CHRYSO SAINT-GOBAIN

gcp

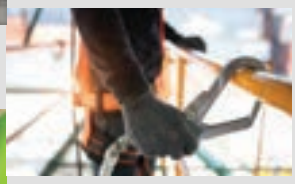
SAINT-GOBAIN CONSTRUCTION CHEMICALS NEWSLETTER

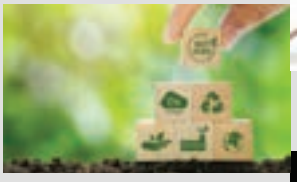
ISSUE: 1 June, 2024

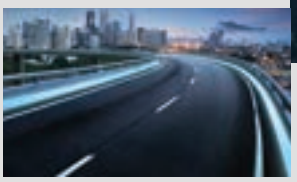
STRONGER TOGETHER

CONSTRUCTION CHEMICALS

SAINT-GOBAIN







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Türkiye is Rising with Our Contributions

NEWSLETTER
ISSUE: 1 June, 2024

CHRYSO-KAT KATKI MALZEMELERİ SAN. VE TİC. A.Ş.
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Osman İLGEN
General Manager

DEAR BUSINESS PARTNERS AND INDUSTRY STAKEHOLDERS,

Greetings and regards from the TCAME (Türkiye, Middle East, Central Asia & Egypt) region.

Since 2017, we have been publishing the "Türkiye CHRYSO Newsletter." With this issue, we are pleased to introduce its new name: "Regional Saint-Gobain Construction Chemicals." I am incredibly happy to share regional topics with our business partners. We continue to grow our network like a snowball every day, and together we are stronger.

As the Saint-Gobain family, with our CHRYSO and GCP brands, we serve the cement, concrete, and construction industries with high-quality, specially designed products and over a hundred years of experience. We significantly contribute to achieving our company's goal of ZERO carbon by 2050. Our extensive production network throughout the region allows us to approach our customers and projects efficiently, minimizing our environmental impact in both raw material and finished product shipments. Currently, we have three new factory investments in our region.

Our region has significant construction potential worldwide and hosts giant projects with a cement production capacity of 350 million tonnes. Thanks to our experienced technical teams, we provide concrete designs and detailed drawings of special construction materials during the project phase. In this magazine, we share some of our project works that serve as references.

Natural resources in the world and our region are rapidly depleting, making it clear that maintaining today's comfort levels will be challenging in the future due to environmental impacts. Recent extraordinary atmospheric events around the world have clearly demonstrated this. While some parts of the world are struggling with drought, many countries simultaneously face fatal flood disasters. The recent technologies and products we have launched are designed to reduce the carbon footprint. Many products are currently in the R&D phase, and we will make them available to our business partners and the industry as soon as possible.

In this newsletter, we provide rich content, including a technical article by the esteemed Prof. Dr. Erbil Öztekin on producing concrete with C35 and above performance, a detailed analysis of TBM tunneling, and the contributions of our Enviromix, Icare, and Quad products toward our Carbon Zero goal. I hope you enjoy reading it and look forward to your feedback.

Having founded in order to produce concrete and cement chemicals, CHRYSO is active in 70 countries with 20 subsidiaries around the world. It has become the leader of the industry internationally

1942: CHRYSOLEUM company was founded, specializing in the production of technical lubricants.

1962: CHRYSOLEUM became CHRYSO SA. The first delayed mould release agent was created.

1964: The first concrete admixture, Stainless, was created.

1969: The Sermaises industrial plant in the south of Paris was established.

1982: Integration with the Lafarge group as part of the Specialty Materials (LMS) branch.

1991: CHRYSO Aditivos was established in Spain.

1994: CHRYSO Aditivos was established in Portugal.

1997: CHRYSO UK, CHRYSO Kat (Türkiye), CHRYSO Chemie (Czech Republic) and CHRYSO SAF (South Africa) were established.

1998: Lanchem became CHRYSO Italy.

1999: CHRYSO Brasil and CHRYSO Mascareignes (Island of Reunion)were established.

2000: CHRYSO Polska (Poland) was established.

2001: CP Services (United States) was taken over and renamed as CHRYSO Inc. Withdrawal from the Lafarge group and establishment of MATERIS.

2005: MATERIS sold its Refractor branch.

2006: CHRYSO Canada and CHRYSO Gulf (United Arab Emirates)were established and SWC (India) was taken over.

2007: ProMix Technologies (Texas, USA) was taken over.

2008: CHRYSO Romania was established and Discolor (France), which ushered in the aesthetic concrete era at CHRYSO, was taken over.

2009: ProMix Technologies (Texas, USA) and Fosroc France were taken over.

2010: A.B.E (South Africa) was taken over.

2012: CHRYSO IRAQ was established.

2013: Belitex was acquired.

2014: Acquisition of Concrete Solutions Technologies (Sri Lanka) and establishment of CHRYSO Hydipco (Algeria).

2015: Establishment of CHRYSO East Africa (Kenya). Acquisition of Corrotech Qatar and changing the name as CHRYSO Gulf LLC (Qatar) as well as acquisition of Betongkemi Nordic AB and changing the name of the company as CHRYSO Nordic AB (Sweden).

2016: Acquisition of Philprime Global Corporation (Philippines).

2017: CHRYSO was incorporated into Cinven Group.

2018: Chemtee Admixtures Limited in Ireland and EUROMODAL in Portugal were acquired in October and BMC DIFFUSION in France was acquired in November.

2019: CHRYSO acquired CEMEXA.

2020: An agreement was made with the Maturix TM solution in January.

2020: By purchasing a majority stake in APTEX in October, CHRYSO has strengthened its presence in Morocco.

2021: In October, Saint-Gobain acquired CHRYSO.

2022: In September, Saint-Gobain acquired GCP Applied Technologies.

Saint-Gobain focuses on its strategy towards sustainable living spaces, operating effectively in various sectors across different structures. The group continues to rapidly expand with numerous production sites in emerging countries. It acquires significant companies in Europe to expand its distribution of building materials.

2000s

New construction materials brands: Meyer in the UK (Jewson and Graham); Raab Karcher in Germany, the Netherlands, and Eastern Europe; Telhanorte in Brazil; Dahl in Sweden; Sanitas Troesch in Switzerland; and Optimera Group in Norway are added to the portfolio.

2005
Saint-Gobain initiates a successful acquisition bid for British Gypsum (plasterboard and plasterboards).

2007
The group's strategy shifts towards sustainable living spaces. Maxit, operating in industrial mortars, is acquired.

2008
Saint-Gobain Initiatives / Entrepreneurship Foundation is established.

2011
Domolab opens in Aubervilliers, France. This futuristic-inspired space aims to reach specialized individuals and leading architects in the field, allowing potential users to experience the comfort created by Saint-Gobain.
Saint-Gobain opened its first Multi-Comfort and energy-efficient building in Beaucouzé, near Angers.

2012
Saint-Gobain acquired GCP the British distribution brand Build Center and the French brand Brossette.

2014
Saint-Gobain sold its packaging division (bottles and jars) to the United States.

2015
Over 170,000 Saint-Gobain employees from 64 countries celebrated the company's 350th anniversary.

LET'S USE CONCRETE ABOVE C 35

Turkey is a developed country in terms of the construction industry. Globally renowned large-scale contracting companies carry out roads, bridges, viaducts, high-rise buildings and multifaceted projects in every corner of the world. In addition, the concrete industry is able to meet the high strength, high durability, appropriate consistency and consistency retention and similar qualities required by reinforced concrete structures under harsh conditions. Cem 1 42.5 class cement is produced in all around the country, and qualified aggregate can increasingly be obtained from quarries operated at an industrial level. Global brands and local companies established in the country can offer all kinds of chemical additives to the market. Mineral additives, especially fly ash and ground blast furnace slag, can be widely used. In high-rise buildings, the use of C40 and C50 strength classes have become the ordinary practise, however C60 and C70 classes are also used. It is not enough for the building lifespan to be 50 years and it is increasingly desired to be a hundred years, while in some cases it is required by people.

