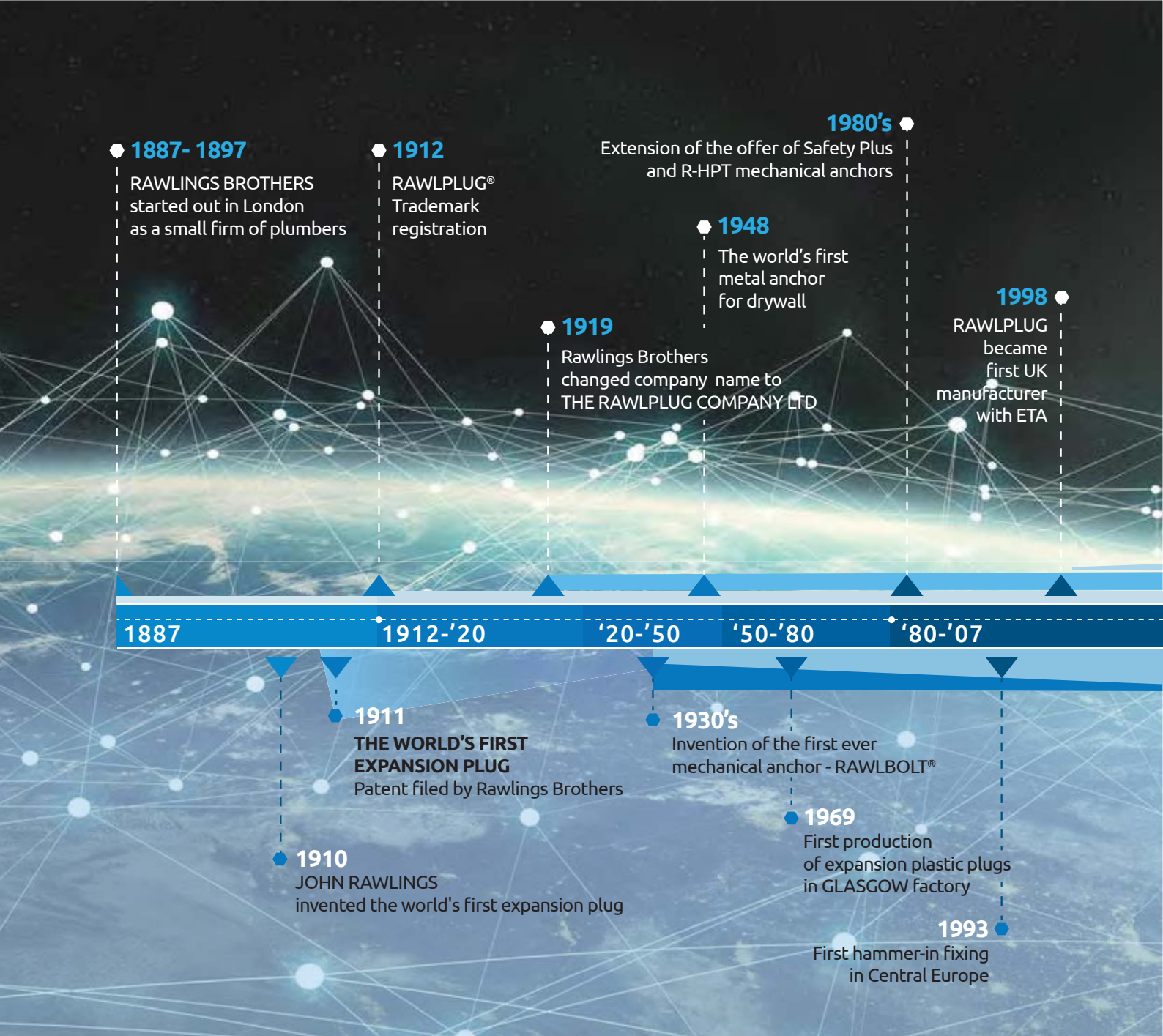




**RAWLPLUG®**

References & Case Studies

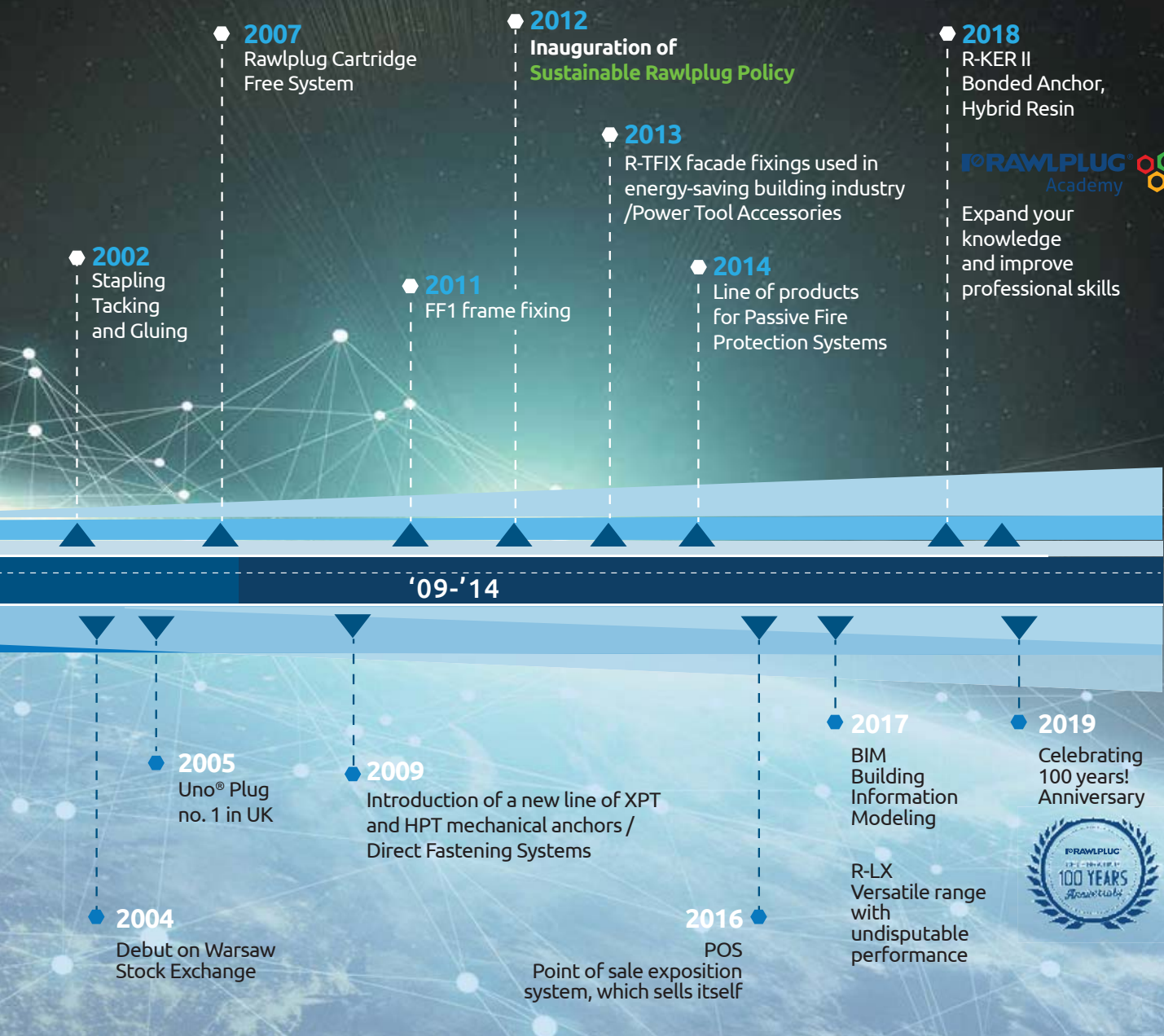
**Trust & Innovation**



Since 1911, when John Rawlings invented and filed an application to patent the world's first wall plug, the history of fixings has been inextricably linked with the RAWLPLUG® brand. Following the tremendous success of this revolutionary product in Europe, the RAWLPLUG company was founded in 1919 and quickly became renowned across the world for its innovative and reliable fixings. Over the years, a small family company became an international organisation whose power is reflected in **13 companies** on four continents, over **1.900 employees** and almost **30.000 lines** making up our diverse range of products. The Group's present-day know-how is a synergy of knowledge and experience based on the best practices of its subsidiaries whose main activity is developing innovative solutions in the field of fixing technologies, including their **design, production and distribution**.

Since it was founded, Rawlplug has placed great emphasis on the **quality and innovation** of its products, developing research centres in Glasgow, Wroclaw and Lancut. R&D teams consisting of experienced engineers, in the quest to find innovative solutions, design products intended for a wide range of substrates and applications. Pioneering Rawlplug solutions, imitated all over the world, have been defining the direction for the entire fixings industry for over 100 years. Nowadays Rawlplug® products are used in construction, automotive, machine and electro-machine, mining, shipyard, road, timber and power industries, including around 30.000 product listings divided into 3 key groups:

**Fixings & Anchors**  
Thermal insulation fixings for facades and roofs, self-drilling screws, lightweight & domestic fixings, frame fixings, medium & heavy-duty anchors, resin-bonded anchors and many others.



**Fasteners**

DIN bolts, nuts & washers, special bolts and many others (including bespoke solutions).

**Tools**

Hand & power tools, power tool accessories (drills, saws, chisels, etc.) and direct fastening systems. Today Rawlplug continues in its fine tradition of innovation through constant research and development of technologies and processes that minimise the company's impact on the natural environment, making sustainable development one of the pillars of its existence.

**Sustainable Rawlplug:**

- employs a strategy of successful management and ethical business practices;
- builds long-lasting relationships based on common respect and trust with customers, suppliers and business partners thanks to an effectively designed and operated supply chain;

- cares for its employees and provides help and support to develop local communities;
- is concerned for the natural environment, focusing on areas involving production processes, employee education and cooperation with experts in the field of waste management.

Thanks to its constant emphasis on innovative solutions and customer care together with keen concern over sustainable development and environmental issues, RAWLPLUG® products continue to be acknowledged around the globe making them a world-class, first choice for the fixings industry.

Sustainable **RAWLPLUG®**

**Dear Customer,**

**Imagine ... you are at the Wembley National Stadium in London ... you are looking for excitement ... you are sitting comfortably ... and you do not even know that you are sitting on one of the 90,000 seats to the ground using 10mm Rawlplug® stainless steel throughbolts.**

Admiring spectacular structures known all over the world, we are delighted with their beauty, splendour and functionality. And we are delighted that we can offer you the highest reliability, durability and aesthetics thanks to the application of Rawlplug® products. There are millions of fasteners and anchors, the appropriate selection of which allows you to admire the beauty, and to ensure the safe use safely use, of the facilities that are visited by thousands of people every day.

**Rawlplug is an unsung hero of many construction projects all over the world.**

We are proud that our products facilitate your work and increase comfort, effectiveness and quality of work, meeting even the most specific and ambitious needs of our Customers. And we want to share this pride with you.

We present you the catalogue of some specifically selected projects in which Rawlplug® products played the key role. Every year, our portfolio is extended with new investments that allow us to carry out **the mission of Rawlplug, i.e. to provide the state-of-the-art reliable solutions.**









**Our products ...**



Bonded Anchors



Mechanical Anchors



Lightweight Fixings



Facade Insulation Fixings



Roofing Insulation Fixings



Passive Fire Protection Systems



Sealants and Adhesives



Screws



Direct Fastening Systems



Power Tool Accessories



Stapling, Tacking & Gluing



POS Essential Offer

# Curiosity rover

Solar System, Mars



By NASA/JPL-Caltech/MSSS. derivate work including grading, distortion correction, minor local adjustment and rendering from tiff-file: Julian Herzog (<http://photojournal.jpl.nasa.gov/PIA15883.jpg>) [public domain], via Wikimedia Commons

## Investment information

**Name:** Curiosity rover

**Location:** Mars, Solar System

**Investor:** NASA

**Contractor:** NASA

**Completion Date:** 2012

### Project:

**Curiosity rover** is a car-sized rover designed to explore Gale Crater on Mars as part of NASA's Mars Science Laboratory mission (MSL). Curiosity was launched from Cape Canaveral on November 26, 2011 aboard the MSL spacecraft and landed on Aeolis Palus in Gale Crater on Mars on August 6, 2012. The Bradbury Landing site was less than 2.4 km from the center of the rover's touchdown target after a 560 million km journey.

