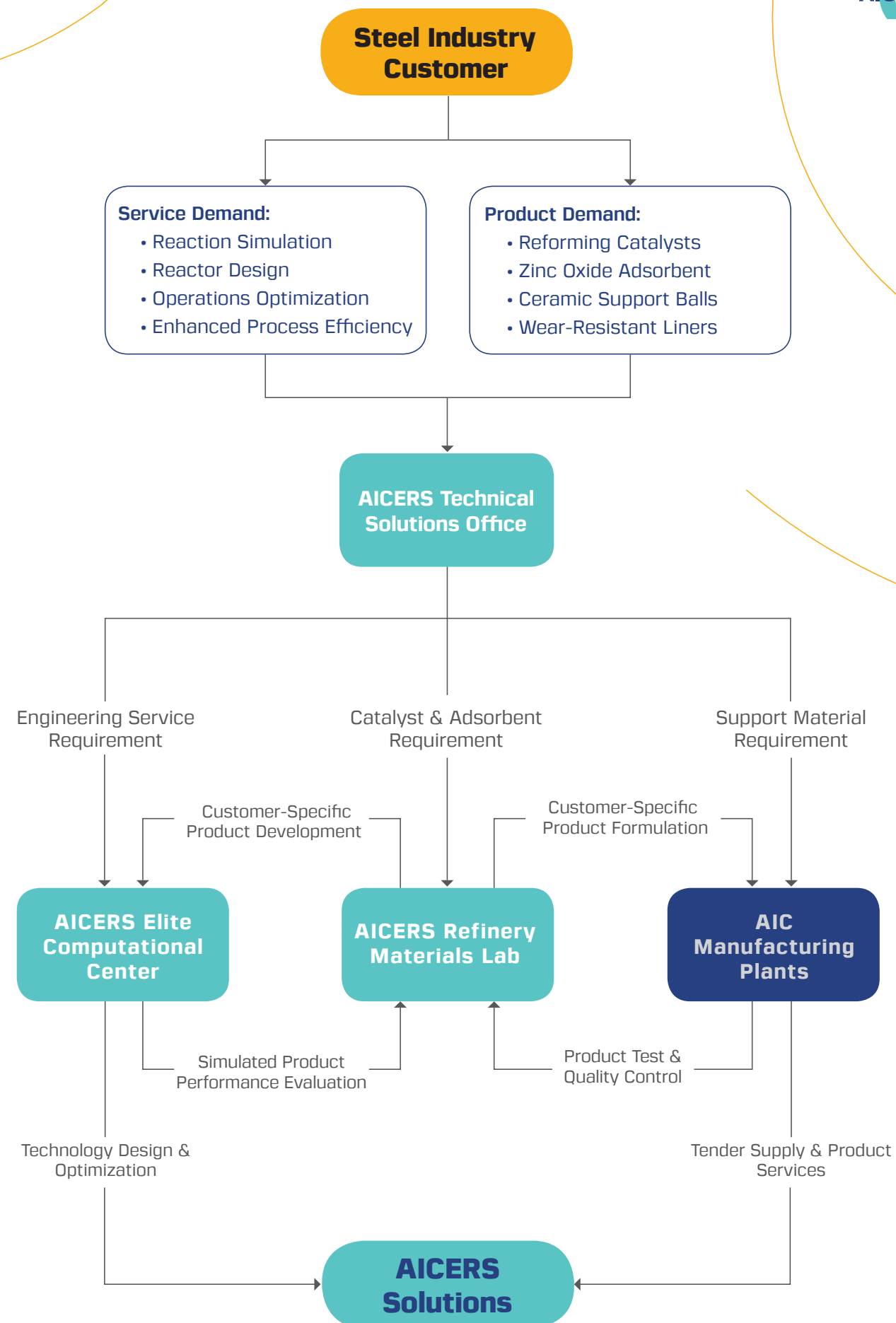
- DRI Semi-Active Catalyst Synthesis
- DRI Active Catalyst Synthesis
- ZnO Adsorbent Synthesis
- Materials Characterization Tests

Technical Solutions Office

- Pre-Sales Service
- After-Sales Service
- Technical Partnership
- Support Materials Supply

Each division of **AICERS** operates in synergy – transforming computational insights into material innovations and delivering them through technical solutions tailored to customer needs.