The country is surrounded by seas on three sides, and reinforced concrete structures are exposed to the effects of chlorine and similar salts carried by sea water. There is a risk of freezing/thawing effects on concrete due to harsh winter conditions in Central and Eastern Anatolia. Dosages and therefore the cement-binder water/binder ratios of concrete as well as their compressive strength are important.

Under the leadership of academics, the Chamber of Civil Engineers and the Turkish Ready-Mixed Concrete Association are working hard to increase the strength classes (and thus the durability) of concrete used in reinforced concrete structures. Reinforced concrete construction concrete strength class starting from C25 has become a standard and the ready-mixed concrete industry is making intense efforts to popularize the use of C30. But we must aim for better, raise the bar to C35, and better yet, C40. Here are the justified reasons.

1- Environmental Impact Class

In our coastal cities, reinforced concrete structures are exposed to airborne salts from sea water, and their environmental impact class is at least XS1. In the territorial parts of our country, in regions far from the coast where frost is expected (Inner Thrace, Inner Aegean, Inner Black Sea, Central Anatolia, Eastern Anatolia), it is appropriate to pay attention to the XF3 environmental impact class (TS 13515). In order to meet the XF3 class, the minimum dosage is recommended as 320kg/m3, the maximum water/binder ratio is 0.50, and the minimum strength class is C30 and additionally, 4.0% air entrainment is desired.

When XS1 class, Cem 1 cement is used, even a 50-year life can only be met with C45 concrete with a cover thickness of 45 mm, at least 380 doses of binder and a water/binder ratio of maximum 0.35. With plenty of appropriate mineral additive support, C35 concrete with a cover thickness of 30 mm, 0.40 water/binder ratio and a dosage of at least 380 kg/m3 may also be sufficient.

Therefore, the harsh climatic conditions of our country require C35 class even for a 50-year economic life, and if 100 years is desired, C40 is required. Increasing concrete classes is a necessity for long economic life.

2- Processability

Increasing the strength class increases the amount of binder (cement + mineral additive), that is, the amount of very fine material, used in concrete and therefore improves the properties expected from fresh concrete (appropriate consistency and consistency preservation, cohesion, transport without segregation, pumpability, easy processing, compressibility). Concrete work on construction sites becomes easier and success rates increase.

3- Carbon Emission

Increasing the strength class allows the reinforced concrete sections to become

smaller, thus reducing the total amount of concrete used in the structure. Less concrete means less cement and mineral additives, less raw materials, less transportation, and lower carbon emissions. Reducing damage to the environment is the common goal of the whole world for the near future.

4- Earthquake Risk

Increasing the strength class reduces the dead weight of the structure reducing the amount of concrete and limits the potential risks to be caused by possible earthquakes. In our country, where most areas are under an earthquake risk, this issue is one of the indispensable prerequisites for building and life safety.

5- Heat of Hydration

As the strength class increases and the cement dosage increases, the concrete produces more hydration heat and heats itself. Self-heating of the concrete accelerates the development of strength, provides the same benefit as steam curing or setting accelerating chemical additives, and is free of charge. However, mass concrete can produce a lot of heat, and harmful chemical reactions may occur above 70°C. Excessive temperature differences between the outer shell and the interior of the building element can lead to different expansion-contractions and cracks. This process can be kept under control by measuring and monitoring the temperatures inside the concrete and by changing and adapting the cement and mineral additive dosages in the concrete.

6- Cover Thickness

Increasing the strength class allows reducing the thickness of the cover layer (concrete cover layer) that must be applied to protect the reinforcement. For example, the cover, which is 40 mm with C30 for an economic life of 50 years, can be reduced to 30 mm with C40, and from 55 mm to 35 mm for a lifespan of 100 years. These are savings that cannot be neglected in the amount of concrete, and they are important contributions in terms of both carbon emissions and earthquake risk.

7- Building Life

The reinforced concrete structure is long-lasting to the extent that it can protect the steel reinforcement inside from corrosion. The two key elements of protection are low water/binder ratio and high binder dosage. C35 ensures protection better than C30 while C40 protects better than C35, and lasts longer.

8- Progress Speed of the Construction Site

Increasing the strength class increases not only the final strength but also the early strength. Mould release times can be shortened, the construction site can work faster, and days or weeks can be saved from the total construction time.

9- Economy

For the reasons explained above, although the reduction in the total amount of concrete is limited, it provides significant cost savings and is economically beneficial.

10- Aesthetics

Increasing the strength class makes it easier to obtain more homogenous concrete surfaces with fewer voids and defects thanks to the increasing amount of fine material used. It also increases the level of success in concrete works by motivating construction site workers to work more carefully, systematically and regularly. Beautiful surfaces like the ones shown in the photos are obtained more easily with these concretes.

11- Chemical Additives

Chemical additives are wonderful elements that allow us to obtain all the properties of concrete such as its water requirement, consistency, consistency retention, setting time, strength gain speed, impermeability, and freeze-thaw resistance at the desired level. Concrete design and production cannot be considered without them, especially all kinds of plasticizing additives. They are very useful in improving both the technical properties and cost of concrete. Without them, producing concrete above C35 and achieving very fluid, spreading consistencies would not be possible.

As with all raw materials, there is variability between cement, mineral additives and aggregate sources and the properties of the same source depending on time.

It is not easy for a concrete producer to change its raw material source from today to tomorrow due to reasons such as long-term supply contracts, availability and logistics difficulties. However, it has the luxury of adding any additives already available in its plant, such as normal, super or hyper plasticizer, setting retarder or accelerator, to the concrete in any proportion it wishes. This convenience allows it to provide the user with the desired properties of concrete and provides the opportunity to balance the variability of raw material properties. Early strength can be improved by increasing the superplasticizer by 1-2 in thousand. Adding one or two points of normal plasticizer to the hyper plasticizer concrete, can soften it, increase its workability and pumpability, slow down the hardening and strength gaining speed of the hyper-fast cement, or, conversely, accelerate the slow cement. It can balance the increased water need of excessively dusty or finely granulated aggregate. This can also produce fast and flexible solutions to daily problems.

12- Conclusion

In today's conditions, there is no additional difficulty in producing C35-C40 class concretes instead of C25-C30 ones. A slightly higher binder and/or plasticizer additive dosage is sufficient and there is no need for additional equipment or raw materials. We just need to have desire for that. Let's believe in it. It is at our reinforced concrete building designers' hands. Aware of this fact, some local governments, such as Kadıköy Municipality, approve C35 and above projects. I hope it becomes widespread throughout the country.

Mining & Underground Chemicals Sales Manager
Ahmet TALU

TBM Tunneling

TBM (TUNNEL BORING MACHINE) machines are machines that perform tunnel lining along with tunnel excavation and make tunnelling safer, higher quality and faster.

TBMs eliminate many drawbacks and make tunnel construction technically easier with today's technology. Transportation tunnels have been opened by mechanical methods in recent years. In order to carry out an efficient tunnel excavation, choosing the excavation machine suitable for the geological structure is an important factor.

TBMs are chosen after ground evaluations. High quality, fast and economical tunnels can be built with the right choice. In today's technology, TBMs are the machines that can excavate in the hardest grounds, soft grounds subject to deformation, ground conditions containing excessive water, and even under the seabed. These machines are designed with high-end technology to protect worker health. These are machines that can detect possible gas leaks on the floor and protect themselves against the possibility of fire.

