Atlas Copco Gas and Process Solutions

The Next Generation of Pump Technology
In 1958, Carter utilized his cutting edge rocket fuel pump engineering experience to begin designing his first submerged motor pump (SMP). In 1961, he introduced the world’s first cryogenic submerged motor pump for the emerging LNG industry.

“Carter clearly established himself as the industry founder and market leader.”

An Industry is Born
As his pump design gained industry prominence, Carter clearly established himself as the industry founder and market leader. His innovative design concepts are still used today in thousands of submerged motor cryogenic pumps around the world.

As the designer and manufacturer of the world’s first submerged motor cryogenic pump, we cherish and honor the history and multitude of technical achievements that Atlas Copco JC Carter Pumps has pioneered.

From that first historic pump and our early beginnings, we have spawned a global industry. JC Carter not only gave birth to the entire SMP industry, but introduced the second generation of pump technology in 1992 which further improved the reliability of pumps.

Overview

About Atlas Copco JC Carter Pumps

Driving Innovation
Today, Atlas Copco JC Carter Pumps continues to innovate and lead cryogenic SMP technology. Utilizing the development of 21st century aerospace engineering, the company has successfully adapted a new generation of proven technological concepts and designs and incorporated them into one homogeneous cryogenic SMP for handling liquid hydrocarbons.

Launched in 2003, this technology is now referred to in the industry as 3rd Generation Motor Cryogenic Pumps. The 3rd generation pump design improves reliability and simplifies maintenance, reducing down time. Atlas Copco JC Carter Pumps is the only company to use 3rd generation cryogenic pump technology.

3rd generation cryogenic pump technology not only improves efficiency but reduces hydrocarbons for a greener world.

Partner Approach to Customer Requirements
Atlas Copco JC Carter Pumps believes that understanding customer requirements and delivering the best solution requires a partner approach toward the working relationship.

This partner approach is part of our culture and is an integral part of the value we deliver to our customers.

“Our team is renowned for product design innovation and engineering content.”
Advanced tools such as CFD analysis are used to optimize designs for maximum efficiency.

**Products Engineered for Efficiency and Reliability**

As the first company in this industry, our team of experienced engineers, technicians and staff bring combined knowledge, technology and innovative solutions to the market.

This knowledge base enables the rapid, cost-effective selection of the best design for the application or design requirement intended.

Our products are engineered for efficiency and reliability. Our team is renowned for product design innovation and engineering content. Carter engineers use advanced tools such as CFD analysis to optimize designs for maximum reliability.

**Expert Workmanship**

Manufacturing and delivering cryogenic SMP products that meet rigid quality and best-of-class standards is a function of the expert workmanship applied to every product that leaves our factory.

Expert workmanship is a vital part of our reputation which mirrors the confidence that our customers place in our cryogenic pump products.

Advanced tools such as CFD analysis are used to optimize designs for maximum efficiency.

**History:**

1946    JC Carter Pumps Company is founded
1961    First LNG Submerged Motor Pump (SMP) commercial installation
1962    JC Carter Pumps technology launches the SMP market
1995    JC Carter Pumps introduces the industry’s Second Generation Technology
2002    Using aerospace engineering, the HyPerInducer® is developed for 3rd Generation JC Carter pumps
2003    The 3rd generation patented LNG SMP is installed
2008    The HyPerInducer® patent is issued to JC Carter Pumps
2011    The company joins Atlas Copco as Atlas Copco JC Carter Pumps and continues a proud tradition of technical leadership
“From that first historic pump and our early beginnings, we have generated a global industry.”
Overview
Company Stability
Atlas Copco JC Carter Pumps has been in business longer than any other company in the industry.

With decades of experience, Atlas Copco JC Carter Pumps is now an industry leader in the development of technology that provides our customers with the most efficient and reliable machines in the industry.

The company has sales and service offices in the US and Japan and a network of representatives around the world, working in cooperation with our parent Atlas Copco Gas and Process Global sales force.

Pursuing Quality Management
Our customers expect and rely on an uncompromising standard in quality. Our quality is a result of many factors — the expert team, years of experience, knowledge of pump technologies and the practices and procedures that are applied to every product from initial concept through design and development to production.


Atlas Copco JC Carter Pumps’ production facility has world-class test capabilities providing:
- Hydrostatic pressure testing
- Engineering performance testing (H₂O, LNG, LPG)
- Customer acceptance testing (LNG, LPG)

Responsive Support at Every Stage
Atlas Copco JC Carter Pumps prides itself on long-term business relationships that have been sustained by a cadre of engineers, technicians and trainers who provide responsive pre and post support to product delivery.

The support team brings added value through its involvement in concept, design, problem solving, start-up/commissioning, training and service life.

Products that Function as Designed
We spend many hours working closely with our customers to completely understand the environment in which our products will be used. This knowledge, coupled with our engineering expertise and experience, allows us to design and deliver the right product every time. Simply stated, our products perform the way we say they will to meet customer requirements.
Overview

**Service and Spare Parts**
Atlas Copco JC Carter Pumps offers service on all our products throughout the world. Customers value our commitment to follow through after delivery.

We understand the value of uptime and do our best to provide spare parts through a variety of service programs and plans.

Our parts are genuine certified Atlas Copco JC Carter Pumps components, designed to original factory specifications. Our service technicians have many years of experience in our manufacturing plant and in the field.

**Competitive Pricing**
As suppliers, meeting our customers’ individual cost requirements is part of our service. The price our customers pay for their product must include more than just “build to specification”.