The rover's goals include an investigation of the Martian climate and geology; assessment of whether the selected field site inside Gale Crater has ever offered environmental conditions favorable for microbial life, including

investigation of the role of water; and planetary habitability studies in preparation for human exploration. In December 2012, Curiosity's two-year mission was extended indefinitely.

Curiosity's design will serve as the basis for the planned Mars 2020 rover.

As of January 2018, Curiosity has been on Mars for almost 2,000 total days since 2012.





By NASA/JPL-Caltech/MSSS (<http://photojournal.jpl.nasa.gov/catalog/PIA16163>), [public domain], via Wikimedia Commons



By NASA/JPL-Caltech/MSSS (<http://photojournal.jpl.nasa.gov/catalog/PIA15883>), [public domain], via Wikimedia Commons

## Products used

**Rawlplug® DIN 7984 bolts** used for the construction of Curiosity rover.



**Rawlplug® DIN 7984 bolt**

# Wembley Stadium\*

United Kingdom, London



## Investment information

**Name:** Wembley Stadium

**Location:** London, United Kingdom

**Investor:** Multiplex / Stadium Seating Ltd

**Completion Date:** 2007

### Project:

**Wembley Stadium**, London, England, which opened in 2007, on the site of the original Stadium, which was demolished from 2002–2003. The stadium hosts major football matches including the FA Cup Final and home matches of the England national football team. Wembley Stadium is owned by the Football Association through its subsidiary Wembley National Stadium Ltd.

With 90,000 seats, it is the largest football stadium in England, the largest stadium in the UK and the second-largest stadium in Europe. Designed by Populous and Foster and Partners, the stadium was built by Australian firm Multiplex. Each of the 90,000 seats was anchored to the substrate of the stand tribune using

Rawlplug® stainless steel Throughbolts R-SPT-A4 (predecessor of R-HPTII-A4). Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

Each of the 90,000 seats was anchored to the substrate of the stand tribune using **Rawlplug® Throughbolts R-SPT-A4** (predecessor of **R-HPTII-A4**). Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.



**R-HPTII-A4 Stainless Steel Throughbolt**

# Emirates Stadium\*

United Kingdom, Holloway London



By ctwino - Template:Voyage dans le stade puis recuperation infos, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=7623086>

## Investment information

**Name:** Emirates Stadium

**Location:** Holloway London, United Kingdom

**Investor:** Arsenal Holdings plc

**Contractor:** Sir Robert McAlpine

**Completion Date:** 2006

### Project:

**The Emirates Stadium** (known as Ashburton Grove prior to sponsorship, and as Arsenal Stadium for UEFA competitions) is a football stadium in Holloway, London, England and the home of Arsenal Football Club. With a capacity of over 60,000, it is the third-largest football stadium in England after Wembley and Old Trafford.

In 1997, Arsenal explored the possibility of relocating to a new stadium. Emirates Airlines was later announced as the main sponsor for the stadium. Actual construction of the stadium began in February 2004. The first seat in the new stadium was ceremonially installed on 13 March 2006 by Arsenal midfielder Abou

Diaby. Each of 60,000 seats was anchored to the substrate of the stand using Rawlplug® R-DCL M10 Lipped Wedge Anchors.

The Emirates Stadium was officially opened by Prince Philip, Duke of Edinburgh on 26 October 2006.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



### Products used

Each of the 60,000 seats was anchored to the substrate of the stand using **Rawlplug® R-DCL M10 Lipped Wedge Anchors**.



R-DCL Lipped Wedge Anchor

# Capital Towers London\*

United Kingdom, Stratford, London



## Investment information

**Name:** Capital Towers London

**Location:** Stratford, London, United Kingdom

**Investor:** Galliard Homes

**Contractor:** Salisbury Glass

**Completion Date:** 2017

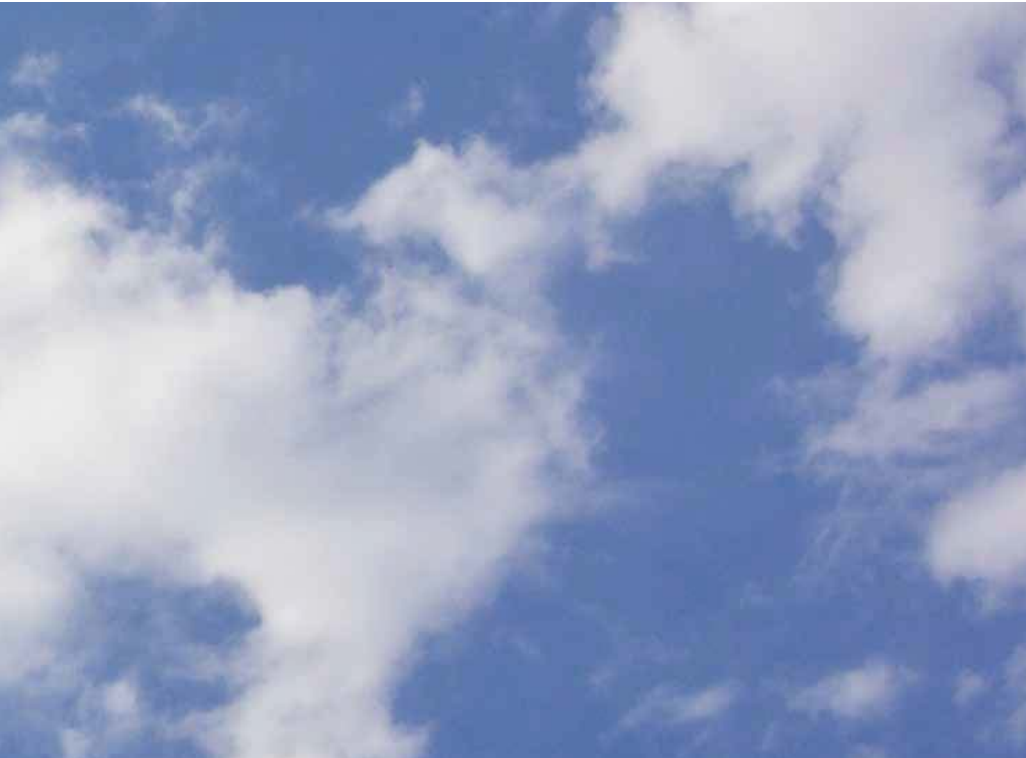
### Project:

**Capital Towers** presents a new and exhilarating residential development overlooking the UK's largest regeneration programme, the Queen Elizabeth Olympic Park. In recent years Stratford has undergone huge regeneration to prepare for London's 2012 Olympic Games. Since the Games, regeneration has continued, transforming the area into one of the best connected and increasingly desirable places to live in London

Capital Towers comprises the 14-level City West Tower and 34-level Sky View Tower, together making up a landmark collection of 191 all private luxury residences each featuring winter gardens. With one, two and three bed duplex apartments available, the majority

of the properties will enjoy superb dual aspect views across Canary Wharf and the City. Each apartment at Capital Towers has been designed and specified to provide stylish living space with every emphasis on natural light and beautifully proportioned rooms that exude the highest levels of quality and style.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

A total of 6,500 **Rawplug® Zinc Flake Throughbolts R-HPTII-ZF M12x120** were installed during the Capital Towers project to secure curtain walling.



**R-HPTII-ZF Zinc Flake Throughbolt**

# Jubilee Line Extension, London Underground\*

United Kingdom, London



## Investment information

**Name:** Jubilee Line Extension, London Underground

**Location:** London, United Kingdom

**Completion Date:** 1999

### Project:

**The Jubilee Line Extension** is the extension of the London Underground Jubilee line from Green Park to Stratford through south and east London. An eastward extension of the line was first proposed in the 1970s and a modified route was constructed during the 1990s. It opened in stages from May to December 1999.

The design of the extension is radically different from anything else on the London Underground. Stations are characterised by cavernous, stark interiors lined with polished metal panels and moulded concrete walls and columns. Some of the stations are truly enormous; Canary Wharf has been compared to a cathedral, with it being said that the neighbouring One Canada Square, if laid on its side, could fit in the station with room to spare. Westminster has a dramatic vertical void nearly 40 m (130 ft) deep.

The size of the stations was a response to safety concerns—overcrowding and a lack of exits had been significant factors in the 1987 King’s Cross disaster—and an attempt to „future-proof” stations by designing from the start for a high use. One consequence is that most platforms and halls are full only in a busy rush hour.

A number of leading architects were employed to design the stations, with the lead being given by Roland Paoletti. It was decided from the outset that although each station would be designed as an individual entity, they would be linked by a common design philosophy and functional elements. Spaciousness was the most noticeable, along with the shared theme of grey and silver polished metal and concrete interiors. More subtly, many stations were designed to admit as much natural light as possible.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.





## Products used

In the The Jubilee Line Extension project was anchored with more than 750,000 Rawlplug® anchors:

- **R-SPL** SafetyPlus - Loose Bolt M12 with zinc coating were used for supporting temporary walkways during construction and temporary fixings for cable support, slurry pipes and fire systems.
- **R-SPL** SafetyPlus - Loose Bolt M12 with special sherardized coating were used to fix all permanent cable brackets, fire systems, lighting and everything attached to the concrete segments.
- **R-RLK** Stainless steel Rawloks were used for fixing mechanical and electrical services in plant rooms
- **R-CAS-V** Spin-In Capsule® with Threaded Rods were used for cladding / curtain walling on all stations
- **Rawlnut** M12 for temporary fixings – to support air supply ductwork hanging from tunnel roof
- **R-RBL-E** Rawlbolt® - Eye Bolts were used for fixing Leaky feeder cable.



**R-SPL SafetyPlus®**  
- Loose Bolt



**R-CAS-V Spin-In Capsule®**  
with Threaded Rods



**RAWLNUT Flexi Plug**  
with Screw



**R-RBL-E Rawlbolt®** - Eye Bolt



**R-RLK Stainless steel Rawloks**

# Parc Olympique Lyonnais\*

France, Décines - Charpieu/ Lyon



## Investment information

**Name:** Parc Olympique Lyonnais

**Location:** Décines-Charpieu/ Lyon, France

**Investor:** OL Groupe

**Contractor:** Vinci SA

**Completion Date:** 2016

### Project:

**The Parc Olympique Lyonnais**, nicknamed the Grand Stade and the Stade des Lumières, is a 59,186 seat stadium which is home to French football club Olympique Lyonnais in Decines near Lyon. It replaced their previous stadium, Stade de Gerland, in January 2016. It is a scheduled venue for the 2019 FIFA Women's World Cup.

On 1 September 2008, Olympique Lyonnais president Jean-Michel Aulas announced plans to create a new 60,000 seat stadium, tentatively called OL Land, to be built on 50 hectares of land located in Decines-Charpieu, a suburb of Lyon. The stadium would also include state-of-the-art sporting facilities,

two hotels, a leisure centre, and commercial and business offices.

On 13 October 2008, the project was agreed upon by the French government. The project proceeded, with an estimate that the stadium would be completed by 2015, allowing at least part of a season for breaking in before the 2016 Euro games.

On September 2009, French newspaper reported that OL Land had been selected by the French Football Federation as one of the twelve stadiums to be used in the country's bidding for UEFA Euro 2016. The FFF officially made their selections on November 2009 and the city of Lyon was selected as a site to host matches during the tournament.

Lyon played their first game in the new stadium on 9 January 2016, winning 4–1 against Troyes in Ligue 1.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

Each of 60,000 seats was anchored to the substrate of the stand using **Rawlplug® Throughbolts R-XPT-10080** (14,000 pcs) and **Rawlplug® R-KER Vinylester Resins with Threaded Rods** or **R-KER Vinylester Resins with Sockets**.