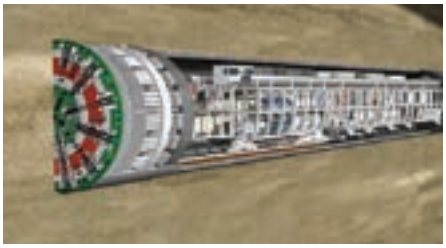
These machines, which are not preferred at first due to their cost; are preferred in most subways, waste-clean water, highways, dams and railway tunnels in residential areas, as it provides fast and high-quality production without harming the environment and residential areas, especially in city centres considering their advantages,.

TBM (Mechanized) Tunneling in Urban Centres

Cities in today's world are integrated with transportation and infrastructure systems and residential and industrial areas. These cities, where millions of people live, are confined to cramped areas due to population. According to studies, it is assumed that the population will increase rapidly in the coming years and even small cities will turn into megacities. This shows us that urban tunnelling will become much more important in transportation over time.

In the report on “Why underground?” published by the International Tunneling Association (ITA) in 2012.; it has been stated that regardless of the type of underground structures built in urban areas, the aim is to leave the land areas empty and improve the quality of life of cities.

When it comes to intercity connections, it has been stated that "long tunnels should be preferred to save time and reduce costs (shorter journeys and less fuel consumption), maximize travel safety and minimize environmental impacts."



Challenges of Tunnel Construction in Urban Centres

Urban tunnelling has some difficulties compared to tunnels built in rural areas. Compared to tunnels built in rural areas, it has some important features and limitations as summarized below.

• The layout and design are related to the end use and functional aspects of the tunnel. For this reason, although tunnel route selection has the freedom of three-dimensional planning underground, it is limited by existing underground structures, building foundations and aboveground structures.

• Tunneling activities in urban areas are generally carried out at shallow depths for reasons such as cost and operation. This leads to an increase in problems such as geological, underground structures and above-ground effects.

• Shallow depth geological formations generally contain loose soils, alluvial deposits or artificial fills. Poor ground quality is one of the key factors for tunnel design and construction control.

• Infrastructure systems (electricity, communication, water, sewage lines) located at the first level of the earth's surface in urban areas may be damaged due to earth settlement caused by tunnelling activities, therefore, before the tunnel is opened, the existing systems must be analysed and strengthened or completely moved.

• There are historical ruins hidden underground in many cities around the world. These ruins must be taken into consideration when planning the tunnel route and the stations or wells to be used for the tunnel.

• Tunneling activities taking place at shallow depths generally cause ground subsidence. The magnitude of this subsidence depends on factors such as ground quality, ground behaviour during tunnel opening, stability control in the tunnel face, and groundwater.

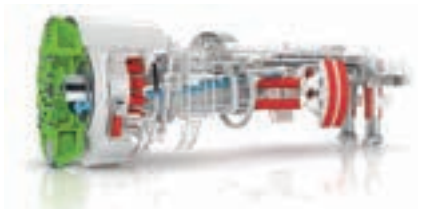
• The damage that may be caused by ground subsidence that may occur during tunnelling to the structures on the ground should be evaluated carefully, taking into account normal and abnormal conditions.

• It is imperative that land subsidence and the risks resulting from it be minimized by taking the necessary precautions.

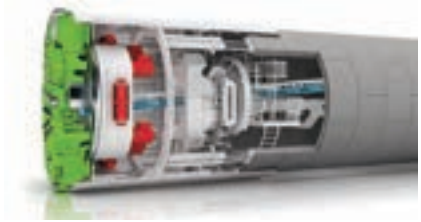
Brief About TBM Types

1.Hard Rock - It is a type of TBM preferred on hard and rocky grounds.

1.1. Unshielded TBMs



1.2. Single Shield TBM



1.3. Double Shield TBM

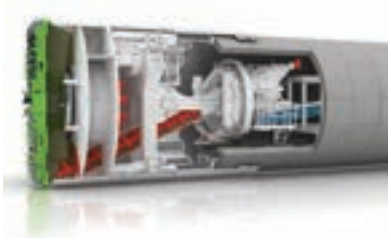
2.Soft Ground TBM (Soft Ground TBM) - It is preferred on soft grounds.

2.1. Slurry TBM

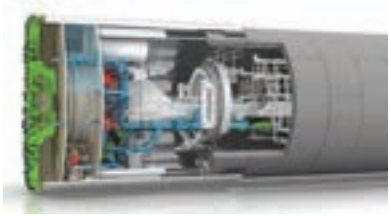
2.2. Earth Pressure Balance (EPB) TBM

It is the widely used TBM type, including in our country. Machines operating on the principle of earth pressure balancing (EPB) first began to be seen in Japan in the 1960s-70s. Loss of stability is inevitable during progress in non-cohesive environments and ground below the groundwater level. This machine is generally used in such areas and in the excavation of rocks that cannot hold their own even for a short time.

The basic working principle can be defined as turning the chuck cavity into a closed volume and keeping it under pressure in order to control water income or land runoff, "allowing a natural pressure to occur in the cutting head and chuck cavity by the effect of the land itself and the water pressure within it." In other words, the aim is for the excavated material to fill the cutter head chamber and support the entire surface. This supporting pressure must be set at a value that meets the natural land pressure on the tunnel. These machines can be manufactured to operate under pressures up to 5 bars. The best working conditions are when the land humidity is 10-15% or less. EPB machines can be designed to be used in different rock and ground formations, from very hard rocks (with disc) to very soft ones (with chisel).



3.Mix Shield TBM



The Importance of Chemicals in TBM (Mechanized) Tunneling

It's not possible to think about TBM tunnelling without chemical additives. As Chryso, a wide range of highly efficient TBM chemicals specially designed to be suitable for use with all TBM types and models throughout tunnel excavation are formulated to meet different geological conditions and customer requirements.

In addition, our professional technical underground structures team is always ready to provide support to ensure the safety and optimum performance of tunnelling machines and personnel and to provide technical consultancy and problem solving services.

In the excavations carried out using TBM, which has been frequently preferred in water/wastewater, road and railway tunnel projects, especially in the metro projects carried out in inner cities recently, various chemicals are needed for the mortars used for ground conditioning, tail shield and main bearing insulation and to prevent surface gaps.

As Chryso, we are constantly improving ourselves in order to be a solution partner in carrying out efficient, low-cost and environmentally friendly excavations in TBM works with our various TBM chemicals product range.

Let's briefly talk about the products we have developed in order to be a solution partner for TBM tunnelling:

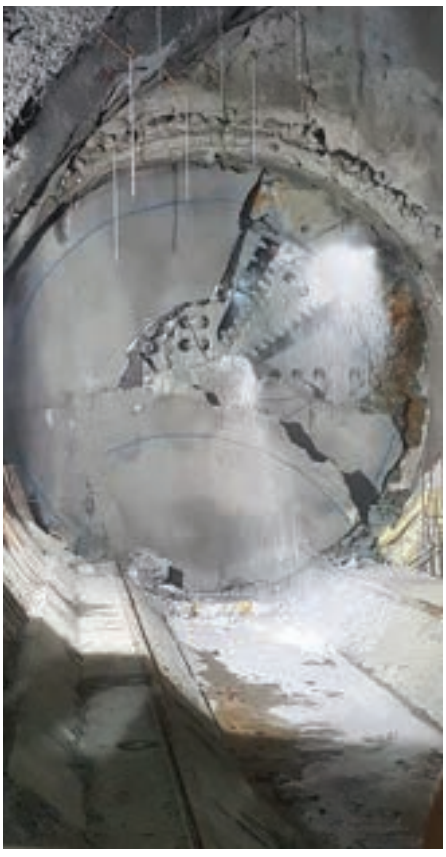
Ground Conditioners - Foams

In tunnels opened with TBM, ground conditioners must be used depending on the type of ground excavated in order to reduce cutter head torque and wear and to ensure faster and more efficient progress.