This integrated framework ensures that **AICERS** remains a trusted partner for optimized performance, reliability, and sustainable industrial advancement. Together, these divisions form a unified pathway from innovation to delivery, ensuring that every **AICERS** solution meets the evolving standards of the steel industry.



DRI Catalysts for MIDREX® Process



The **MIDREX®** process is a leading direct reduction method that converts iron ore pellets into sponge iron using a shaft furnace. In this process, natural gas and recycled top gas are catalytically reformed into hydrogen (H₂) and carbon monoxide (CO) – the key reducing agents for iron oxide – through steam and CO₂ reforming reactions within the reformer tubes.

Operating under severe conditions – including high temperatures, low pressures, low steam-to-carbon ratios, and elevated CO₂ levels – demands a robust and optimized catalyst system.

AIC's DRI catalyst configuration is engineered to meet these challenges through a multi-layered arrangement:

High Active Catalyst

A premium nickel alumina-based catalyst engineered for high-efficiency performance in DRI reformers. This catalyst delivers exceptional reforming activity, minimal pressure drop, and superior resistance to coke formation, ensuring long-term operational reliability.

Key Features:

- Outstanding catalytic activity
- Low pressure drop across tubes
- Long operational lifetime and stability

Semi Active Catalyst

A nickel magnesium oxide (MgO)-supported catalyst optimized for low steam-to-carbon ratio conditions common in DRI plants. Its composition provides enhanced resistance to coking while maintaining stable reforming efficiency under demanding process environments.

Key Features:

- Strong resistance to coke formation
- Optimized performance
- Stable operation

Inert Ceramic Support

High-strength ceramic support materials designed for reformer tube preheating zones. They ensure uniform gas distribution, smooth heat transfer, and protection of active catalysts from hot spots and sintering.

Key Features:

- Robust stability
- Uniform gas flow and preheating

To accommodate variations in MIDREX® plant designs and gas compositions, **AICERS** develops customized catalyst formulations and geometries, delivering enhanced reforming efficiency, longer catalyst life, and improved reliability.

Mixed Reforming Solutions



DRI High Active Catalyst
(AIC-DRI-HA410)

Nominal Content(wt%)	NiO	Min 12
	Carrier	Alumina
Physical Properties	Bulk Density (kg/L)	1.1 ± 0.1
	Crush Strength, Radial (Kgf)	Min 110
Shape	Ribbed rings	9
	Holes	6
Size (mm)	Diameter	33 ± 2
	Height	18 ± 1
	Hole	5 ± 0.5

**DRI Semi Active Catalyst
(AIC-DRI-SA420)**

Nominal Content(wt%)	NiO	Min 6
	Carrier	Alumina
Physical Properties	Bulk Density (kg/L)	1.05 ± 0.1
	Crush Strength, Radial (Kgf)	Min 120
	Ribbed rings	9
Shape	holes	central
	Diameter	30 ± 1
Size (mm)	Height	28 ± 2
	Hole	11 ± 1



**DRI Inert Support
(AIC-DRI-IR430)**

Nominal Content(wt%)	Al ₂ O ₃	Min 95
Physical Properties	Bulk Density (kg/L)	1.4 ± 0.1
	Crush Strength, Radial (Kgf)	Min 250
Shape	-	Raschig ring
Size (mm)	Diameter	32 ± 3.5
	Height	32 ± 2.5
	Hole	17 ± 1.5

Desulfurization Adsorbent



AIC high-performance zinc oxide sulfur adsorbent is engineered for efficient H₂S removal from reformer feed gas, helping to extend catalyst life and optimize overall process performance. Its robust design ensures high adsorption capacity under demanding MIDREX® operating conditions, maintaining cleaner gas streams and protecting downstream catalysts from sulfur-induced deactivation.

The adsorbent provides a **minimum sulfur pickup capacity of 30%** and can be customized to meet specific process requirements, with adjustable surface area, pore structure, and crush strength. Through precise pore engineering and composition control, **AICERS** ensures consistent performance and long operational reliability across diverse reformer configurations and gas compositions.