**R-KER Vinylester Resins with Threaded Rods**



**R-XPT Throughbolt**

# Prague Marina

Czech Republik, Prague



## Investment information

**Name:** Prague Marina

**Location:** Prague, Czech Republic

**Investor:** Marina Island s.r.o.

**Completion Date:** 2016

### Project:

**Prague Marina** is a development project for Holešovice Harbor in Prague-Holešovice, residential and commercial office buildings. The first buildings were completed at the turn of 2008 and 2009. In the final phase, the project will include about a thousand apartments, office and retail space, restaurants and cafes and recreational park areas. The complex is being built by Prague Marina, a. S., A member of the Lighthouse Group development group, in cooperation with Czech Ports, Inc. Shareholders of Prague Marina are Deutsche Bank AG, Real Estate Private Equity Group London, GTC International Development Company, Scorpio BSG Ltd. and Alliance Holdings & Developments Ltd.

Marina Island offers three categories of condominiums, ranging from comfortable

apartments on intermediate floors, through Townhouses evoking the feeling of living in a family villa, up to luxurious Penthouses on the top levels.

A remarkable location at the border of two worlds. On one hand, it offers serenity, privacy, a double-sided waterfront, abundant nature. On the other hand, it does not lack the bustle of the city, work opportunities, shops, cafes and other cultural and sports opportunities. And all of this is situated only 8 minutes from the city centre.

On the peninsula is also to be built a sports marina.

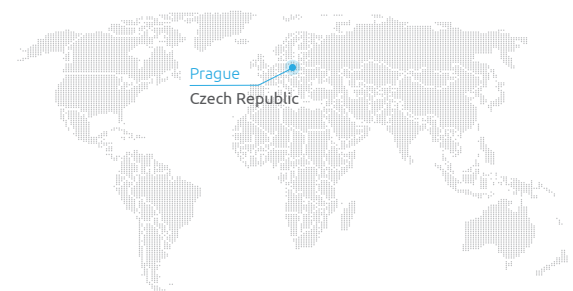
The area is protected from flooding to a level exceeding the 2002 flood. A number of listed buildings of the early 20th century are to be preserved in the port area.



## Products used

Rawplug® products have been used for installation of external thermal insulation system (ETICS):

- **Universal facade fixing TFIX-8ST**
- **Universal facade fixing TFIX-8S.**



**TFIX-8ST**  
Universal facade fixing



**TFIX-8S**  
Universal facade fixing

# The National Forum of Music

Poland, Wrocław



## Investment information

**Name:** The National Forum of Music

**Location:** Wrocław, Poland

**Investor:** Minister of Culture and National Heritage  
/City of Wrocław and Lower Silesian Voivodeship

**Contractor:** PB Inter-System

**Completion Date:** 2015

### Project:

**The National Forum of Music** based in Wrocław, Poland, was originally conceived as a musical performance venue. The investment project was completed in 2015, and the impressive building now houses a large concert hall with 1,800 seats and three smaller chamber halls with the capacity of 250-450 seats. It provides the home to many major ensembles and festivals held in Wrocław. The postmodern building of the National Forum of Music (NFM), commonly known as one of the largest and most technologically advanced music venues in Poland, was designed by APA Kuryłowicz & Associates.

Commenced in 2009 and completed in 2015, the construction works were conducted in a site of 48,500 square metres situated in the Liberty Square at the very heart of the city, close to the historical Wrocław Opera. The building consists of six floors above the ground level as well as three underground storeys.

Presently, the National Forum of Music holds the following national and international festivals and events: the Wroclaw Cantans International Festival of Music, Jazztopad, Musica Polonica Nova, Musica Electronica Nova, Forum Musicum and many others.



[https://pl.wikipedia.org/wiki/Narodowe\\_Forum\\_Muzyki](https://pl.wikipedia.org/wiki/Narodowe_Forum_Muzyki)

## Products used

- **R-DCA** Wedge Anchor for mounting of the acoustic ceiling support structure on all levels
- **R-RBL Rawlbolt** M10/15 for fixing of seats
- **R-HPT-II-ZF Zinc Flake Throughbolt** 08065/15 for installation of rope access railings
- **R-HPT-II-ZF Zinc Flake Throughbolt** -12120/250 for fixing of safety railings
- **R-HPT-II-ZF Zinc Flake Throughbolt** -08065/15 for mounting of the acoustic ceiling support structure on all levels
- **R-KEX II Pure Epoxy Resin** 400 for rebar gluing.



**R-DCA Wedge Anchor**



**R-RBL Rawlbolt®**



**R-HPTIIZF Zinc Flake Throughbolt**



**R-KEX II Pure Epoxy Resin with Post-Installed Rebars**

# The Municipal Stadium

Poland, Wroclaw



## Investment information

**Name:** Wroclaw Stadium

**Location:** Wroclaw, Poland

**Investor:** City of Wroclaw

**Contractor:** Mostostal Warszawa / Max Boegl

**Completion Date:** 2011

### Project:

**The Municipal Stadium** in Wroclaw (Poland) is a fourth category (highest) football stadium built for the 2012 UEFA European Football Championship. The stadium has a capacity of 42,771 spectators, all seated and all covered. It is the third largest stadium in Poland.

Stadium construction began in April 2009 and was completed in September 2011. The winning architectural concept developed by JSK Architekci is called STADIUM-LANTERN. The distinctive shape was chosen to be easily recognisable and associated with a dynamic city. The shape of the stadium is highlighted by the innovative design of its external walls. The building is covered by glass fibre mesh coated with teflon. The mesh is anchored

by steel rings placed around the entire body of the stadium. The covering lends lightness and transparency to the massive structure. The colours of the external walls of the stadium can be changed using a sophisticated lighting system.

The stadium is divided into a number of dedicated zones necessary for the proper functioning of a sports arena. VIP seats are broken down into three sectors: gold, silver, and bronze. Seats for fans with disabilities are located in stands equipped with wheelchair ramps, and disabled fans are able to sit next to their caretakers. There are 102 such seats in the stadium plus another 102 seats for caretakers. There are also 50 places for people who have vision problems. For the hearing impaired, professional collector headphones for listening to match commentary are available. The new stadium is an arena without barriers. Each seat meets FIFA/UEFA requirements and is equipped with power, telephone, internet and TV connections. Some seats have a foldable desktop. Seats for commentators have revolving chairs.





## Products used

Rawlplug® products have been used for:

- installation of all internal barriers - bonded anchors **R-KER Vinylester Resins + R-STUDS** - 66,000 anchor points
- installation of all external barriers - mechanical anchors **R-SPL-C SafetyPlus** - 83,000 anchor points
- installation of tracking systems and seats construction - mechanical anchor **R-DCA Wedge Anchor** - 30 000 anchor points
- installation of conduits systems - mechanical anchor **R-HPT Throughbolt** - 6,000 anchor points
- installation of balustrading - bonded anchor **R-RP30 Polyester Resin + ITS**

All installation was preceded by a series of tests confirming the highest quality of Rawlplug anchors.



**R-KER Vinylester Resins with Threaded Rods**



**R-SPL-C SafetyPlus - Countersunk**



**RP30 Polyester Resin (CFS+)**



**R-HPTII-A4 Stainless Steel Throughbolt**



**R-DCA Wedge Anchor**

# Amazon logistic centres\*

Poland, Sady / Wrocław



## Investment information

**Name:** Amazon

**Location:** Sady and Wrocław, Poland

**Investor:** Amazon.com

**Contractor:** Goodman / Panattoni Europe

**Completion Date:** 2015

### Project:

**Amazon**, an American e-commerce company founded in 1994, based in Seattle, is the world's largest online retailer and mail-order seller. The cornerstones of the company's activity include numerous logistics centers constructed using lightweight steel technology. A distinctive large-area flat roof is covered with heat shield panels designed to reduce heat loss. From the outside the panels are protected by waterproofing membrane that insulates the roof against external elements like wind or rainfall.

In the period of 2014/2015, large-area Amazon logistics centres were built in Poland. All roofs were constructed using Protan roof membrane and Rockwool mineral wool. The roofs of two

facilities in Sady and Wrocław are anchored to the steel sheet substrate by means of special Rawlplug® R-GOK-PLUS anchor sleeves with R-WX self-drilling screws. Each building has a roofing with a total length of 500 m and a width of 200 m, i.e. the area of approximately 100,000 m<sup>2</sup>. In total, more than 600 thousand sets of Rawlplug roof fasteners were installed on Amazon logistic facilities.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

Rawlplug® roofing fixings **R-GOK-PLUS Anchor Sleeves** with **WX self-drilling screws** fixed hydroinsulation membrane to the steel sheet base material. Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.



**R-GOK-PLUS Anchor sleeves**



**R-WX Self-drilling screws**

# City Towers Czyżyny

Poland, Krakow



## Investment information

**Name:** City Towers Czyżyny

**Location:** Krakow, Poland

**Investor:** Atal

**Contractor:** Atal

**Completion Date:** 2016

### Project:

**City Towers Czyżyny**, a project based on state-of-the-art technological solutions and distinctive for its facade colouring effect, has become widely known of its original architecture and interesting space development. The investment seems to have been designed for relax purposes, hence the spacious balconies and green terraces, the eye-catching lawns, scions and shrubs, making the premises all the more attractive. The City Towers of Czyżyny are fenced and equipped with a comprehensive monitoring system that provides the tenants with a sense of comfort and security.

Both inside and outside, the buildings feature parking places as well as other high-end

amenities, such as storage rooms for bicycles and wheelchairs. Nevertheless, what has attracted the residents' utmost attention is the spaciousness and excellent layout of flats and fully-serviced apartments. Each of them has been designed with the tenants' needs in mind, and so they offer them as much space as possible as well as bright and very customisable interiors.

The City Towers Czyżyny estate is a perfect combination of passion for modern architecture and utility value with the perks of an excellent location and innovative aesthetics.



## Products used

- **TFIX-8M Facade insulation Fixings with metal nail**
- **R-KER Vinylester Resin with Threaded Rods R-STUDS** for reinforced concrete constructions.
- **R-XPT Throughbolt** for barrier installation.



**TFIX-8M Facade insulation Fixings with metal nail**



**R-KER Vinylester Resins with Threaded Rods**



**R-XPT Throughbolt**

# S7 Expressway

Poland



## Investment information

**Name:** S7 Expressway

**Location:** Poland

**Investor:** General Directorate for National Roads and Highways (GDDKiA)

**Contractor:** Stalprodukt

**Completion Date:** 20016

### Project:

**National road No. 7**, DK 7 is a route of the Polish national roads network running from Żukowo near Gdańsk, through Warsaw and Kraków to the border with Slovakia at Chyżne. It is part of European route E77. The stretch between Kraków and Zakopane is commonly referred to as Zakopianka.

Since the beginning of 1990s parts of the DK 7 were being rebuilt to expressway standards and now form part of the Expressway S7. The section around Kraków is concurrent with Autostrada A4 motorway.

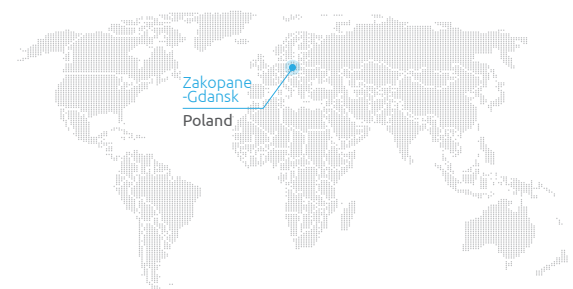
Prior to its modernisation, the DK 7 was the most dangerous road in Poland along with DK 1.

Installation is in progress in multiple locations, including a bridge on the S7 road in Krakow, the longest bridge in this part of Poland.



## Products used

Since the project was launched, over 35,000 bonded anchors have been installed in **R-CAS-V-16 Spin-In Capsule**, in a system with **R-STUDS-16190-88HD Threaded rods**.