Ground conditioners enable balanced, safe and efficient excavations in different ground conditions. Our ground conditioner foams are:

• **SCF W Group:** It allows more comfortable progress on standard grounds by balancing the parameters and conditioning the ground.

• **SCF Group:** It is a foaming agent used as a ground conditioner and clay separator for soils containing high concentration clay. With its adhesive structure, it separates the clay material that prevents the cutter head from digging easily and allows for more comfortable excavation.



• **AAF Group:** It allows more efficient and safe excavation on hard rock surfaces by preventing overheating, slowing down the wear of cutting equipment and preventing dust generation.

Greases

Greases, whose main functions are insulation, lubrication and protection, are used in various areas in TMBs. Greases served as CHRYSO TBM GRS series;

• **TBM GRS F Series:** It is the first filling grease used in TBM machines to protect new brush systems for a longer period of time before starting the first excavation.

• **TBM GRS Series:** It is a tail sealing filler material specially produced for TBMs. It ensures protection by preventing the penetration of water, mortar and soil into the space between the shield and concrete segments.

• **TBM GRS M Series:** It is the grease that protects the main bearing, used for oil insulation in TBM machines. It prevents material and dust from entering the main bearing from the excavated elements.

CHRYSO aims to be carbon neutral in 2050

İntegraed Management Systems Manager
HANDE GÜLENÇ MEMİŞOĞLU

Climate change is one of the most important problems of today's world. As CHRYSO, we attach great importance to reducing the effects of climate change and sustainability. While living today, we also consider the future and take into account the environmental impacts of our operations.

We support our customers in achieving their sustainability goals. CHRYSO is the solution partner for developing low-carbon concrete, and CHRYSO additives improve cement performance, reduce energy consumption and production costs, thereby reducing associated CO2 emissions. The Life Cycle analysis of all our product groups is planned to be completed by 2030.

We work in cooperation with our suppliers for sustainability. Our goals for logistics planning, increasing the use of bio-sourced or recycled raw materials, and using 100% recyclable packaging are on our road map.

Solar panels were installed on the roof of our factory to benefit from solar energy, which is a renewable energy source. In this way, we meet 32% of our electrical energy needs from solar energy. Thus, we will prevent 189 tons of carbon emissions in 1 year.

By carrying out process optimization studies in production, we make our energy use more efficient.

We carry out studies both for minimizing our fossil fuel consumption and searching alternative fuels.

We work to prevent waste generation and reduce waste amounts. We segregate waste at source and ensure that it is recycled thanks to our zero waste system. We aim to minimize water consumption by monitoring it. We recycle and reuse industrial wastewater.

We plan events and trainings for our employees to raise awareness about the importance of combating climate change. For this purpose, we played the Climate Puzzle game with all our employees on CHRYSO Environment and Occupational Safety Day.

We track our documents electronically within the scope of digitalization efforts to minimize paper usage.

As a result, we develop materials and solutions that have a significant impact on our common future by emitting the least amount of waste to the environment and using natural resources at the most effective level.

Occupational Health And
Safety Specialist
SARA SEKMEN

WORKING AT HEIGHT

Falling from height may lead to very serious consequences, considering the impact effect caused by the level difference. We see falling from height as one of the most important causes of occupational accidents that result in loss of life, especially in workplaces.

When the table of velocity and distances caused by falling is examined, the distance covered and the speed reached by the falling person in seconds reveal the severe impact that will occur when hitting the ground.

As CHRYSO, we started using horizontal lifelines in our stations as of October 2022, in order to minimize the risk of falling from heights and to make possible falls safe.

With this project, we aim to make all our shipping employees feel safe in our facility, to be able to continue their work in good health, and to eliminate work accidents caused by falling from heights.

Time (s)	Velocity (km/sa)	Distance (m)
0,1	3,52	0,05
0,2	7,06	0,20
0,5	17,68	1,23
1	35,32	4,91
1,5	52,98	11,05
2	70,63	19,62
2,5	88,31	30,66
3	105,95	44,15

HAVING JOINED THEIR FORCES UNDER THE CORPORATE BODY OF SAINT-GOBAIN, CHRYSO-GCP MAKES A DIFFERENCE WITH ITS STRONG INFRASTRUCTURE, QUALITY AND FAST SOLUTIONS

CHRYSO SALES AND MARKETING DIRECTOR
RIZA **ALTINSOY**

Saint-Gobain, which is listed among the top companies in the world; develops, produces and distributes materials and solutions that significantly impact the quality of life and our common future with 180,000 employees in 76 countries. CHRYSO and GCP have joined SAINT-GOBAIN, which was founded in France in 1665 and has a turnover of over 50 billion Euros with 350 years of experience. The company continues its customer-oriented approach of offering innovative solutions to the sector regarding cement and concrete additives in the construction industry with this integration. We talked to CHRYSO Sales and Marketing Director Rıza Altınsoy about the developments in business processes, product ranges and production capacities with this integration, the effective solutions they offer especially for difficult and dirty aggregates, the renewable energy investments they have made in terms of sustainability and the solutions they offer to develop low-carbon concrete and to improve cement performance.

Aggregate, which has the largest proportion among the materials that make up concrete, is increasing its strategic importance in the ready-mixed concrete sector day by day, as a material natural resources of which are being depleted rapidly and clean, high-quality samples that comply with standards of which are rare to find. What would you like to say about ensuring standardization in the production and use of aggregate and solving the problems experienced in the sector? What solutions do you offer for particularly difficult, dirty aggregates?

Rıza Altınsoy (CHRYSO Sales and Marketing Director): When we look not only in aggregate but also in general terms, it has become seriously difficult to find natural sand in Turkiye. Natural sand ensures that concrete can be pumped easily and maintains its workability properties.

If appropriate innovative admixtures are not used in concrete designs where natural sand is not available, serious problems occur. In aggregate, the biggest problem is the material with a high clay content resulting from sand. For this reason, we make a difference with our QUAD Technology, which shows excellent performance in dealing with high clay content sands and brings challenging aggregates to their knees.

The two major earthquakes we experienced on February 6-7, with the epicentre in Kahramanmaraş, gave entire Turkey a deep shock. New housing tenders were carried out after the earthquake. However, the aggregate problem experienced throughout Turkey is also experienced in the projects carried out by TOKİ in the earthquake area.

In some of the projects, aggregate is supplied by establishing on-site mobile crushers in technically suitable areas instead of bringing aggregate directly from a quarry. At this point, it is necessary to bring the performance of the concrete into compliance with the standards. With our QUAD product, we ensure that concrete reaches its designed performance in these challenging aggregates.

Just like the Optima 100 technology, which is preferred in mega projects thanks to its superior performance, we continue our approach that differentiates from the market and produces radical solutions with our QUAD technology.

"*We offered a definitive solution to aggregate-related problems with QUAD*"

But also a global problem. Concrete is a product that we expect to see an increase in its strength in long run. You cannot take that risk with every new product. Therefore, it must be a tested and recognized product and we are aware of this need in the market. Keeping this in mind, we continue our efforts to find solutions for the consumers' problem. In this context, what differentiates us from other companies is that it is a product that receives definitive answers from our business partners in the field in terms of performance.

Each customer may have a different request. This is an area of expertise, and we can produce solutions for all kinds of concrete-related issues. We prevent the increase in costs caused by difficult aggregates.

