CASING ADVANCEMENT SYSTEMS

Atlas Copco Rock Drilling Tools

Atlas Copco

PRODUCTIVITY IN A PIPE

Creating stability

Drilled casings, or casing advancement systems, are today's preferred method for drilling in difficult ground conditions; boulders and loose formations. There are three main reasons for its' increased usage: productivity, quality and risk management.

When drilling in overburden the conditions are often challenging with risk for collapsing walls, hole deviations and failure to reach design depth or bedrock. All threats to productivity and quality.

Compared to other methods, casing advancement is in most cases the best and most productive alternative with highest reliability in hole straightness and reliable assurances that targeted depth or bedrock is reached. These are all essential parameters in construction works.

Designed for efficiency

Atlas Copco Casing advancement systems are based on three key elements: a pilot bit to drill the hole, a ring bit (or reamer) to enlarge the hole, and a casing shoe to transfer part of the impact to the casing.

The system enables the casing to advance simultaneously with the drillstring and offers a possibility to either retrieve or leave the casing in the ground.

Simply put, casing advancement systems meet all challenges and keeps both efficiency and productivity high even in the most difficult ground conditions.

Less risk – better quality

Atlas Copco casing advancement systems enable contractors to perform their work faster with higher quality and reduced risk. The system adds value whether the mission is to install foundation, support elements or simply case the hole in collapsing formation.

Making the difficult simple

Todays complexity of projects makes it even more important to select reliable methods, which lower the total costs of operation.

Complexity brings more parameters to consider and with that also more uncertainties. If an uncertainty or a risk becomes a real problem, failing to reach the target, there will be additional cost to the project. Professional contractors keep their competitive edge by reducing the risks and looking beyond the obvious.

"The main advantage of Symmetrix is speed. We drill a metre in 12 minutes, compared to 60 minutes with the old method. A secondary, but equally important factor, is the ability to drill below the casing without the need to change the drill string. Instead we are using the drill through feature of the Symmetrix. This saves a lot of time and increases the productivity even further"

Vitor Costa, Project Engineer, Leixoe Harbor, Portugal

CASING ADVANCEMENT IN ACTION

A multitude of applications

There are numerous applications where overburden, unconsolidated geology and poor ground formations provide tough challenges. For example in construction, mining and also well drilling for water and energy.

In some cases, the challenge is to keep the hole open and to prevent loose formations from caving in. This is achieved by installing casing in the collapsing layers enabling deeper drilling into solid rock.

In other cases, the target can be to construct foundations or improve characteristics of soil or poor ground, by installing temporary or permanent casings. This is used for bridges, buildings and other infrastructures like dams, roads, tunnels and ports.

Casing advancement systems bring added value to all project stakeholders. Today, drilled casing becomes increasingly popular as the method offers all benefits required from a casing solution.

FOUNDATION WORK

The past years, drilled casings have replaced many other conventional methods in difficult ground formations. High demands on productivity, drilling accuracy and ability to drill inclined piles for foundation work makes casing advancement systems increasingly popular both for end bearing and friction piles.

With todays complex and competitive business environment, risk management is a central and crucial factor. Project managers are seeking solutions with reduced risk, foreseeable cost and reliable time planning.

Atlas Copco casing advancement systems enable contractors to drill with high penetration rate to required depth in very challenging formations.

The ability to drill micropiles in dense, urban areas with limited space is improved with the casing advancement systems, as small rigs can handle relatively larger micropiles.

WELL DRILLING

Wherever there is a well to be drilled for water or energy, there is always a need to case the overburden layer. For any well driller, productivity and high utilization of equipment is critical to succeed, quick and reliable drilling in overburden is a key factor to achieve this.

Well drilling is frequently done in urban, developed areas where the well must be drilled as quick as possible with minimum of impact on surroundings. Most of the wells are drilled without any detailed ground investigation, and the demands are high on the systems ability to perform well in any ground condition.

Atlas Copco offers the solution which can be used with small, compact rigs (using the DTH drilling method) with excellent results in almost any ground condition.

PIPE ROOFING AND ANCHORING

As tunnelling projects more often encounter challenging conditions such as soil, weak rock or shallow overburden, casing advancement systems have found their way into tunnelling support systems.

Pipe roofing is a method of pre-reinforcing the ground ahead of the tunnel face to ensure that the excavation can proceed safely. Steel casing is installed in an umbrella pattern around the excavation line, forming a protective arch under which the tunnel can advance.

Tieback (or ground) anchors are common all over the the world. They are typically installed to provide support for slopes or other structures. They can be installed in combination with a retaining wall structure, as individual or systematic support.

Reliable productivity, straightness of drilling and minimized disturbance to the formation are key factors for both pipe roofing and tieback anchoring. All which match perfectly with the Atlas Copco casing advancement systems.