Key Features:

- High H₂S removal efficiency
- Prolongs catalyst lifetime
- Enhances process reliability and efficiency

AIC sulfur adsorbent complements its DRI catalyst solutions, providing a complete system for maximizing reformer efficiency and operational longevity.

Sulfur Adsorbent (AIC-Z20)

Nominal Content(wt%)	ZnO	Min 90
Physical Properties	Bulk Density (kg/L)	1.2 ± 0.1
	Crush Strength, Radial (Kgf)	Min 70
	Surface Area (m ² /g)	Min 30
Shape	-	Extrudate
Size (mm)	Diameter	4.7

Ceramic Balls for Desulfurizer Beds



AIC ceramic balls serve as a reliable support medium for desulfurization units in DRI plants. Positioned within the ZnO desulfurizer columns, these ceramic balls ensure uniform gas distribution, stable flow dynamics, and mechanical protection for the active sulfur adsorbent layer.

With **over 30 years of manufacturing experience**, **AIC** has developed advanced ceramic formulations optimized for strength, durability, and process compatibility. Unlike conventional alumina-based supports, ceramic balls are primarily made from high-purity silica, offering excellent thermal shock resistance, chemical stability, and superior performance in reducing environments typical of the steel industry.

Key Features:

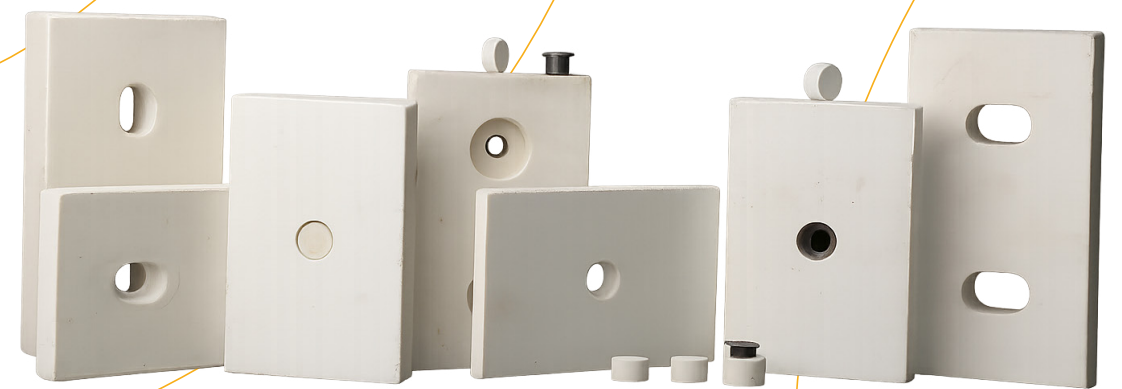
- Excellent thermal shock resistance and strength
- Ultra low water adsorption
- Uniform gas flow

AIC also provides customized sizes to suit various process design considerations, ensuring perfect integration with our catalyst and adsorbent systems.

Ceramic Ball (AIC-ADM220)		
Nominal Content(wt%)	Al ₂ O ₃	25 ± 3
	SiO ₂	69 ± 3
	Leachable Iron Content	Max 0.1
Physical Properties	Bulk Density (kg/L)	1.45
	Crush Strength, Radial (Kgf)	Min 150
	Hardness (mohs)	7
	Water Adsorption (wt%)	0.4



Wear-Resistant Alumina Liners for Material Handling



AIC wear-resistant alumina liners provide durable protection for process equipment exposed to abrasion, erosion, and mechanical impact. These liners are widely applied in ball mills and other high-wear zones within DRI and steel production facilities, where continuous contact with abrasive materials demands exceptional strength and stability.

Manufactured from high-purity alumina with outstanding hardness, and chemical resistance, **AIC** liners ensure long-term reliability under mechanical conditions of material-handling systems. Their precise engineering and installation versatility help extend equipment life, reduce downtime, and maintain steady operational efficiency.