QUAD is not a single product, but the name of the technology that is composed of a family of products and solutions. We develop tailor-made solutions according to the needs and expectations of our customers under QUAD. We do this first in the laboratory and then in the field together with our customers just like we always do in our business processes. Instead of the traditional methylene blue test, we develop the most appropriate and accurate solution by obtaining detailed information about the clay type with the patented “CLEAR TEST” test method.

The difference of QUAD technology is based on identifying the raw material, analysing the raw material with the Quad application (mobile devices) and ultimately presenting the most appropriate admixture and concrete design.

"*We develop tailor-made solutions by listening to our business partners and understanding their needs.*"

What are the standards, durability and strength properties that concrete must have in order to build concrete that has the ability to perform above the specified standards and to minimize the risk of earthquakes that may arise in concrete? Considering the bitter experiences of our country located on a seismic zone, could you please tell us about the solutions you offer for earthquake-resistant buildings?

Rıza Altınsoy: The earthquake that took place this year wounded us all deeply. We increased our efforts to reach more channels in order to explain ourselves about correct concrete practices. We provide trainings at many universities and non-governmental organizations. We consider the correct management of this entire process as a social responsibility rather than a commercial activity. All elements that make up concrete are important for the performance and durability of concrete.

For example; we analyse the aggregates coming to our laboratory using the ”CLEAR TEST” test method and ensure that this analysis result sheds light on the development of the most accurate and effective product.

Acting with social responsibility awareness rather than c ommercial activities in earthquake zones, we recommend and ensure the use of the right materials at affordable costs.

"*Turkey is the leader cement producing country in the world market.*"

The global cement and concrete products market grew from $364.12 billion in 2022 to $394.02 billion in 2023, at a compound annual growth rate (CAGR) of 8.2%. The cement and concrete products market is expected to reach 527.78 billion dollars in 2027 with a compound annual growth rate of 7.6%. Can we have your market assessment on the global cement and concrete products market?

Rıza Altınsoy: Generally speaking, especially European countries do not want to produce cement due to its environmental effects.

That is why we need to increase the performance in cement even more. Cement produced only from clinker, which we call CEM 1, has begun to be used rarely now. Cement types containing mineral additives began to be used more intensively. With the mineral additive, not only wastes are utilized but also clinker is not produced. Stopping the production of clinker also means less energy is consumed.

When we look at the market, Turkey is among the countries that produce the most cement in the world market. If we make a global assessment, the recession continues in Europe and we think that concrete consumption will decrease. While there is no slowdown in the USA, the current situation continues. India and the Pacific are making rapid progress in this regard. There is a slowdown in China because there is a problem in housing production. Africa, on the other hand, remains stable. In Turkey, there has been an increase this year compared to 2022. The concrete industry is one of the sectors that continues to be both competitive and dynamic. However, there is a high probability that there will be risks in payment discipline in the new period. Considering all of these, we generally think that 2024 will run in parallel to 2023.

"*We have created a structure where we can provide faster service and technical support with GCP*"

The acquisition process of GCP APPLIED TECHNOLOGIES has been completed. GCP has been integrated under the Construction Chemicals Business Unit, part of Saint-Gobain's High Performance Solutions division, and has merged with CHRYSO, a leading global player in the construction chemicals market. Could you please explain the advantages of this merger? What differences will the merger create in your business processes, product range and production capacity?

Rıza Altınsoy: We have just completed our integration. When we look from the product line perspective, we receive GCP products from America and Europe. According to the plan we developed, we decided to keep stock in Turkey and created our orders accordingly. In fact, we will receive these stocks within this month. GCP has a very serious positive perception and awareness about waterproofing in Turkey, especially in proof materials. In that sense, experienced practitioners prefer this product.

With Saint-Gobain's acquisition of GCP in 2023 and our involvement, we have created a structure where all products can be found as a whole and we can provide faster service and technical support.

In this context, we have products that offer very effective solutions to the entire market. We think that we will be much more effective in 2024.

We have a wide product portfolio wherein we act as a solution partner to the needs of our customers in tunnels and mines. Shotcrete products, concrete subadmixtures, fibers, dust inhibitors, backfill grout and TBM products are our important product groups within this scope. In addition, we are expanding our portfolio with waterproofing and injection products, which are our innovative special construction materials with approved effects, which we call SBM (Special Building Materials). For example; Preprufe, de Neef, Stirling Lloyd, Bituthene, Silcor are among our important product groups with proven effectiveness and used in mega projects in Turkey and around the world. As Chryso-GCP, one of the world's leading construction chemicals companies united under the corporate body of Saint Gobain, we will continue to support our customers with our growing team, strong product range and innovative solutions.

CHRYSO, one of the market leaders in cement and concrete additives in the construction industry, also stands out with its sustainability efforts. Could you please tell us about your renewable energy investments in terms of sustainability, the solutions you offer to develop low-carbon concrete and improve cement performance?

Rıza Altınsoy: Regarding this, we directly equipped the roof of our production plant in Gebkim with solar panels and we cover most of the energy we consume from those panels. By carrying out process optimization studies in production, we make our energy use more efficient. We also started to provide faster and more effective service to our business partners in the region through our 4TH plant we established in Aydın. In this way, we will reduce our logistics-related carbon emissions.

Water is our most valuable resource, so it is very important to reduce water consumption in both the concrete and aerated concrete and cement stages. We continue to focus on this issue with the solution suggestions and products we offer.

We reduce the clinker content, energy consumption and also the negative impact of alternative fuels on cement and concrete performance with our innovative solutions.

We achieve high strength levels in cements with our AMA 100 EL activation technology. We enable the production of high-quality cements with low carbon content by using locally available cement materials with maximum efficiency thanks to this powerful technology.

How was 2023 for CHRYSO adopting the motto of "Innovation is Our Chemistry, as one of the pioneers of supply in concrete and cement additives for many years? Could you please tell us about the new projects and investments that you are planning to realize in 2024?

Rıza Altınsoy: We observe that there is growth in the market compared to last year. I can say that we grew more than the market. 2023 has been very good for CHRYSO. There are many parameters, but I think 2024 will run in parallel to 2023.

We will continue to be a pioneer in the industry with our low carbon and sustainability focused innovative solutions, especially ENVIROMIX.

Always Building Better

"Saint-Gobain Türkiye offers architectural solutions to the construction sector from foundation to roof with a sustainability approach. We aim to reduce the environmental impact not only while producing our products forming these systems, but also during the use of the building."

Saint-Gobain, a leading global group of companies in construction materials, high-performance materials, and environmental sustainability, is a French group of companies with many independent subsidiaries operating in various countries. Saint-Gobain Türkiye operates as part of this large international group of companies. Globally recognised for innovation and sustainability, the company aims to contribute to global environmental goals such as contributing to sustainable construction projects and increasing energy efficiency. We carry out studies both for minimizing our fossil fuel consumption and searching alternative fuels.

We work to prevent waste generation and reduce waste amounts. We segregate waste at source and ensure that it is recycled thanks to our zero waste system. We aim to minimize water consumption by monitoring it. We recycle and reuse industrial wastewater.

We plan events and trainings for our employees to raise awareness about the importance of combating climate change. For this purpose, we played the Climate Puzzle game with all our employees on Chryso Environment and Occupational Safety Day.

We track our documents electronically within the scope of digitalization efforts to minimize paper usage.

As a result, we develop materials and solutions that have a significant impact on our common future by emitting the least amount of waste to the environment and using natural resources at the most effective level.

How does Saint Gobain view sustainability? What efforts do you make for this?