**R-CAS-V Spin-In Capsule  
with Threaded Rods**

# Metro Bucharest

Romania, Bucharest



## Investment information

**Name:** Metro Bucharest

**Location:** Bucharest, Romania

**Investor:** Metrorex

**Contractor:** Astaldi

**Completion Date:** 2013

### Project:

**The Bucharest Metro** is an underground rapid transit system that serves the capital of Romania, Bucharest. It first opened for service on 16 November 1979. The network is run by Metrorex. One of two parts of the larger Bucharest public transport network, Metrorex carries approximately 500,000 passengers per weekday, compared to the 2,650,000 daily riders on Bucharest's RATB transit system. In total, the Metrorex system is 69.3 kilometres (43.1 mi) long and has 51 stations.

The Bucharest Metro project involved the extension of Line 5 between Universitate and Pantelimon, the construction of the Pantelimon 2 depot, and the acquisition of 30 new

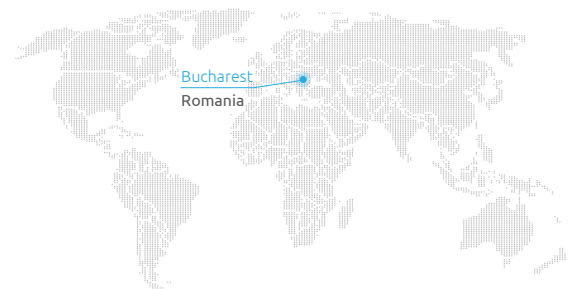
trains for this line. The new section linked the Centre to Eastern Bucharest, increasing the annual number of metro passengers by 34 million to almost 260 million, and offering 350,000 inhabitants an alternative to surface transportation. The new metro Line 5 option has brought about a reduction in traffic congestion and a decrease in traffic-related emissions and noise levels.





## Products used

For the Bucharest Metro Line 5 project more than 9,300 **Rawlplug® 600 ml R-KEX-II Pure Epoxy Resin** with M32 post-installed rebars were installed to reinforce the foundation.



**R-KEX II Pure Epoxy Resin  
with Post-Installed Rebars**

# Sochi Olympic Park

Russia, Sochi



## Investment information

**Name:** Sochi Olympic Park

**Location:** Sochi, Russia

**Investor:** Russian Federation

**Completion Date:** 2013

### Project:

**Sochi Olympic Park** was constructed for the 2014 Winter Olympic Paralympics. It is located in the Adler City District of Sochi, Imeretinsky Valley, on the Black Sea, about 4 km (2.5 miles) from Russia's border with Abkhazia / Georgia.

The Olympic Park contains the main Olympic Stadium which was used for the Games' ceremonies, as well as the venues which were used for indoor sports such as hockey, figure skating, curling, and speed skating. It also houses training facilities, the Olympic Village, the international broadcasting centre, and other amenities. The park was designed so that all of the venues would be accessible within walking distance of each other. The venues are situated around a water basin containing a fountain known as „The Waters of the Olympic

Park". Designed by California-based WET (which also designed the cauldron for the 2002 Winter Olympics in Salt Lake City), the fountain measures 5.3 meters in diameter, has a capacity of approximately 700,000 gallons of water, and features more than 250 nozzles and jet systems that can create fog and execute choreographed water displays set to music.

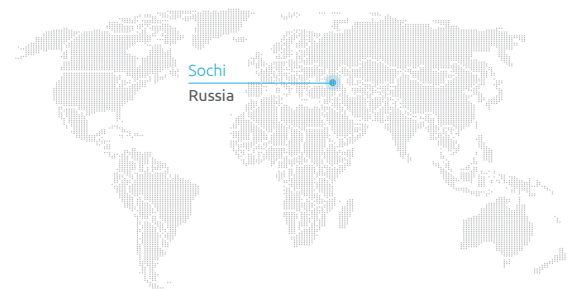
Construction of the complex began in 2007. Most of the venues were completed by 2013.

But the one record that Sochi will be remembered for is a slightly more dubious one: the most expensive Olympic Games ever (summer or winter). The total costs linked to the 2014 Sochi Olympics were just under \$55 billion (RUB 1,652 billion).



## Products used

Rawlplug® Facade fixings TFIX-8M were installed to external wall insulation during the Sochi Olympic Park.



TFIX-8M Facade fixing  
with metal nail

# VTB Arena\*

Russia, Moscow



[https://en.wikipedia.org/wiki/VTB\\_Arena#/media/File:VTB\\_Arena.jpg](https://en.wikipedia.org/wiki/VTB_Arena#/media/File:VTB_Arena.jpg)

## Investment information

**Name:** VTB Arena

**Location:** Moscow, Russia

**Investor:** ZAO „UK „Dinamo”

**Contractor:** Codest International S.r.L.

**Completion Date:** 2017-2018

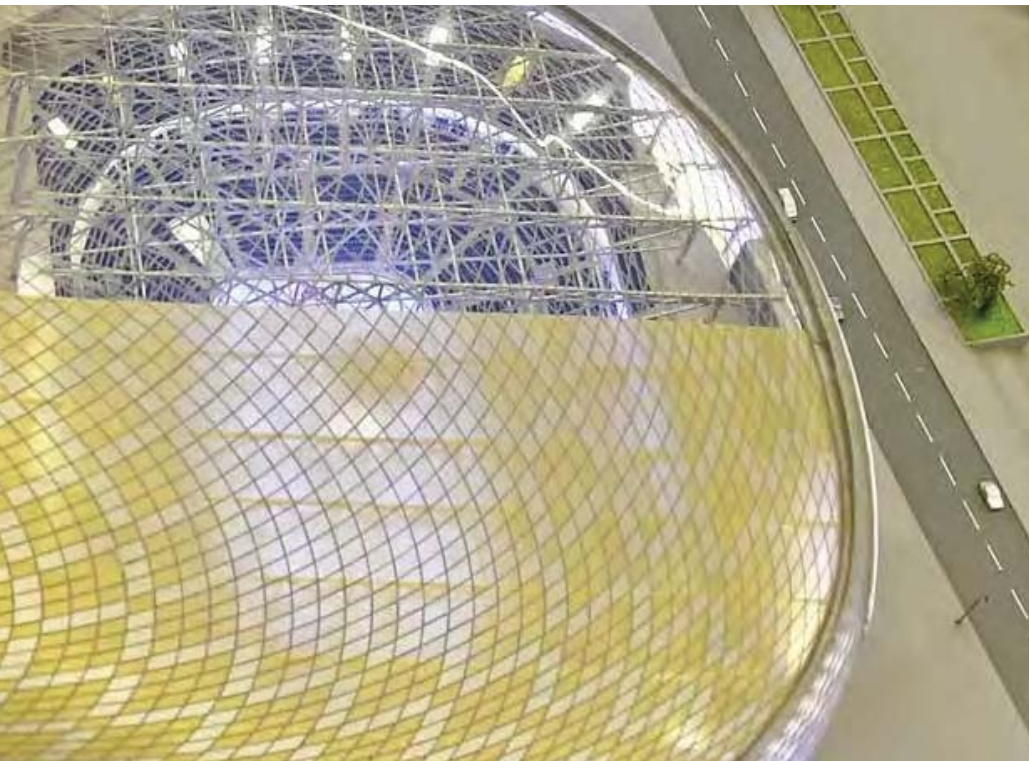
### Project:

**VTB Arena** is a planned multi-purpose stadium in Moscow, Russia.

The old Dynamo Stadium was closed for demolition in 2008, and the new VTB Arena was built in its place. The final design of the new stadium was by David Manica of Manica Architecture and construction is scheduled to be completed in 2017. The project is currently slated to be called VTB Arena, but VTB Bank is attempting to sell the naming rights. The football stadium will have a capacity of 27,000 (which can be adjusted up to 45,000 or down to an undisclosed number), while the indoor arena will have a base capacity of 12,000 (expandable to 15,000). The new complex will

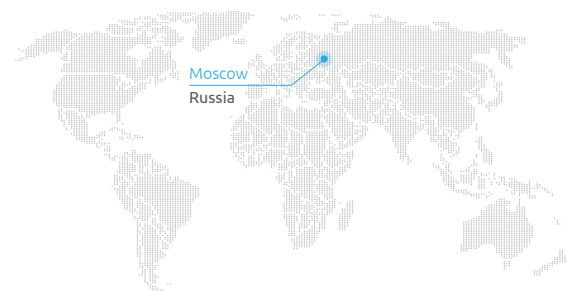
also include a shopping and entertainment centre, office buildings, apartment buildings, a 5-star hotel, and a 1,600 car parking garage. The total investment is estimated at US\$1.5 billion.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

**Rawlplug® Throughbolts R-XPT** and **Wedge anchors R-DCA** were installed during the VBT Arena project. Their installation was preceded by a series of tests confirming the highest quality of Rawlplug fixings.



**R-DCA Wedge Anchor**



**R-XPT Throughbolt**

# Volgograd Arena

Russia, Volgograd



## Investment information

**Name:** Volgograd Arena

**Location:** Volgograd, Russia

**Investor:** FGUP

**Contractor:** AO „Stroytransgaz”

**Completion Date:** 2017

### Project:

**Volgograd Arena** is a football stadium in Volgograd and one of the venues for the 2018 FIFA World Cup. It will also host FC Rotor Volgograd. It has a capacity of 45,568 spectators.

The Stadium is built on site of the demolished Central Stadium, at the foot of the Mamayev Kurgan memorial complex, near the Volga River.

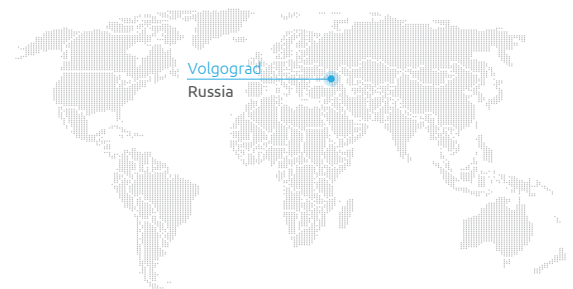
The previous stadium was built in 1958, on the site of a former oil depot. This area was undeveloped, occupied by randomly distributed low-value buildings, warehouses, barracks and ravines. To save money it was proposed to make the stadium a compact, single object,

which consisted of the podium at the 40 thousand spectators, a sports arena of the Olympic sample and two large sports complex with 10 different gyms. The complex included a swimming pool and riding school which was not built due to lack of funds.



## Products used

- Pure epoxy resin **R-KEX II Pure Epoxy Resin** (1,600 items)
- **R-STUDS Metric Threaded Rods** applied to install safety barriers and balustrading
- **Trouthbolt R-XPT** to fixing all 45,000 seats
- **Concrete Screw R-LX-HF** (1,900 items) to expansion joints.



**R-KEX II Pure Epoxy Resin with Rebars and Threaded Rods**



**R-XPT Throughbolt**



**R-LX-HF Concrete Screw Anchor**

# Arena Baltika

Russia, Kaliningrad



[https://fr.wikipedia.org/wiki/Stade\\_de\\_Kaliningrad](https://fr.wikipedia.org/wiki/Stade_de_Kaliningrad)

## Investment information

**Name:** Kaliningrad Stadium (Arena Baltika)

**Location:** Kaliningrad, Russia

**Investor:** FGUP „Sport-In“

**Contractor:** Crocus International

**Completion Date:** 2017

### Project:

**Kaliningrad Stadium** (also called Arena Baltika) is an association football stadium under construction in Oktyabrsky Island, Kaliningrad, Russia. It will host some of the games of the 2018 FIFA World Cup. It will also host FC Baltika Kaliningrad of the Russian Football National League, replacing Baltika Stadium.

This will be a two-tier stadium, equipped with ultramodern security systems and CCTV. The project is based on the concept of the Allianz Arena, which hosted matches of the 2006 World Cup in Germany. The project cost is planned around 11 billion rubles. Commissioning is planned in 2017. The stadium following the 2018 World Cup will turn into

25,000 seating capacity and part of the roof will be retracted.