OTHER APPLICATIONS

There are numerous applications where the ground is difficult, but there is a need for stable holes to either take samples in exploration, start an oil well or simply underpass a road.

Drilled casings are perfectly suited as the hole is stabilized in the same instant as it is drilled. This means it can be utilized for its purpose very quickly and in a reliable way. When drilling holes for critical applications, the cost of failure is simply too high to take any unnecessary risks. Casing advancement systems are in many ways the most suitable solution for a variety of applications.

With an increasing urbanization, the infrastructure needs continuous development. At the same time, the urban life must not be disturbed while developing the area. By drilling casings as underpasses the utility pipe is ready much quicker, safer and with much less disturbance than with traditional methods.

Casing advancement is also suitable for applications with special requirements such as blasting holes under water, predrilled holes for grouting in challenging formations, conductor casings for oil and gas.

SIMPLY THE BEST

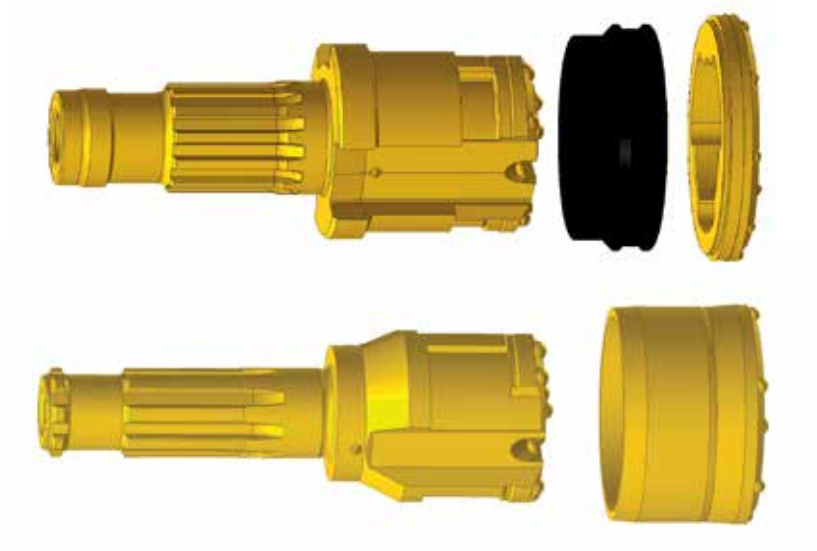
Every casing advancement project has its challenges, whether deep or shallow holes, sensitivity or productivity demands. The systems from Atlas Copco offer a spectrum of solutions to meet any project demands in the most efficient way.

Symmetrix

PRODUCTIVITY AND PRECISION

In construction works, it is imperative with accuracy and reliability of the drilling to meet the tight time schedules. The often complex operations place high demands on productivity and speed to meet deadline – regardless of ground conditions.

This is exactly where the Symmetrix system is at its best – where ground is difficult, time is limited and precision is crucial. Symmetrix can drill in any direction through a vast mix of formations including very challenging conditions.



Symmetrix is the king of versatility in overburden drilling. Different models has been designed to meet the demands in a variety of applications

The shortest route to bedrock

Whether there are big boulders, inclined competent layers or hard bed rock, Symmetrix continues to drill until the required depth is reached. The system drills quicker and more accurate than any other method available today.

The system has opened the way to utilize new construction methods that save contractors time and money.

If the installed foundation piles are deviating, the bearing capacity is reduced and increase the number of piles are needed. This drives time and costs and is something all stakeholders wish to minimize.

Saving money with straight holes

The unique design of Symmetrix enables straight and efficient drilling through any kind of soil or rock. The system provides reliable results with high productivity and precision where conditions are tough and reliability diffcult to achieve with any other method.

Elemex

EFFICIENT DRILLING IN SENSITIVE ENVIRONMENTS

The global urbanization trend makes drilling in sensitive areas, with existing structures and foundations, more and more common. The risk for disturbances and settlements is high. Air control and minimized overdrilling is essential to reduce these risks.

Controlling air escape puts high demand on the drilling system. Conventional DTH drilling systems push air straight into the ground, which is a feature derived from rock drilling applications where the removal of cuttings from bit face and cooling of the bit requires more air.

However, in urban areas with loose overburden material, excessive air can escape in surrounding area and disturb the excisting structures. It can also cause increased overdrilling, meaning removing more material than needed. This can cause cavities in the ground, which create risk for settlements in existing structures and foundations close to the drill hole.

Controlling air escape

Previously, the solutions were limited to drilling with water or using other more expensive methods. This was the case until Elemex was born. The Elemex system is specially designed to meet these challenges, and enables urban drilling by controlling the air and minimizing air escape without jeopardizing productivity.