As it is known, the construction sector has a critical role in terms of people's need for housing, especially in the face of climate change, the use of natural resources, rapid urbanisation and increasing population. It is vital to act with the future in mind while responding to these needs today. As a world leader in sustainable and lightweight construction solutions, we are aware of our responsibilities. This world giant, which has already been operating for more than 350 years, focuses on sustainable and lightweight construction methods in order to function as a solution to such needs. Considering the activities, we see that sustainability is not a matter of today for Saint-Gobain: a journey that started in 2003 with the publication of the Code of Conduct and Business Conduct, the Group became a signatory of the "UN Global Compact" in the same year and the compliance programme was formalised in 2009. In 2019, it signed the UN Global Compact's commitment to become net zero carbon by 2050. It creates sustainability roadmaps. And it is initiating a powerful transformation in all sectors and countries in which it operates. Challenging targets are set until 2050, with 2030 as the first milestone, covering water consumption, carbon emissions, circular economy, and the materials it produces. Our Group's "Grow and Influence" strategic roadmap is based on two fundamental pillars that will enable us to achieve these goals: one is sustainability and the other is the ability to offer customer-specific performance solutions. Because the aim is always to build better for the welfare of people and the planet. We strive not to harm the Earth while making the planet we live on more habitable for everyone. Even though we endeavour to enlarge the area where we have a positive impact, we know that this is not a path that can be walked alone, these are goals that require collective effort. For this reason, contributing to the sustainability transformation of both the sectors in which we operate and all the countries we impact is one of our primary responsibilities.

"As Saint-Gobain Turkey, We Are Taking Firm Steps To Further Strengthen Our Commitment To Environmentally Friendly Practices. For Example, We Offer Epd And Ec1 Certification To Our Customers For Certain Products. By 2030 We Aim To Complete The Life Cycle Analyses Of All Our Products"

AS Saint-Gobain Türkiye, we are taking firm steps to further strengthen our commitment to environmentally friendly practices. For example, we offer EPD and EC1 certification

to our customers for certain products. Bu 2030 we aim to complete the life cycle analyses of all our products. The statements in these documents reflect our achievements that help us meet important environmental goals. We use recycled content and recyclable materials in our plastic buckets. We started to use special kraft bags in our product packaging. These bags stand out with their moisture-proof properties and innovative design. Moreover, they are 100% recyclable, reducing our impact on the environment. Taking 2017 as a starting point, we have a commitment to reduce our industrial water consumption by 50%, reduce our non-recoverable production waste by 80%, and reduce our carbon emissions from our operations by 33%, no matter how much our production capacity increases. And most importantly, we believe that we can contribute to a more sustainable future for all, and solutions can still be discovered that will allow us to live a better life together without jeopardising future generations. Saint-Gobain's R&D centres, which employ 3,500 researchers globally, are constantly working towards this goal and we are capable of rapidly integrating innovative products developed in these R&D centres into our local markets.

What exactly is lightweight construction, where Saint-Gobain is positioned as a leader?

When we say lightweight construction, we mean construction methods in which lighter and more flexible materials are used and structures have a lower mass. Compared to conventional heavy structures, these structures can provide advantages both during the construction process and during the use of the structure. Compared to traditional building materials, lightweight construction solutions created with energy efficient building materials with better insulation properties are highly efficient in heating, cooling, and lighting. In addition, lightweight construction methods allow the building to be constructed faster than traditional construction techniques. This creates an advantage in total costs by putting the construction into operation earlier. We can say that lightweight construction is a construction management that can respond to the increasing need for accommodation, energy constraint and responsible use of resources that we face due to the population. We observe that this method is more widely used in developed countries. It is obvious that it is increasing rapidly in emerging markets. On the other hand, our country is located in the Alpine-Himalayan earthquake zone. If we examine lightweight construction in terms of earthquake movements of structural elements, the flexible behaviour of these structures helps to distribute the deformation expected to occur in the earthquake throughout the structure and absorb the energy. In addition, as an example, the use of lightweight wall systems can save lives against fatal situations that may occur due to the collapse of heavy walls.

What does Saint Gobain do to promote sustainable construction solutions in Türkiye?

At the beginning of our conversation, I mentioned that this work requires a collective consciousness and work. This was one of our starting points. As Saint-Gobain Türkiye, we first established a Saint-Gobain Architectural Solution Team consisting of architects and engineers in 2023. We came together with Türkiye's leading architects at the events we organised and explained our concept of lightweight construction solutions. Immediately afterwards, this qualified team visited the architectural offices one by one and discussed the projects in the architects' hands. We made special technical drawings and prepared architectural details for many projects. In fact, we have shown that a global company that looks like a material manufacturer can also function as a kind of architectural firm working on the system details created with materials. Our job is not the design of the project, but the selection of the right materials and detail solutions within this design. Subsequently, we organised online events to increase our impact and to address more architects. We talked about sustainable construction methods with very esteemed architects who joined us here. We believe in the power of unity! We know that we can make a meaningful difference in the future by taking collective action today.

"Lightweight Construction Is A Construction Management That Can Respond To The Increasing Need For Shelter, Energy Shortage And Responsible Use Of Resources That We Face Due To Population."

Unleash the Power of Sand.

We Bring Challenging Aggregates to Heel with **CHRYSO®** QUAD Series



CHRYSO is an active player in solving important issues such as sustainable construction, circular economy and protection of natural resources with its **CHRYSO® Quad** series.

CHRYSO® Quad,

- İncreases concrete quality and performance, regardless of material content.
- Aims to minimize its impact on the environment and its carbon footprint.
- Ensures savings by allowing the use of local resources.


Your Solution
Partner for
Difficult Aggregates
Quad
CHRYSO® Quad
Innovative Chemistry for
Sustainable Construction

Modern Pool from CHRYSO **LuminTech®**: A Glittering Touch to Design

CHRYSO, one of the leading brands in the construction industry with its activities in the field of concrete, cement additives and construction chemicals, brings a new breath to aesthetic and energy-efficient pool designs with the LuminTech® technology developed. LuminTech®, which is applied to the concrete surface, stores the energy obtained from the sun during the day and reflects blue, green and turquoise sparkles for more than 10 hours from the moment it gets dark.

Well-designed pools that reflect our lifestyle and tastes also increase comfort and quality of life in living spaces. Sustainable, safe and useful pools are being built with the changing and developing design approaches in today's architectural designs.

CHRYSO, one of the leading brands in the construction industry with its activities in the field of concrete, cement additives and construction chemicals, brings a new breath to architectural design with its new LuminTech® technology offered to the pool industry.

LuminTech®, which was introduced to the market with the "Concretes that Glow in the Dark" motto, beautifies pool edges with its glow in the dark or dimly lit environment and creates a warm atmosphere in the environment.
Having specially designed for concrete, LuminTech® has high performance and durability. It stores the energy obtained from the sun during the day and reflects blue, green and turquoise sparkles for approximately 10 hours from the moment it gets dark.

LuminTech®, which imitates aggregate colors during the day, provides better visibility with the glow it emits at night, increasing safety and giving your pool a modern look.

LuminTech®, which consists of different shiny particles applied to the surface, is applied by adding it to the concrete surface.

A decorative effect on architectural lines

Producing different visual effects in light and dark with its aesthetic features and different color options, LuminTech® technology can be used to highlight a garden path, the edges of a swimming pool or the architectural lines of a dark building. While it imitates natural aggregate during the day, it can also offer daytime color options that differ from the colors seen at night.

Improved visibility and quality of life for users

LuminTech®, which makes it easier for users to find their place in the dark by defining spaces more clearly, can replace bright markings and, in some cases, electric lighting in night or dimly lit areas. LuminTech®, which also attracts attention with its environmentally friendly features, is produced using recycled materials and natural mineral pigments.