Soil compaction work was completed in December 2014. Preparation work for construction of the infrastructure started in January 2015. Testing for the stadium piles and foundation began in July 2015.

Natural weak soils were stabilized and work was completed at the site measuring 43.75 hectares by September 2016. The area measuring 20.02 hectares by 33.85 hectares was filled and soil compacted.

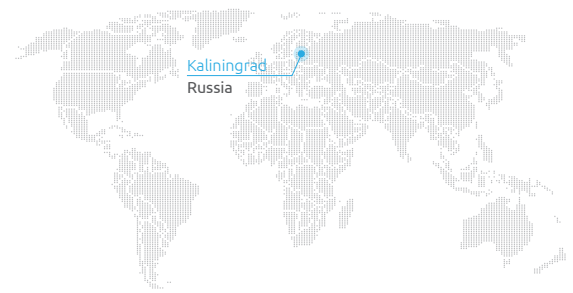
During excavation, some pre-war buildings' infrastructure was found which was not marked on the topographic survey.





## Products used

- R-XPT Throughbolts - fixings for fences and railings.



R-XPT Throughbolt

# Dinamo Stadium

Belarus, Minsk



[https://en.wikipedia.org/wiki/Dinamo\\_Stadium\\_%28Minsk%29](https://en.wikipedia.org/wiki/Dinamo_Stadium_%28Minsk%29)

## Investment information

**Name:** Dinamo Stadium

**Location:** Minsk, Belarus

**Investor:** City of Minsk

**Contractor:** OAO „Stroytrest Nr 1”

**Completion Date:** 2017

### Project:

**Dinamo Stadium** (Belarusian: Стадыён Дынама) is a multi-purpose stadium in Minsk, Belarus. The object was constructed and opened in 1934 and then expanded in 1939. It is currently undergoing a massive renovation project. Earlier it was used mostly for football matches and was the home ground of Dinamo Minsk, FC Minsk and the Belarus national football team.

In 1978-1980, in preparation for the matches of the football tournament of the 1980 Summer Olympics, the stadium underwent considerable reconstruction. The territory of the stadium was expanded and fenced with a new fence with the symbols of the Olympics-80. A modern central

tribune was built, instead of the old one. There are new large lighting masts with powerful searchlights, a new football scoreboard, as well as a torch for the Olympic flame.

In the 2008 – 2013 seasons the BATE Borisov Club used the Dynamo Stadium as a home arena during the games of the Champions League group stage.

The stadium officially seated 40,000, but because part of the upper stand had been abandoned in the mid-1990s for safety reasons, the capacity before renovations was only 34,000.

In 2019, the Europa League Final is planned to be played there.

# Belarus



## Products used

- **R-LX Concrete Screw Anchors** were used to fasten the 33,000 seats.



**R-LX-HF Concrete Screw Anchor**

# Burj Khalifa Tower\*

United Arab Emirates, Dubai



## Investment information

**Name:** Burj Khalifa Tower

**Location:** Dubai, United Arab Emirates

**Investor:** Emaar Properties

**Completion Date:** 2010

### Project:

At a height of 829.8m, **Burj Khalifa** is the tallest building in the world.

Access to its 160 floors is provided by 57 elevators, with the fastest ones able to cover a distance of 124 floors in 60 seconds. That means they can travel at a speed of up to 10m/s!

The design is derived from the Islamic architecture of the region, such as in the Great Mosque of Samarra. The Y-shaped tripartite floor geometry is designed to optimize residential and hotel space. A buttressed central core and wings are used to support the height of the building. Although this design was derived from Tower Palace III, the Burj Khalifa's central core houses all vertical transportation with the exception of egress stairs within each

of the wings. The structure also features a cladding system which is designed to withstand Dubai's hot summer temperatures.

Burj Khalifa was designed to be the centrepiece of a large-scale, mixed-use development that would include 30,000 homes, nine hotels (including The Address Downtown Dubai), 3 hectares (7.4 acres) of parkland, at least 19 residential towers, the Dubai Mall, and the 12-hectare (30-acre) artificial Burj Khalifa Lake. The decision to build Burj Khalifa is reportedly based on the government's decision to diversify from an oil-based economy to one that is service and tourism based. According to officials, it is necessary for projects like Burj Khalifa to be built in the city to garner more international recognition, and hence investment.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.

# Middle East



## Products used

The stability and load-bearing capacity of the elevator system is based on **Rawlplug® M10, M12 and M16 R-XPT Throughbolts**. These were chosen by a Rawlplug's customer, one of the major elevator providers in the UAE, Bahrain and Qatar. Their decision was based upon a series of tests which proved both the quality and reliability which only a premium producer can deliver.



**R-XPT Throughbolt**

# Burj Al-Arab\*

United Arab Emirates, Dubai



## Investment information

**Name:** Burj al-Arab

**Location:** Dubai, United Arab Emirates

**Contractor:** Jumeirah

**Completion Date:** 1999

### Project:

**The Burj al-Arab** is a luxury hotel located in Dubai, United Arab Emirates. It is the third tallest hotel in the world; however, 39% of its total height is made up of non-occupiable space. Burj Al Arab stands on an artificial island 280 m (920 ft) from Jumeirah beach and is connected to the mainland by a private curving bridge. It has a helipad near the roof at a height of 210 m (689 ft) above ground.

Burj Al Arab was designed by multidisciplinary consultancy Atkins, led by architect Tom Wright, who has since become co-founder of WKK Architects. The design and construction were managed by Canadian engineer Rick Gregory also of WS Atkins. Construction of the Island began in 1994 and involved up to 2,000 workers during peak construction. It was built to resemble the

billowing spinnaker sail of a J-class yacht. Two „wings” spread in a V to form a vast „mast”, while the space between them is enclosed in a massive atrium. The hotel was built by South-African construction contractor Murray & Roberts and Al Habtoor Engineering. The building opened in December 1999.

Several features of the hotel required complex engineering feats to achieve. To secure a foundation, the builders drove 230 forty-meter-long (130 ft) concrete piles into the sand. Engineers created a ground surface layer of large rocks, which is circled with a concrete honeycomb pattern, which serves to protect the foundation from erosion. It took three years to reclaim the land from the sea, while it took fewer than three years to construct the building itself. The building contains over 70,000 m<sup>3</sup> (92,000 cu yd) of concrete and 9,000 tons of steel. Inside the building, the atrium is 180 m (590 ft) high.

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# Middle East



## Products used

Rawlplug conducted initial testing for anchoring the facade. A total of 10,000 **Rawlplug® R-SPT-A4 Stainless Steel Throughbolts** (predecessor of **R-HPTII-A4**) and **R-KEM Polyester Styrene Free Resin** (predecessor of **R-KEM II**) were installed throughout the project.



**R-HPTII-A4 Stainless Steel Throughbolt**



**R-KEM® Polyester Styrene Free Resin**

# Dubai Opera House\*

United Arab Emirates, Dubai



By Dubai Opera LLC (Own work) [CC BY-SA 4.0 (<http://creativecommons.org/licenses/by-sa/4.0/>), via Wikimedia Commons]

## Investment information

**Name:** Dubai Opera House

**Location:** Dubai, United Arab Emirates

**Investor:** Emaar Properties

**Contractor:** Consolidated Contractors Company

**Completion Date:** 2016

### Project:

**Dubai Opera House** is a multi-format performing arts centre, which is located within The Opera District in Downtown Dubai. It is being developed by Emaar Properties to host a variety of performances and events including theatre, opera, ballet, concerts, conferences and exhibitions. Its plans were announced in March 2012 and it was completed in 2016. It opened on 31 August 2016.

The 1901-seat performing arts centre was designed by Janus Rostock of Atkins. The theatre was conceived by Theatre Projects Consultants. It can be converted into a traditional theatre, concert hall, banquet hall or exhibition space. Using hydraulic lifts and

seating wagons to relocate 900 of the 2,000 seats, the space can be used for other events while the extra seating is stored in garages beneath the theatre.

Dubai Opera House is designed to resemble a dhow, a traditional sailing vessel, in which the 'bow' of the structure will house the opera's main stage, orchestra and seating, while the elongated 'hull' will have waiting areas, taxi drop-off areas, and parking.

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Middle East



**Products used**

- installation of wall ties - **SP-KSC-8/27 Plastic Collated Pins + SP-AM-11 Cartridge shots**
- installation of mesh - **SP-KRC8/32 Nail with washer**
- installation of wall ties - **R-GS-06040 Ceiling wedge anchor**
- **R-FF1-N-10L100 Nylon Frame Fixing**

All installation was preceded by a series of tests confirming the highest quality of Rawlplug® anchors.



**SP-KSC Plastic Collated Pins**



**GS Ceiling wedge anchor**



**FF1-L Nylon frame fixing countersunk version - zinc plated**

# Swiss Tower\*

United Arab Emirates, Dubai



## Investment information

**Name:** Swiss Tower

**Location:** Dubai, United Arab Emirates

**Investor:** Nakheel

**Contractor:** HIPCO

**Completion Date:** 2009

### Project:

**The Swiss Tower** is a 40-floor tower in The Jumeirah Lakes Towers Free Zone in Dubai, United Arab Emirates.

The tower has a total structural height of 161 m (527 ft).

Construction of the Swiss Tower was completed in 2009. The Swiss Tower is a part of Jumeirah Lakes Towers which consists of 80 towers being constructed along the edges of three artificial lakes.

Rawplug also provided ongoing testing up to the 40th floor during the 12 month contract phase.

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# Middle East



## Products used

Rawlplug conducted initial testing for anchoring the glass facade. A total of **45,000 10x115 specified Rawlplug® Stainless Steel Throughbolts R-SPT-A4** were installed throughout the project.



**R-HPTII-A4 Stainless Steel Throughbolt**

# Dubai Metro

United Arab Emirates, Dubai



## Investment information

**Name:** Dubai Metro

**Location:** Dubai, United Arab Emirates

**Investor:** Roads and Transport Authority

**Contractor:** Al Ghurair Investment Group

**Completion Date:** 2009

### Project:

**Dubai Metro** is a driverless, fully automated metro rail network in Dubai, United Arab Emirates. The Red Line and Green Line are operational, with three further lines planned. These first two lines run underground in the city centre and on elevated viaducts elsewhere. All trains and stations are air conditioned with platform edge doors to make this possible. Architecture firm Aedas designed the metro's 45 stations, two depots and operational control centres. The Al Ghurair Investment group were the metro's builders.

The first section of the Red Line, covering 10 stations, was ceremonially inaugurated on 9 September 2009, by Mohammed bin Rashid Al Maktoum, Ruler of Dubai. The Dubai Metro

is the first urban train network in the Arabian Peninsula and either the second in the Arab World (after the Cairo Metro) or the third. A major expansion of the Red Line to add 15 kilometres of track and extend it from Ibn Battuta to the Expo 2020 site was announced in April 2015. Until 2016, The Dubai Metro was the world's longest fully automated driverless metro network with a route length of 75 kilometres (47 mi), which was recognised by the Guinness World Records in 2012.

The first phase covers 35 kilometres (22 miles) of the proposed network, including the Red Line set for completion by September 2009. Green Line was to be completed by June 2010.

The construction cost of the Dubai Metro project has shot up by about 80 per cent from the original AED 15.5 billion/ US\$4.2 billion to AED 28 billion/ US\$7.8 billion.