In fact, The Elemex system not only minimizes air escape, but also prolongs drill bit service life and, in some cases, actually drills faster than any other system available.

In urban drilling, Elemex is not only a safe choice where settlement of neighbouring buildings can be a risk with other methods. It is also a more productive and cost efficient choice.

Elemex reduces air leakage into ground, making drilling in urban areas a less risky operation. Longer service life and increased productivity are just positive side effects!

Odex

A RELIABLE SOLUTION FOR SHALLOW DEPTHS

When drilling permanent casing, particularly at shallow depths, simplicity and cost efficiency are key parameters to consider. The ability to continue below the casing is also of importance, as drilling most often continues into bedrock.

Well drilling (energy or water) or blast hole drilling in loose or broken formations, are typical applications where these demands are critical, and where Odex outperforms other solutions.

Odex, with an eccentric reaming wing is perfect for drilling casing through easy homogenous unconsolidated ground, like soil, silt, clay, sand and gravel.

Odex never leaves anything but a shoe with casing in the hole.

Reaming the way

At start, the Odex eccentric reaming wing is in the close position. When the system starts drilling at the end of the casing, the reamer swings out in the drilling position and thus enlarges the hole for the casing to advance.

At final depth, drilling is stopped and reverse rotation is applied carefully. This causes the reamer to return in to the bit, thus reducing the overall diameter of the drill string, which then can be removed from the hole leaving the casing in place. And – the drill string is ready to go for next hole!

PART OF THE SOLUTION

Our well proven casing advancement systems, Symmetrix, Elemex and Odex, are very well suited for use together with different DTH hammers and drilling rigs on the market. For a complete solution, the Terranox DTH hammers, the Mustang drilling rigs and Unigrout grouting equipment are all products committed to reliable and safe geotechnical drilling. With Atlas Copco you can get a unique in-house turnkey solution for your geotechnical drilling operation.

Terranox

DTH drilling is gaining increased interest in geotechnical applications all around the world. With advantages such as improved hole straightness and reliable performance in challenging ground conditions, this method is turning into the number one choice for many construction companies and well drillers. Terranox is a range of DTH hammers dedicated to cost efficient and reliable geotechnical drilling.

High impact energy is not needed when drilling in loose overburden material. On the contrary, high impact can create unnecessary wear and increased risk of failure on the casing advancement systems.

Terranox hammers are designed to work efficiently also at lower pressures, which makes the hammers perfect for drilling of casings.

The Terranox hammers are based on a well-proven technology with over 30 years of successful operations. Terranox hammers are rugged, reliable and easily serviced.

PART OF THE SOLUTION

Casings

In casing advancement systems it is possible to use different types of casings depending on the application.

The sizes can be from 76 up to 1220 mm, with different lengths and wall thickness depending on if the casing is to be permanent or retrievable.

Compressors

Compressed Air is most common medium to power the DTH hammer, flush out the cuttings and cool the drill string. For casing advancement systems, reliable air compressors with sufficient supply of pressure and volume is needed as part of set up in drilled casings operations.

In general, the Terranox hammer requires a 12–14 bar air pressure, and a sufficient air volume for efficient removal of drilled cuttings. Atlas Copco well known compressors are provided in a range of different sizes and configuration to suit the demands of any casing advancement project.

Mustang geotechnical drilling rigs

The Mustang rigs offer a flexible concept for drilling, well suited for most drilling methods on the market. The rigs not only provide productivity during drilling, but also ensures an efficient ownership over the rig's full service life.

The Mustang range is designed to meet the requirements of different geotechnical drilling areas where casing advancement systems are used; slope stabilization, underpinning, micropiling and well drilling.

We use standard modular components – feeds, rotary heads, boom systems and basic frames – all in order to provide the optimal configuration for the specific application.

Safety, ergonomics and daily maintenance are considered in the design to ensure operator can be safe and work efficiently.

With efficient operation and flexibility to meet your needs, the Mustang provides a unique opportunity to optimize your operation and keep the lifetime costs low.

Unigrout grouting platforms

The Atlas Copco Unigrout range offers a range of grout systems designed to seal, strengthen or consolidate formations and structures by preparing and injecting grout.

The platforms are operated by fully hydraulic power units, with electric or diesel drive. For urban applications, the Unigrout range provides a set of very compact, high performance, grouting units which are safe to operate, highly reliable and easy to clean and service.

In most of application demanding grout injection, controlling the grouting parameters is a must. Atlas Copco grouting equipment adds value by making it possible to control pressure and flow separately. For a full monitoring of the grouting treatment, the Logac electronic grout recorder, can be added to the solution.

COMMITTED TO SUSTAINABLE PRODUCTIVITY

We stand by our responsibilties towards our customers, towards the environment and the people around us. We make performance stand the test of time. This is what we call – Sustainable Productivity

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