Areas of Application

- **Garden and walking paths**
- **Terraces**
- **Swimming pool surroundings**
- **Garden and walking paths**
- **Terraces**
- **Swimming pool surroundings**
- **Sidewalks, bike paths and dark intersections**
- **Surface retarding agent and polish applied concrete**

LuminTech® technology with unique features

Impressive Excellent gloss duration (more than 10 hours)

- Resistance to breakage due to impact, abrasive wear, freeze-thaw cycles
- Easy application and maintenance
- Self-management process: The cycle of energy absorption and emission is done alternately without external intervention.


Reveals the Brightness of
Concrete in the Dark.

During the Turkey Ready Mixed Concrete Association

Beton 2023

During the Turkey Ready Mixed Concrete Association event held from November 8th to 11th, 2023, our General Manager and the President of the Association of Additive Manufacturers, Osman İlgen, participated in the opening speeches and welcomed visitors to the BETON 2023 Fair.

On the first day of the fair, valuable information about innovations and developments in the industry was shared, and opportunities for interaction and collaboration among participants were increased. This event, which is a gathering point for leading figures in the concrete industry, provided an excellent opportunity to discover new business prospects and closely follow the latest trends in the sector.

New Technology Cement Additives

Our presentation on "New Technology Cement Additives" took place during the CUSCIT'23 fair organized by Cementurk from November 22nd to 25th.

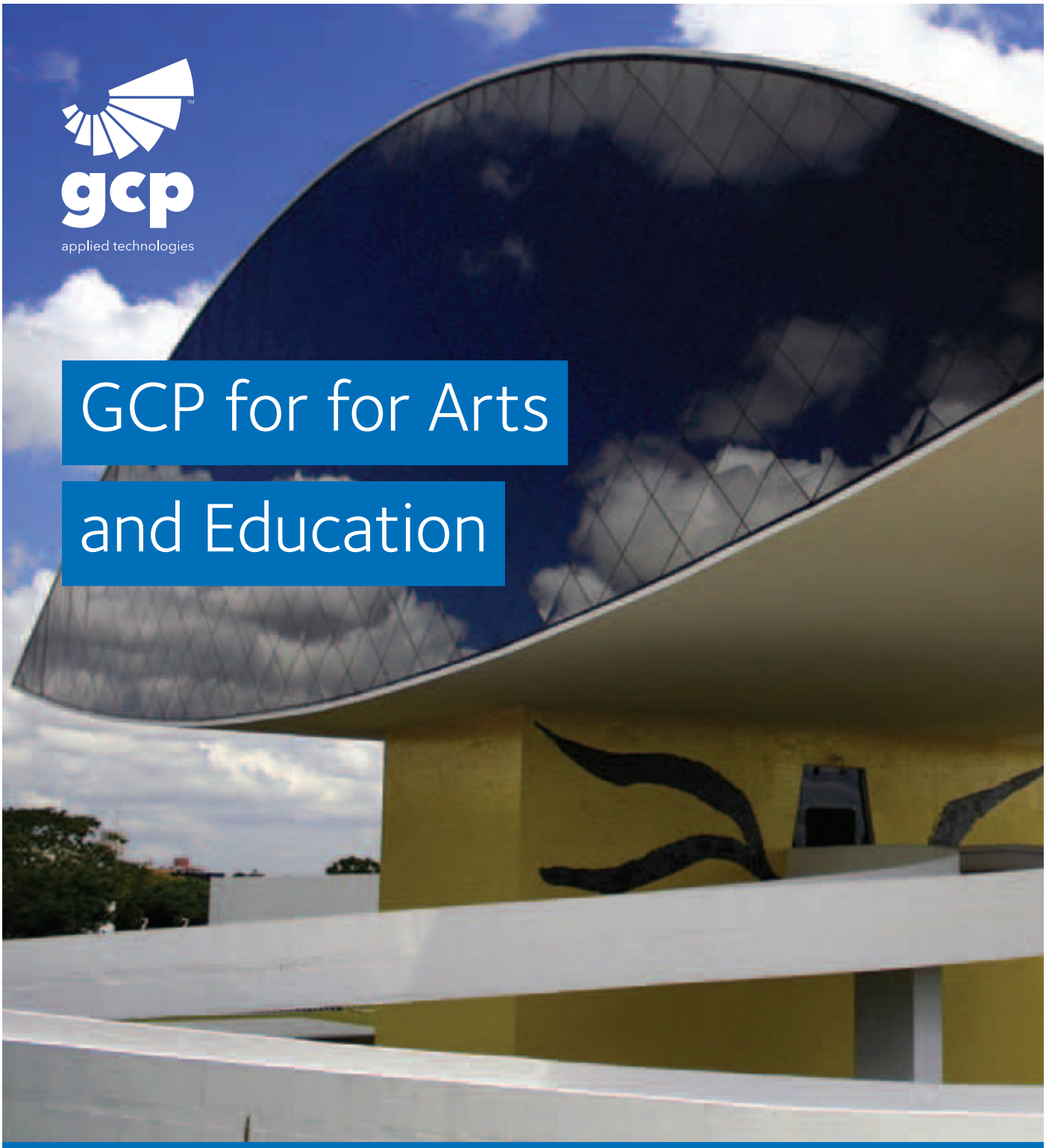
The presentation was conducted by our Director of Cement Chemicals, Ahmet Kuvel. We extend our gratitude to all the valuable participants who attended our presentation, where new initiatives to reduce CO2 emissions were shared. Thank you for your participation.

All representatives and stakeholders of the cement sector gathered at the Cemtech Europe 2023 Conference held at the Istanbul Conrad Hotel from October 8th to 11th.

During the conference, we shared where and how Chryso is positioned in the transition phase to low-carbon cement production with the attendees. We continue to offer solutions with high performance obtained from our new, technological, and sustainable products, Chryso AMA 100EL and Chryso ICARE.

GCP for Airports

International Project Solutions



GCP for for Arts and Education

International Project Solutions

TURKIYE IS RISING WITH OUR CONTRIBUTIONS!

CHRYSO becomes a solution partner for the superior and sustainable concrete performance of projects with the products it develops specifically for its projects such as bridges, highways, subways, airports, tunnels, railways, ports, etc. in many parts of Turkey.

Contributing to the development of our country, CHRYSO provides services with its tailor-made solution policy and wide product range.