# Middle East



## Products used

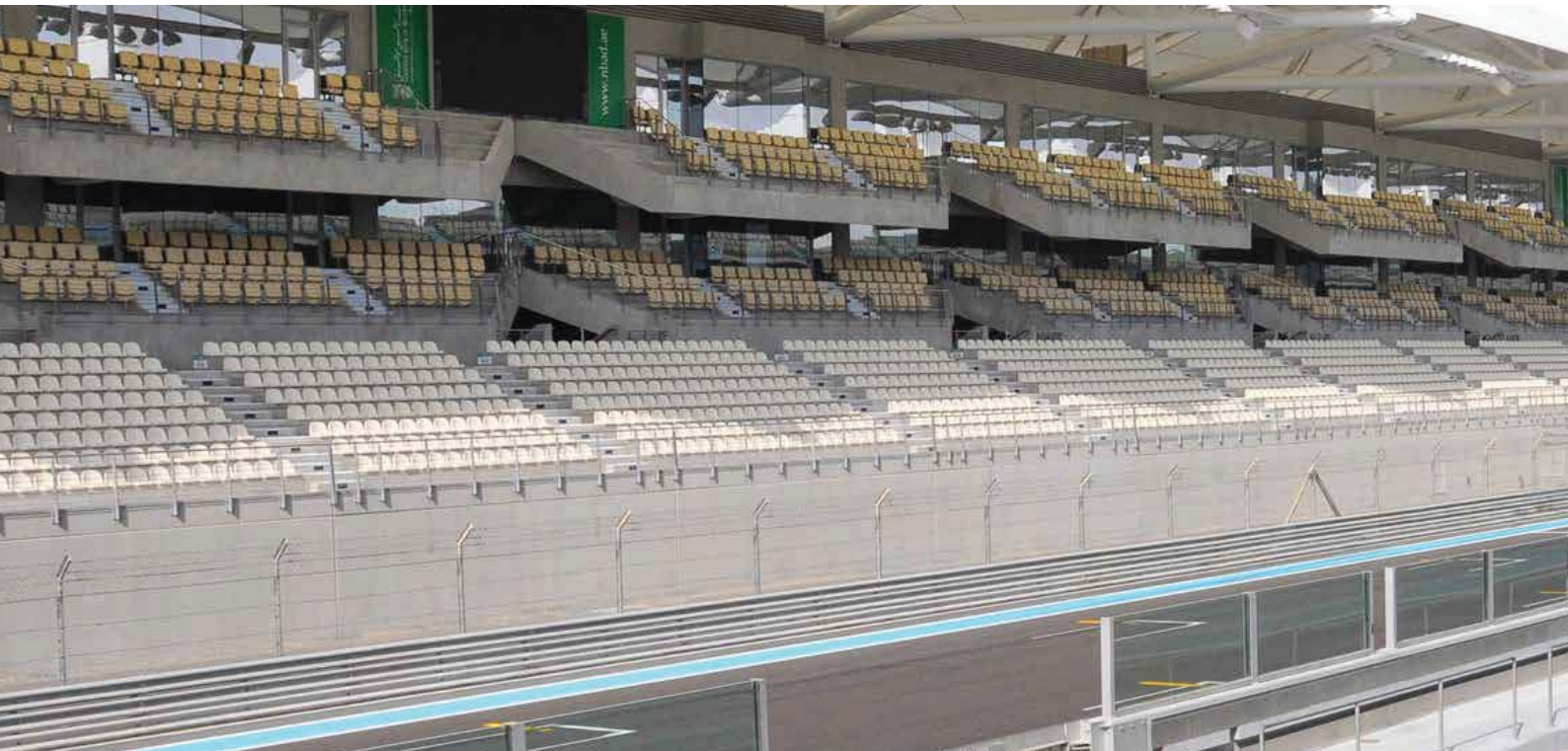
**Rawlplug® Spin-in Capsules R-CAS-V-16** approved by Systra for Shanghai Issey were installed to the substrate of cladding applications on all stations (Red, Green). Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.



**R-CAS-V Spin-In Capsule®  
with Threaded Rods**

# Yas Marina Circuit F1\*

United Arab Emirates, Abu Dhabi



## Investment information

**Name:** Yas Marina Circuit F1

**Location:** Abu Dhabi, United Arab Emirates

**Investor:** Government of Abu Dhabi

**Contractor:** Cebarco-WTC WLL

**Completion Date:** 2009

### Project:

**The Yas Marina Circuit** (Arabic: *سراي مسرمة قبلح*) is the venue for the Abu Dhabi Grand Prix. The circuit was designed by Hermann Tilke and is situated on Yas Island, about 30 minutes from the capital of the UAE, Abu Dhabi. Yas Marina is the second Formula One track in the Middle East, with the first being in Bahrain. The circuit has FIA Grade 1 license.

The marina-based development includes a theme park, a water park, as well as residential areas, hotels and beaches and its potential can be provided by statistics

- Seating Capacity – 41,093
- Area – 161.9 ha
- Length – 5.5 km
- Longest straight – 1140 metres

The circuit was built by main contractor Cebarco-WTC WLL, under contract from developer Aldar Properties. Among the sub-contractors involved were KOH AH HING from Malaysia (structural contractor), as well as specialised subcontractors like Voltas (MEP), PKE-Siemens (MEP), Able-Middle East (earthworks), Hamilton International (interior) and Bau Bickhardt (track) to name a few. Yas Marina Circuit is the largest permanent sports venue lighting project in the world.

The surface of the track is made of graywacke aggregate, shipped to Abu Dhabi from a Bayston Hill quarry in Shropshire, England. The surface material is highly acclaimed by circuit bosses and Formula One drivers for the high level of grip it offers.

On 7 October 2009, the circuit was granted final approval to hold Formula One races by the FIA. Bruno Senna was the first driver to complete a test run on the circuit.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.

# Middle East



## Products used

All of the 40,000 seats around the circuit were anchored to the substrate using **Rawlplug® Lipped Wedge Anchors R-DCL M10**. Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.



**R-DCL Lipped Wedge Anchor**

# The Grand Egyptian Museum\*

Egypt, Giza



## Investment information

**Name:** The Grand Egyptian Museum (GEM)

**Location:** Giza, Egypt

**Investor:** Egyptian Ministry of Culture

**Contractor:** Besix Orascom JV

**Completion Date:** 2018

### Project:

**The Grand Egyptian Museum (GEM)**, also known as the Giza Museum, is a planned museum of artifacts of ancient Egypt. Described as the largest archaeological museum in the world, the museum is under construction and is scheduled to be partially open in 2018. The museum is sited on 50 hectares (120 acres) of land approximately two kilometers from the Giza pyramids and is part of a new master plan for the plateau.

The design of the building was decided by means of an architectural competition

The building is shaped like a chamfered triangle in plan. It sits on a site two kilometers west of the pyramids, near a motorway interchange.

The building's north and south walls line up directly with the Great Pyramid of Khufu and the Pyramid of Menkaure. In front of the building is a large plaza, filled with date plants. One of the main features of the Museum is the translucent stone wall, made of alabaster, that makes up the front facade of the building. Inside the main entrance is a large atrium, where large statues will be exhibited.

The new museum is designed to include the latest technology, including virtual reality. The Museum will also be an international center of communication between museums, to promote direct contact with other local and international museums. The Grand Egyptian Museum will include a children's museum, conference center, training center, and workshops similar to the old Pharaonic places.

### Interesting facts:

The organisers received 1557 entries from 82 countries, making it the second largest architectural competition in history.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



Middle East



**Products used**

- R-HPTII-ZF Zinc Flake Throughbolt
- R-XPT Zinc Plated Throughbolt
- R-DCA Wedge Anchor
- R-RBL, R-RBP Rawlbolt®
- R-LX-HF Concrete Screw Anchor.



R-HPTII-ZF Zinc Flake Throughbolt



R-XPT Zinc Plated Throughbolt



R-DCA Wedge Anchor



R-RBL, R-RBP Rawlbolt®



R-LX-HF Concrete Screw Anchor

# Cairo Metro

Egypt, Cairo



## Investment information

**Name:** Cairo Metro Line 1 and Line 2

**Location:** Cairo, Egypt

**Investor:** National Authority for Tunnels  
(Egyptian state)

**Contractor:** Spie

**Completion Date:** 1996

### Project:

**Cairo Metro** Line 1 is the first line of the Cairo Metro system in Cairo city, Egypt as well as the first metro system in Arab countries and in Africa. It was constructed in 1989 and connects Helwan with El Marg passing other 32 stations. Line 1 sometimes called French-built line or simply the French line that extends to 44.3 km long with 4.7 km underground and carries trains with 3 units, which have a time difference of 2.5 minutes and a maximum speed of 100 km/h. The line can carry 60,000 Passengers per hour in each direction. The Construction of the project started in 1982 after the French government agreed on giving Egypt the necessary loan. The total cost of the first stage from Helwan

to Ramsis is 473.9 million EGP. The second stage costed in total 499.6 million EGP.

Cairo's metro network was greatly expanded in the mid-1990s with the building of Line 2 (red), from Shoubra-El-Kheima to Cairo University, with an extension to Giza.

It is the first line in history to have a tunnel going under the Nile. The tunnel under the Nile is 8.35m in internal diameter and was constructed using two Herrenknecht bentonite slurry shield TBMs, which are 9.43 m in diameter. Extending 21.5 kilometres (13 mi) with 20 stations, it is sometimes called the „Japanese-Built Line“. The main difference between Lines 1 and 2 is that Line 1 uses an overhead line while Line 2 uses the third-rail system. The construction was finished in October 2000 and was later extended to El Mounib. The communication for line 2 was provided by Alcatel in 2005. Total project of Line 2 cost was 761 million euros.

## Middle East



### Products used

Rawlplug® R-DCL Lipped Wedge Anchor were installed to the substrate of electrical services applications:

- Line1 – 100,000 Wedge Anchors
- Line2 – 150,000 Wedge Anchor.



R-DCL Lipped Wedge Anchor

# Tehran-Shomal Freeway\*

Iran, Tehran



## Investment information

**Name:** Tehran-Shomal Freeway

**Location:** Tehran - Chalous, Iran

**Investor:** Tehran-Shomal Co

**Completion Date:** 2014-2017

### Project:

**Freeway 3**, or more commonly known as Tehran-Shomal Freeway (لأمش - نارعت هاردازا). Tehran-North Freeway is a freeway in Northern Iran, connecting Tehran to cities of western Mazandaran.

With the construction of this freeway, travel time between Teheran and Chalous is reduced by approximately 2 hours in comparison to existing road.

Currently, section 4 is in service and section 1 is under construction. Progress at sections 2 and 3 is stalled due to various reasons. The freeway runs parallel to Road 59, the old road connecting Karaj to Chalus.

Tehran-Shomal Freeway has 121 km with 150 tunnels and 79 bridges from Tehran to Calous.

Rawlplug products was used to:

Expansion joints

Post-installed rebars for air exchange system

Concrete grinding

Mechanical: firefighting, water supply, jet fan

Electrical: lighting, tunnels control facilities

Construction costs: 500 million US dollars.

Tehran Province has over 1,500 historical sites of cultural significance. The oldest are the remains of two sites in Firuzkuh County that date back to the 4th millennium BCE.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.

# Middle East



## Products used

- R-KEX II Pure Epoxy Resin (7,000 used items)
- R-HPTII-ZF Zinc Flake Throughbolt (60,000)
- R-XPT Throughbolts (60,000)
- R-DCA Wedge anchors (100,000).



**R-KEX II Pure Epoxy Resin with Post-Installed Rebars**



**R-HPTII-ZF Zinc Flake Throughbolt**



**R-XPT Zinc Plated Throughbolt**



**R-DCA Wedge Anchor**

# The Altair tower\*

Sri Lanka, Colombo



## Investment information

**Name:** The Altair tower

**Location:** Colombo, Sri Lanka

**Investor:** Indocean Developers (PVT) Limited

**Contractor:** Shapoorji Pallonko Co. & Ltd.

**Completion Date:** 2017

### Project:

**The Altair tower** in Colombo, Sri Lanka, is an ambitious project. With a final height of 240 metres, when fully constructed, the building will consist of a main 68-floor tower alongside a sloping, 64-floor tower. Even now, it is one of the tallest towers in Colombo's skyline. The Altair tower contain both private apartments and commercial spaces.

The project includes R-XPT-16125/5 bolts in its construction. Specifically, Rawlplug's through-bolts were used to fix and secure separator beams in the elevator shaft. Rawlplug DCA wedge anchors, threaded rods and screws used in various applications.