Key Features:

- Superior wear and impact resistance
- Long service life and reduced maintenance needs
- Available in different sizes

With these liners, **AIC** extends its expertise beyond catalysts and adsorbents—delivering complete material solutions that strengthen every stage of the DRI process.

Wear-Resistant Alumina Liners (AIC-LA)

Nominal Content(wt%)	Al ₂ O ₃	Min 92
	Particle Density (kg/L)	3.6
Physical Properties	Hardness (mohs)	9
	Porosity (%)	0
Shape	-	Tile
Color	-	White

Reformer Computational Service

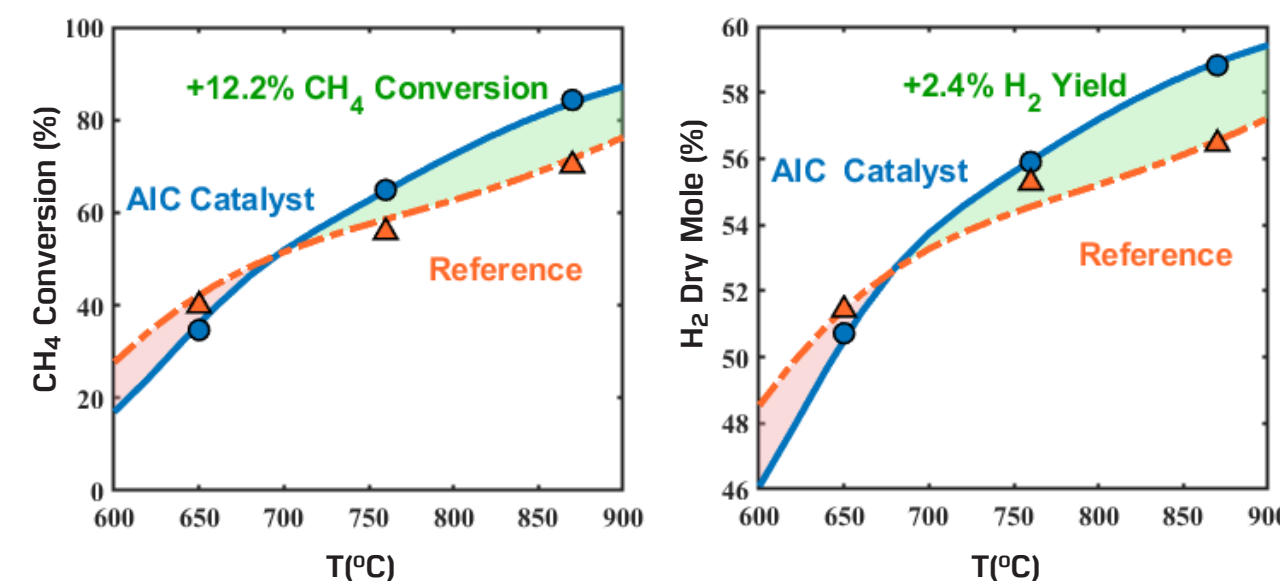
Unlock the full potential of your DRI reformers with **AICERS** Reformer Computational Service. Using advanced kinetic modeling and reactor simulation, we provide data-driven insights into catalyst behavior and reaction engineering, helping you maximize hydrogen yield, methane conversion, and overall process efficiency.

Key Features:

- **Reaction Mechanism Study** – Understand fundamental reaction pathways.
- **Kinetic Modeling** – Compute reaction rates and activation energies.
- **Reactor Simulation Program** – Predict performance under your process conditions.
- **Reformer Optimization Recommendations** Practical guidance to enhance yield and catalyst performance.

AICERS transforms complex kinetics of catalytic reactions into actionable strategies for improved DRI operations, ensuring your catalyst and reformer perform at their best condition.

Pilot tests conducted at the **Research Institute of Petroleum Industry (RIPI)** show that the **AICERS** High Active DRI Catalyst delivers a **2.4% higher hydrogen yield** and a **12.2% improvement in methane conversion** compared to a reference commercial catalyst.