Infrastructure Projects

ÇANAKKALE BRIDGE	DLSY
YAVUZ SULTAN SELİM BRIDGE	ICTAŞ-ASTALDİ ORT.
OSMANGAZİ BRIDGE	NUROL-ÖZALTIN-MAKYOL ASTALDİ YÜKSEL-GÖKÇAY ORT.
EURASIA TUNNEL	YAPI MERKEZİ-SKEC ORT.
MARMARAY CR3	OHL (KKC ORT.)
GAYRETTEPE - YENİ HAVALİMANI METROSU	KOLİN-KALYON-CENGİZ ORT.
HALKALI - ISTANBUL AIRPORT METRO	KOLİN-KALYON-CENGİZ ORT.
İZMİR-ANKARA HIGH SPEED TRAIN	ERG İNŞAAT
İZMİR-ANKARA HIGH SPEED TRAIN	KOLİN İNŞAAT
İZMİR-ANKARA HIGH SPEED TRAIN	BAYBURT GRUP
YUSUFELİ DAM CONNECTION ROADS	LİMAK İNŞAAT
RİZE-ARTVİN AIRPORT	ASL İNŞAAT
ZİGANA TUNNELS	CENGİZ İNŞAAT
NORTHERN MARMARA HIGHWAY	KALYON-KOLİN-CENGİZ-LİMAK İNŞAAT
FİLYOS PORT	KOLİN İNŞAAT
SİİRT- ERUH ROAD	MİLA ENERJİ
RİZE İYİDERE PORT AND LOGISTICS HUB	CENGİZ-YAPI&YAPI ORT.
ANKARA-ISTANBUL HIGH SPEED TRAIN	BAYBURT GRUP
ASOS-TROYA TUNNELS	KALYON İNŞAAT
ÜMRANİYE-ATAŞEHİR-GÖZTEPE METRO	GÜLERMAK-NUROL-MAKYOL ORT.
ÜSKÜDAR-ÇEKMEKÖY METRO	DOĞUŞ İNŞAAT
BOSTANCI-DUDULLU METRO	ŞENBAY-KOLİN-KALYON ORT.
SAKARYA AKYAZI VIADUCTS	MAKYOL İNŞAAT
MOUNT KOP TUNNEL	BAYBURT GRUP
KARAMAN ROAD	BAYBURT GRUP
ÇUKUROVA AIRPORT	BAYBURT GRUP - KZV İNŞAAT
VAUK TUNNEL PROJECT	BAYBURT GRUP
SİVAS KANGAL ROAD	TAŞ YAPI
ÇORUM KIRKDİLİM ROAD	TAŞ YAPI
AMASYA TURHAL ROAD	TAŞ YAPI
AŞAĞI KALEKÖY DAM	CENGİZ-ÖZALTIN ORT.
KÖMÜRHAN BRIDGE	DOĞUŞ GÜLSAN ORT.
ANKARA-SİVAS HIGH SPEED TRAIN	DOĞUŞ İNŞAAT
OVİT TUNNEL	CMA ORTAKLIĞI
SABUNCUBELİ TUNNEL	MAKYOL İNŞAAT
SABİHA GÖKÇAN AIRPORT TUNNELS	ÇELİKLER İNŞ.
MECİDİYEKÖY-MAHMUTBEY METRO	GÜLERMAK-KOLİN-KALYON ORT.
CENAL THERMAL POWER PLANT	CENGİZ-ALARKO ORT.
SOMA THERMAL POWER PLANT	KOLİN İNŞAAT
KİĞI-YEDİSU ROAD AND TUNNEL	ÖZALTIN-CENGİZ ORT.
ERZURUM ÇAT ROAD	SEZA İNŞAAT
DİNEK HGHWAY	ZİVER İNŞAAT
HEKİMHAN-KULUNCAK ROAD	ZİVER İNŞAAT
MALATYA-YAZIHAN ROAD	ZİVER İNŞAAT
KASTAMONU-İNEBOLU ROAD	CENGİZ İNŞAAT
KOVANLIK HYDROELECTRIC POWER PLANT PROJECT	ÖZKA İNŞAAT
SARIÇAY DAM	ÖZALTIN İNŞAAT

Superstructure Projects

TOGG PLANT	YAPI MERKEZİ
GALATAPORT	DOĞUŞ-BLG ORT.
ÇAMLICA MOSQUE	GÜR YAPI
BROOKLYN DREAM	KUZU GRUP
SAMSUN 19 MAYIS STADIUM	ALİ ACAR İNŞ.
ATAKÖY WWTP	LİDYA-KALYON ORT.
ACIBADEM BENESTA	BENESTA
PİYALEPAŞA İSTANBUL	İBRAHİM POLAT HOLDİNG
VARYAP MERİDİAN	VARYAP-EMLAK GYO
ESKİŞEHİR CITY HOSPITAL	AKFEN-KOVANCI-DERBENT ORT.
ÇAĞLAYAN PALACE OF JUSTICE	
AKASYA RESIDENCE VE SHOPPING MALL	AKİŞ GYO
QUASAR İSTANBUL	VİATRANS-MEYDANBEY ORT.
SİNPAŞ BOMONTİ QUEEN	SİNPAŞ
SİNPAŞ BOSPHORUS CITY	SİNPAŞ
SİNPAŞ ALTINORAN İNCEK	SİNPAŞ
KUZU EFFECT	KUZU GRUP
ÖZDİLEK CENTER	ÖZDİLEK
TÜRKTELEKOM ARENA	TOKİ-VARYAP-UZUNLAR ORT.
SAZLIDERE BRIDGE	RÖNESANS İNŞAAT
KARAMAN ULUKIŞLA HIGH SPEED RAILWAY	DEMCE İNTEKAR ORTAKLIĞI
ANKARA – SIVAS ROAD	ZİVER İNŞAAT
İÇDAŞ DOCK	İÇDAŞ ENERJİ
SABIHA GÖKÇEN AIRPORT	SET GRUP
TOKAT NIKSAR ROAD	DOĞUŞ YDA ORTAKLIĞI
HALKALI ISPARTAKULE HSR	YAPI&YAPI İNŞAAT
AYANCIK – ÇATALZEYTIN ROAD	YAPI&YAPI İNŞAAT
SERTAVUL TUNNELS	BERGİZ İNŞAAT

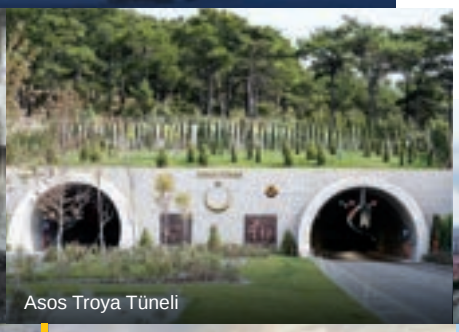
CHRYSO SAINT-GOBAIN

gcp

CHRYSO: UNCHANGING SOLUTION PARTNER OF MEGA PROJECTS

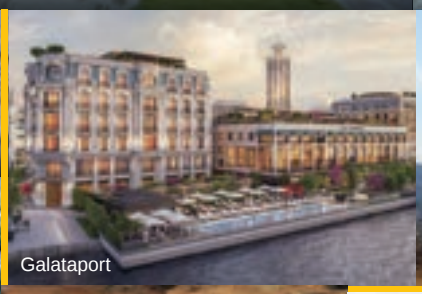

1915 Çanakkale Köprüsü

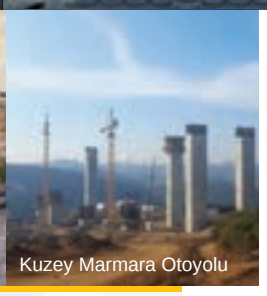

Avrasya Tüp Geçit Projesi

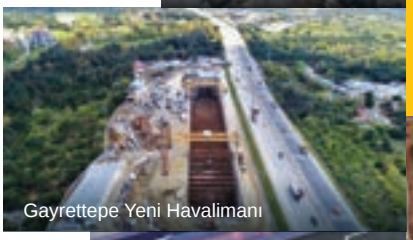

Asos Troya Tüneli


Çamlıca Camii


Filyos Liman Projesi


Galataport


Kuzey Marmara Otoyolu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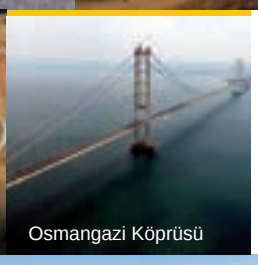
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Rize-Artvin Havalimanı


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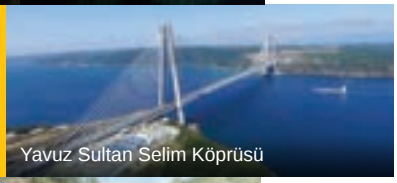
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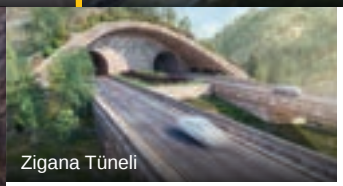
Yusufeli Barajı


Zigana Tüneli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