The building has been designed by Moshe Safdie of Safdie Design who was also the

architect for the Marina Bay Sands in Singapore. There are two towers, one of which is leaning on the other. The leaning tower has been designed using a distinctive diagrid structure with flat slabs which not only adds structural stability to the building without the need for internal columns but also allows for a permeable surface with large windows. This allows maximum airflow and light which contributes to energy savings in heating and cooling and also provides access to the balcony for an awesome view.

The towers will be constructed on reinforced concrete piles and a raft footing with a reinforced concrete and/or steel superstructure. Even though Colombo rarely experiences significant earthquakes (it is classified in seismic Zone 0 under the international building code), Altair has been designed to withstand earthquakes up to 7 on the Richter Scale.

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

Rawlplug® Throughbolts R-XPT and Wedge anchors R-DCA were installed during the Altair tower project, which was preceded by a series of tests.



R-DCA Wedge Anchor



R-XPT Throughbolt

# Access Towers II\*

Sri Lanka, Colombo



## Investment information

**Name:** Access Towers

**Location:** Colombo, Sri Lanka

**Contractor:** Access Realities Ltd / Maxaire Ltd

### Project:

When the **Access Towers** project in Colombo, Sri Lanka, moved to the second phase of construction, Rawlplug products were chosen to help secure ceiling fixings. Completed, Access Towers will act as a major commercial space for Colombo. The project follows on from the successful Access Towers 1, which opened in 1998. The new building, Access Towers II, will have 25 floors and a car park suitable for 240 vehicles.

The construction, valued at approximately 2,700,000,000 Sri Lankan Rupee (over 17,000,000 US Dollars). Access Realities (Pvt) Ltd are overseeing the project directly, contracting to Access Engineering. Maxaire (Pvt) Ltd will be acting as a sub-contractor.

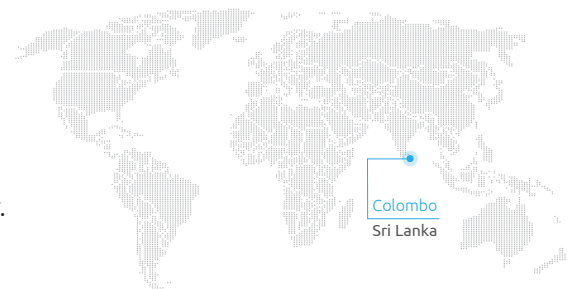
\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.





## Products used

Rawlplug® products – specifically **R-DCA-10-40 Wedge Anchors** and **R-XPT-12100/5 Throughbolts** – were chosen to securely hang cable trays and base plates to the ceilings within the tower.



**R-DCA Wedge Anchor**



**R-XPT Throughbolt**

# Extension of Southern Expressway

Sri Lanka



## Investment information

**Name:** Extension of Southern Expressway (ESEP)  
**Location:** Sri Lanka  
**Investor:** Exim Bank of China  
**Contractor:** China State Construction Eng. Co. Ltd.  
**Completion Date:** 2019

### Project:

Sri Lanka is currently undergoing an ambitious project to extend one of its major traffic routes. **The Construction of Extension of Southern Expressway (ESEP)** looks to join key areas together and Rawlplug products are being used in its development. While the project is being overseen by the Road Development Authority, work has been contracted out to the China State Construction Engineering Corp. Limited.

The extension, expected to be fully completed in 2019, is being constructed in four sections. The first 3 sections will connect Matara to Beliatta, Beliatta to Wetiya, Wetiya to Andarawewa. The fourth section will connect Hambanthota and Mattala, via Andarawewa.



## Products used

Rawlplug® **R-KEX-II-600 Epoxy Resin and Rebar** is being used to Anchor Rebars and Threaded Rods.



**R-KEX II Pure Epoxy Resin  
with Rebars and Threaded  
Rods**

# Western Dedicated Freight Corridor

India, Haryana, Rajasthan, Gujarat, Maharashtra



## Investment information

**Name:** Western Dedicated Freight Corridor (WDFC)

**Location:** Haryana, Rajasthan, Gujarat, Maharashtra, India

**Investor:** DFCCIL- Indian Railways

**Completion Date:** 2017-2021

### Project:

The **Western Dedicated Freight Corridor** or Western DFC is a broad gauge freight corridor under construction in India by Indian Railways. It will connect India's capital, Delhi, and its economic hub, Mumbai. This corridor will cover 1483 km, 1342 bridges, and 20 stations, Building Works 68,000 sq.m. Freight trains with 1.5 km length, 3660 mm width and 7.1 metre height clearance, a first and only in the world. Double-stack standard shaped containers transported through electric locomotives with trailing loads of 15000 ton and trains with 400 container capacity, a first and only in the world.



## Products used

Rawlplug conducted initial testing for anchoring of canopy bridges.

- **R-XPT Throughbolt** 12-120,16-150, R-STUD 12x150
- **R-KEXII Pure Epoxy Resin** are approved and installed at the bridges, canopy and tracks.



**R-XPT Throughbolt**



**R-KEX II Pure Epoxy Resin with Rebars and Threaded Rods**

# Delhi Metro\*

India, New Delhi



## Investment information

**Name:** Delhi Metro Rail Corporation (DMRC)

**Location:** New Delhi, India

**Investor:** DMRC

**Completion Date:** 2018

### Project:

The Delhi Metro is a Largest Indian Metro System serving Delhi and its satellite cities of Faridabad, Gurgaon, Noida and Ghaziabad in National Capital Region in India. Delhi Metro Rail Corporation Limited, a state-owned company with equal equity participation from Government of India and Government of Delhi, built and operates the Delhi Metro. 12th longest metro system in length and 16th largest in ridership. Delhi metro had an average daily ridership of 2.76 million passengers. Phase-III has 28 underground stations, 2 new lines and 11 route extensions, totaling 167.27 km, with a cost of ₹350 billion (US\$5.5 billion). As of July 2017, the total network length in NCR is 512.26 kilometers (318.30 mi).

\* Names of the buildings or engineering constructions may be registered as trademarks in the name of third parties. Rawlplug is not an owner of said trademarks and claims no rights thereto.



## Products used

Rawlplug conducted Series of Demo's and testing for Underground Rebaring coupler application.

- A total of 2,500 Bottles of **R-KEXII Pure Epoxy Resin** and 4,000 Bottles of **R-KER Vinylester Resin** have been consumed.
- 20,000 pcs of **HPTII-ZF Zinc Flake Throughbolt** have been installed for underground metro walkway application. Their installation was preceded by a series of tests confirming the highest quality of Rawlplug® fixings.



**R-KEX II Pure Epoxy Resin with Rebars and Threaded Rods**



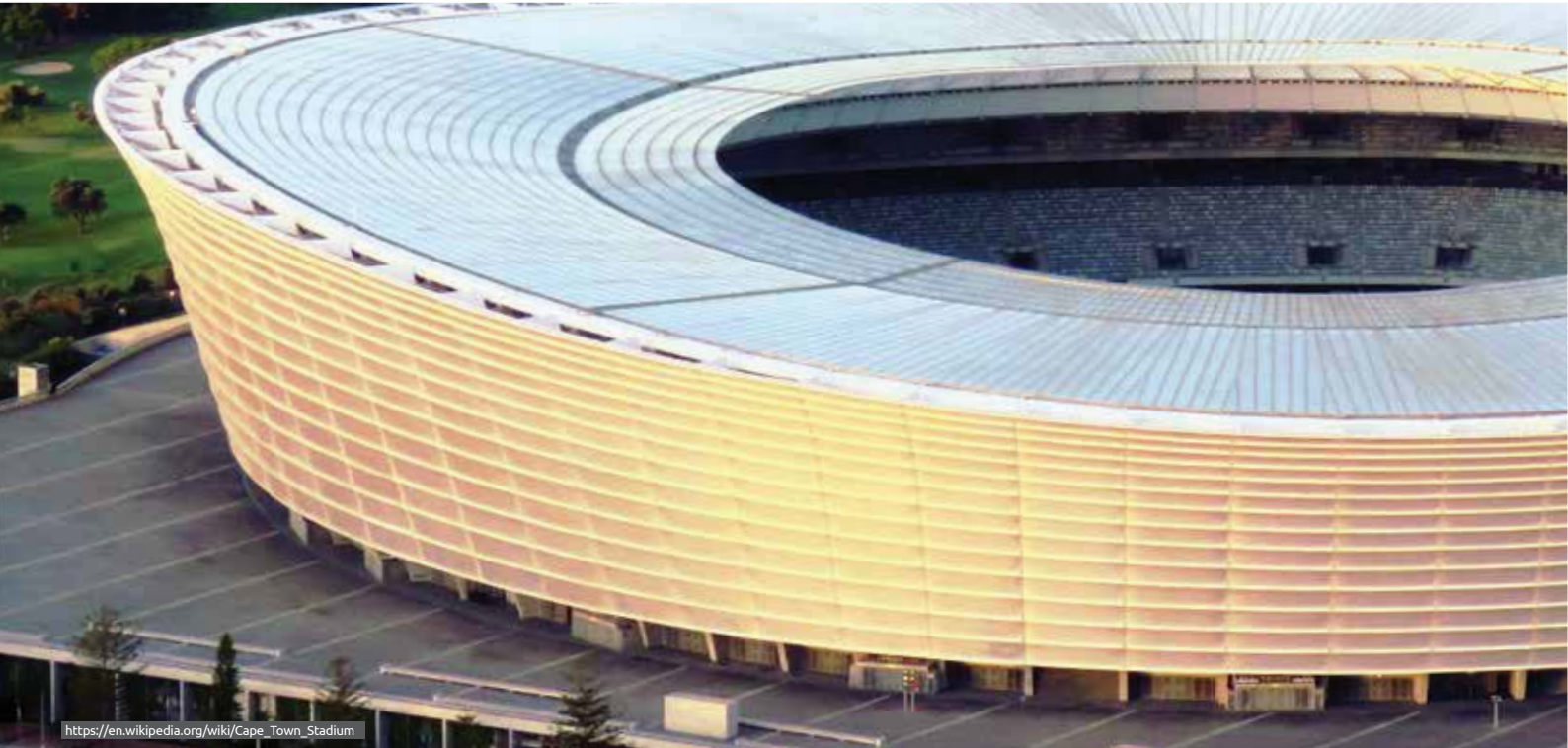
**R-KER Vinylester Resin with Threaded Rods**



**R-HPTII-ZF Zinc Flake Throughbolt**

# Cape Town Stadium

South Africa, Cape Town



[https://en.wikipedia.org/wiki/Cape\\_Town\\_Stadium](https://en.wikipedia.org/wiki/Cape_Town_Stadium)

## Investment information

**Name:** Cape Town Stadium

**Location:** Cape Town, South Africa

**Contractor:** Murray & Roberts / WBHO

**Completion Date:** 2009

### Project:

The **Cape Town Stadium** (Afrikaans: Kaapstadstadion; Xhosa: Inkundla yezemidlalo yaseKapa) in Cape Town, South Africa is a stadium that was built for the 2010 FIFA World Cup. During the planning stage, it was known as the Green Point Stadium, which was the name of the previous stadium on the site, and this name was also used frequently during World Cup media coverage. It is the home ground of Premier Soccer League clubs Ajax Cape Town (since 2010) and Cape Town City (since 2016). It has also hosted the South Africa Sevens rugby tournament since 2015.

The stadium is located in Green Point, between Signal Hill and the Atlantic Ocean, close to

the Cape Town city centre and to the Victoria & Alfred Waterfront, a popular tourist and shopping venue. The stadium had a seating capacity of 64,100 during the 2010 World Cup, later reduced to 55,000. The stadium is connected to the waterfront by a new road connection, Granger Bay Boulevard.

Cape Town Stadium was featured in the film *Safe House* (2012) - American-South African spy action-thriller starring Denzel Washington. The stadium also features in many local advertising and print media campaigns.