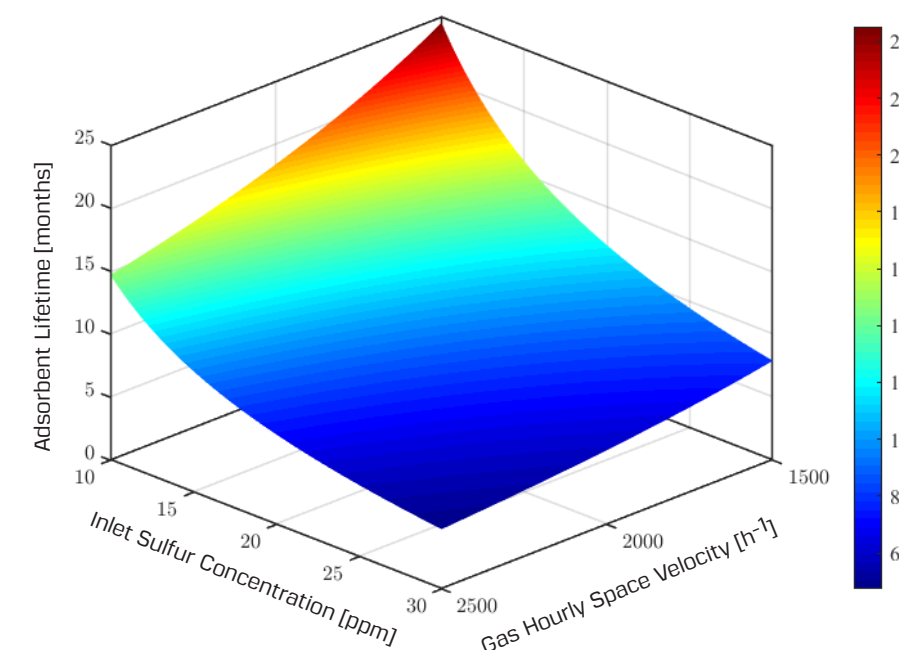
Desulfurizer Computational Service

AICERS Computational Service transforms your desulfurization process through advanced reactor-scale and pellet-scale modeling. Gain actionable insights that extend adsorbent life, maximize H_2S capture, and enhance overall process performance.

Key Features:

- **Adsorption Kinetic Modeling** – Compute sulfur uptake rates and adsorbent capacities tailored to your specific operating conditions.
- **Reactor Simulation Program** – Forecast desulfurizer performance, breakthrough timing, and bed utilization to make informed process decisions.
- **Pressure Drop Predictions** – Ensure stable operation with accurate flow and pressure insights.
- **Desulfurizer Optimization Strategies** – Receive actionable recommendations to extend ZnO lifetime, maximize sulfur removal, and enhance process stability and economy.

AICERS tackles process and operational challenges by delivering innovative, computation-driven solutions for more reliable and efficient desulfurization.



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1. Ardakan Industrial Ceramics Co. (AIC)
2. Aluminum Pars Oxide of Kasra Co. (ALPACO)
3. Diba Ceram Novin Kasra Co.
4. Mineral Engineering Zarrin Powder Novin Kasra Co.
5. EliteComputed RefineMat Solutions Dept. (AICERS)



- ISO 9001
- ISO 10002
- ISO 10004
- ISO 10668
- ISO 14001
- ISO 24178
- ISO 26000
- ISO 29001
- ISO 29990
- ISO 34000
- ISO 38500
- ISO45001
- ISO 50001



- Over 30 years of expertise in industrial ceramics.
- First and largest producer of industrial ceramics in Iran.
- Supplier of advanced catalysts, adsorbents, and ceramic balls.
- Listed on Tehran Stock Exchange (First Board) with Financial Rating: A⁺
- Committed to innovation, quality, and international standards (IMS certified).
- Manufactured Three Grade-1 Knowledge-Based National Products.
- Dedicated customer support team ensuring optimal service and technical guidance.
- ISO certifications, reflecting world-class standards in quality, sustainability, brand integrity, energy efficiency, and corporate governance.



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www.aic.ir



info@aic.ir



+98 21 26372531



Central Office: 8th Floor, Shirin Building, No.21, Aghabozorgi Street,
Shahid Fayyazi(Fereshteh) Street, Tehran 1964833122, IRAN



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