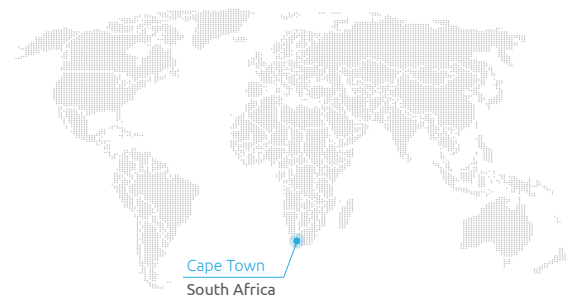




## Products used

Rawlplug supplied:

- Universal polyester resin **R-KEM II Polyester Styrene Free Resin Concrete**
- Wedge anchor **R-DCA Wedge Anchor** - all sizes.



**R-KEM II Polyester Styrene Free Resin**



**R-DCA Wedge Anchor**

# First National Bank Stadium\*

South Africa, Johannesburg



## Investment information

**Name:** First National Bank Stadium  
(FNB Stadium)

**Location:** Johannesburg, South Africa

**Investor:** City of Johannesburg

**Contractor:** Grinaker-LTA / Interbeton

**Completion Date:** 2009

### Project:

**First National Bank Stadium** or simply FNB Stadium, also known as Soccer City and The Calabash, is a stadium located in Nasrec, bordering the Soweto area of Johannesburg, South Africa. The venue is managed by Stadium Management South Africa (SMSA) and is a home ground of Kaizer Chiefs F.C. in the South African Premier Soccer League as well as key fixtures for the South African national football team (Bafana Bafana).

It is located next to the South African Football Association headquarters (SAFA House) where both the FIFA offices and the Local Organising

Committee for the 2010 FIFA World Cup were housed. Designed as the main association football stadium for the World Cup, the FNB Stadium became the largest stadium in Africa with a capacity of 94,736. The stadium is also known by its nickname „The Calabash” due to its resemblance to the African pot or gourd.

FNB Stadium the site of Nelson Mandela’s first speech in Johannesburg after his release from prison in 1990, and served as the venue for a memorial service to him on 10 December 2013. The World Cup closing ceremony (after the Netherlands and Spain) on the day of the final saw the final public appearance of Mandela.

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[https://en.wikipedia.org/wiki/FNB\\_Stadium](https://en.wikipedia.org/wiki/FNB_Stadium)



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## Products used

- Pure epoxy resin R-KEX II
- Polyester Styrene Free Resin R-KEM II
- Spin-In Capsule R-CAS-V®
- Wedge Anchors R-DCA of all sizes
- Nylon hammer-in fixing FX-N
- Powder Actuated Tools Consumables.



Johannesburg  
South Africa



R-KEX II Pure Epoxy Resin with Rebars and Threaded Rods



R-KEM II Polyester Styrene Free Resin



R-CAS-V Spin-In Capsule® with Threaded Rods



R-DCA Wedge Anchor



FX-N Hammer-in Fixings

# Michelangelo Towers\*

South Africa, Johannesburg



## Investment information

**Name:** Michelangelo Towers

**Location:** Johannesburg (Soweto), South Africa

**Investor:** City of Johannesburg

**Contractor:** Grinaker-LTA / Interbeton

**Completion Date:** 2005

### Project:

The **Michelangelo Towers** is a hotel building in Sandton, South Africa. It is a prominent structure in the Sandton skyline and is one of South Africa's elite hotels.

An African Icon, towering 143 metres above the Sandton skyline, the Michelangelo Towers offers panoramic views of the Magaliesberg, the Johannesburg CBD and the Sandton cityscape, including all the hotels in Sandton. The Michelangelo Towers is one of five Legacy Developments that is in heart of the Richest Square Mile.

This all-suites hotel offers short and long term accommodation, and ranges from the

unparalleled luxury of the 600sqm Cupola Suite to Presidential and Executive 1 and 2 bedroom suites. Guests are spoilt for shopping and dining choices with direct access to the Michelangelo Towers Mall, located directly opposite Sandton City and Nelson Mandela Square.

The Michelangelo Towers have accommodated guests such as former United States President Barack Obama, Oprah Winfrey, Angelina Jolie, Mariah Carey, Paris Hilton, Lady Gaga and Justin Bieber.

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# Africa



## Products used

- Polyester Styrene Free Resin R-KEM II.



R-KEM II Polyester  
Styrene Free Resin

## Technical Advisory



We offer technical support at every stage of your project from the design stage through to its completion.

We provide a comprehensive package of technical support related to consultancy, designing and testing of fixings and fasteners. Our extensive experience comes from working closely with our clients on many demanding projects. We understand the limitations of sites and structures and you can count on our quality testing to help with your specifications.

### Site Testing

We are happy to visit your sites to conduct Pull-Out Tests. This is particularly useful where structures are unknown or potentially weak, for example solid or hollow, low-strength blockwork, which can be as thin as 100mm, and brickwork, where there could be voids and poor mortar strength.

A series of tests is carried out in accordance with the engineering requirements and in compliance with BS 8539 and the Construction Fixings Association guidelines. A recommendation is then made based on the actual results obtained to enable an accurate specification to be done, and the correct product to be selected.

### Design, Software and Applications

Time and precise calculations are of great importance to the architect and the designer. With this in mind, RAWLPLUG have developed a unique calculation program (Rawlplug EasyFix), a Fixings & Fasteners Selector and other applications that facilitate and accelerate the work process on an architectural design.

As part of the continuous development of our products and services we are happy to announce the latest update of Rawlplug's unique EasyFix Pro calculation software. Known and appreciated by fixings professionals, the EasyFix application has been upgraded to the PRO version.

EasyFix Pro now lets you design mountings for base plates, estimate the consumption of resin, and has special modules for the calculation of mountings balustrades and flat roofs. In the near future calculation modules for masonry, facades and rebars will be available. An improved interface means the program is easier to operate, and new features allow for a wider range of calculations and convenient refilling or previewing of data.

As ever the developments have been designed to produce results which adhere strictly to guidelines prepared by the European Organisation for Technical Approvals (EOTA), thus ensuring the safe and successful implementation of solutions.

For the PRO version of EasyFix a number of new features have been developed which streamline and accelerate fixings design using RAWLPLUG products.

EasyFix Pro is available free of charge - to download simply register as a user of the program at [easyfix.rawlplug.com](http://easyfix.rawlplug.com).

The new program's website also contains detailed information about changes to previous versions of EasyFix and contacts to the Rawlplug's Technical Advisors.

Go to [www.rawlplug.com/en](http://www.rawlplug.com/en) to learn more about our: Calculation program optimizing the Rawlplug EasyFix anchors BIM models with RAWLPLUG products

### RAWLPLUG ACADEMY

The RAWLPLUG Academy is derived directly from our tradition and experience and it aims towards global sharing and the promotion of brand awareness in regards to our products and services.

Our product knowledge, and our products themselves, are our best reference. In addition, their potential applications are a key parameter which guarantees effectiveness with our business Partners and Distributors resulting in the desired handling by the Users.

The challenge for The RAWLPLUG Academy and our coaching teams is to provide knowledge of our products and their applications tailored for the customer, as quickly as possible.

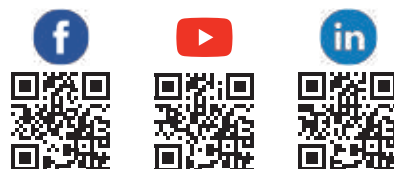
RAWLPLUG Academy resources include an extensive training program and methodology to support its effectiveness. Apart from traditional seminars and training workshops, we offer a program of e-learning training, which best suits the needs of our customers and partners around the world thanks to its attractiveness, easy access.

To request any technical help, please contact us: [technical.helpdesk@rawlplug.com](mailto:technical.helpdesk@rawlplug.com).

Visit our web site to learn more: [www.rawlplug.com](http://www.rawlplug.com)



Social media Rawlplug profiles:



# More from Rawlplug

## Efficacy in the hardest conditions

We are proud to present innovative fixing from the **Bonded Anchors and Mechanical Anchors** group designed for the heavy loads demanded by industrial construction. Among our products you will find unique solutions to enable you to achieve maximal amounts with any kind of substrate. Knowledge backed-up with experience guarantees the effectiveness of our fixings and the success of your investment.

## Durability and versatility

Our wide range of expansion plugs made of synthetic materials and metal, for low and medium loads, have been used for years for both industrial and residential construction. Incredibly durable FF1 from frame fixings group, universal in use 4ALL and UNO Plug, no. 1 on the UK market, are leading products of RAWLPLUG®'s offer in the field of **Lightweight Fixings**, designed with every substrate in mind.

## Innovations in Energy Saving construction

As a leading producer of façade insulation fixings we would like to present to you our wide array of products used in energy saving constructions. The Reliability and simplicity of our solutions combined with their ease of installation make them the most popular and desired by professionals. We invite you to familiarize yourselves with our offer for **Façade Insulations Fixings**.

## Excellent resistance for high loads

Thanks to our close cooperation with roof covering product producers, and our insight into the needs of investment contractors, our **Roofing Insulations Fixings** are one of the most popular among European roof fixing system producers. We invite cooperation from engineers, architects, and roof works contractors. And encourage you to try out our calculation software "ROOFIX" today.

## Safety Certificate

Stepping towards the needs of customers, and increasing the general level of safety in closed spaces, we have created a protection system event of which in the combustion prevents fire and smoke from spreading. We invite you to acquaint with our offer for **Passive Fire Protection Systems**, which hold the European Conformity Assessment.

## Guarantee of lasting quality

Thanks to our constant monitoring of the production of assortments from our **Foams, Sealants and Adhesives** range we guarantee the constant and repeatable quality of our products. Their wide range of application possibilities and high efficiency has enabled us to rank among the top 5 of companies in the construction chemistry industry for years.

## Maximal weather resistance

Rawlplug® **Fasteners** guarantee reliability of connections and maximal weather resistance. Our products, thanks to the use of appropriate materials and adoption of modern anticorrosion coating, pass even the hardest tests, matching the expectations of the most demanding clients. In our rich offer of screws characterized by extraordinary ease of installation, one may find perfect kind of connection for any kind of material and substrate.

## Save time and minimize costs

In our offer of **Direct Fastening Systems** you may find, among others, highly effective pneumatically and gas powered nailers with accessories, compressors and an innovative and ergonomic rebar tier. We invite you to familiarize yourselves with the capabilities of Rawlplug® tools, which can significantly increase the comfort and effectiveness of work at any construction site.

## Maximal effect of optimal offer

In order to ease the application and proper use and installation of our products, we supplement the our assortment of fixings with a precisely composed offer of **Power Tool Accessories**. They include, among others, European-made drills of the highest quality, as confirmed with a Sichersafe certificate. We invite you to familiarize yourselves with our offer of accessories for professional installation techniques of the Rawlplug® brand.

## Ergonomics for construction and at home

We offer high-quality **Stapling, Tacking and Gluing** tools that are recommended for both professionals and home DIY. Rawlplug's stapling tools are especially intended for construction, finishing works and repairs while our hot-melt adhesive system includes a new line of glue guns and glues for a wide range of applications - all of which are exceptionally easy to use and provide maximum efficiency and a high degree of flexibility for routine work

## Unique and exclusive exposition

Rawlplug **POS Essential Offer** it is a unique and complete solution designed for product exposition in building wholesale and retail stores. The POS system is based on easily configurable rack components enhanced with expansive information elements and additional decorations, as well as a combination of individual packages in form of innovative Rawlplug Bag and cutting-edge cardboard boxes.

Sealants and Adhesives

Facade Insulation Fixings

Lightweight Fixings

Direct Fastening Systems

Power Tool Accessories

POS Rawlplug Essentials

Passive Fire Protection Systems

Bonded Anchors & Mechanical Anchors

Roofing Insulation Fixings

Facade Insulation Fixings

Fasteners

**RAWLPLUG®**

Trust & Innovation. Since 1919.



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