At Atlas Copco JC Carter Pumps, we work hard to keep our costs in line with our ability to deliver product and services at a competitive price.

Cost improvement programs and improvements in our manufacturing processes are continually adopted to keep costs under control and ensure that we meet this important customer objective.

Competitive pricing is an important element in the value we deliver with every product. Our goal is to provide more value and benefits coupled with the ease and simplicity of working with Atlas Copco JC Carter Pumps.

“Our products perform the way we say they will to meet customer requirements.”
Product History
The Evolution of Pump Technology

First Generation Pump Technology
In 1962, Atlas Copco JC Carter Pumps introduced the first generation LNG submerged motor pump. These first generation pumps were manufactured from 1962 to 1973.

In the early days of the Cryogenics Industry, pumps were of the shaft seal type. Eliminating the shaft seal was an important improvement in Cryogenic Hydrocarbon Liquid plant safety and in the evolution and design of SMP’s for improved performance and handling of hydrocarbon fluids. This new design of SMP’s also provides for improved plant safety and reduced maintenance costs to the owner/operators.

The invention of the Cryogenic Submerged Motor Pump required Carter to design its own special bearings, electrical cables and electrical feed-throughs. The pumps were small and single-staged and operated at 3 000 and 3 600 RPM.

Impellers were axially balanced with back wear rings, so no balance drums were included in the designs. At that time, electrical feed-throughs were single, gasketed seal type.

Second Generation Pump Technology
The introduction of the In-Tank Pump in 1973 brought a new level of safety to the industry by eliminating bottom or low side penetrations in the storage tanks.

With the need for better NPSHR for all in-tank applications, Atlas Copco JC Carter Pumps introduced the Spiral or Helical Inducer.

Improvements made in the design:
• Higher Suction Speed Designs improve NPSHR
• Reduced vibration when operating near the design point
• Change in diffuser design for longer bushing life on multi-stage HP pumps
• Improved bearing designs
• Balance Drum Assemblies became standard on all pumps
Driving 3rd Generation Technology

While virtually all competitive systems sold today throughout the world still use second generation technology, Atlas Copco JC Carter Pumps has continued to establish itself as an industry leader with the introduction of third generation of pump technology in 2003.

This new technology offers many advantages over the previous generation designs:

• Reduced power consumption due to higher pump efficiency — 5-15% higher efficiency than industry average making it the greenest cryogenic pump available anywhere
• Higher plant revenues over previous designs as a result of higher pump efficiencies (less boil off gas and lower power consumption)
• Smaller boil off gas compressors and condensers required reducing capital investment
• Lowest NPSH values in the industry and higher net storage tank capacity due to patented HyPerInducer® — More than one meter of additional tank available storage.
• Higher specific speed hydraulics which offer slimmer profile machines, lower tip speeds and reduced rotating mass.
• Smallest column size for in-tank pumps in the industry

Atlas Copco JC Carter Pumps is the one and only manufacturer to offer the patented HyPerInducer®. Originally developed with space age technology for jet engine fuel pumps, this unique design allows tank pumping levels to be lowered 1-2 meters, providing access to more live storage capacity.
Modular Advantages:

- Component Modularity allows stages of the pump to be added to increase head while maintaining a constant flow.
- Easy to maintain because the maintenance groups are familiar with repeatable designs/component assemblies.

3rd Generation Design Advantages over 2nd Generation Design:

- A smaller size pump means a smaller pump column.
- Better NPSH means access to more tank capacity.

“Up to 15% higher efficiency than industry average.”

3rd Generation: Best-In-Class Inducer Designed for Performance (1600m³/hr In-Tank Pump)
High Efficiency, Less Boil Off Gas, Improved Reliability

1st Generation
Fan Inducer – 1962
Nss < 25 000
NPSHR > 2.6 m

2nd Generation
Spiral Inducer – 1975
Nss < 45 000
NPSHR > 1.4 m

3rd Generation
HyPerInducer – 2002
Nss < 100 000
NPSHR > 0.4 m
“As the first company in this industry, our team of experienced engineers, technicians and staff bring combined knowledge, technology and innovative solutions to the market.”

Our unique Component Modularity design is made up of separate stages which can be easily added to increase head. This design improves reliability and simplifies maintenance, reducing down time.
Our Solution for You
SMPs Designed for More Energy Efficiency

Carbon dioxide (CO$_2$) is produced from a combination of fossil fuels. It is a by-product of all power plants where fuel is converted to CO$_2$. The combustion of all carbon containing fuels will yield CO$_2$ (and in most cases, water).

For example: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

CO$_2$ causes severe health effects when concentration exceeds certain limits. Increase in CO$_2$ emissions also causes greenhouse effect.

Power plants using coal as fuel also produce carbon monoxide (CO). CO poisoning is the main type of fatal air poisoning in most countries.

Atlas Copco JC Carter Pumps’s 3rd generation pumps are designed for a greener world by using less power as a result of providing the best-in-class efficiency. By using less energy to operate our pumps, power plants supplying the energy release fewer CO$_2$ and CO.

“Smaller energy demand of Atlas Copco JC Carter Pumps pumps reduce power plant CO$_2$ and CO emissions by reducing energy demand”
Atlas Copco JC Carter Pumps
Pump Applications

Low Pressure In-Tank Pumps
These pumps are installed inside a storage tank in a vertical discharge column and are used to transfer liquid from the storage tank.

High Pressure Pot Mounted Pumps
These pumps are installed into a pressure vessel called a suction pot or suction vessel. The suction vessel becomes the outer casing of the SMP. They are used for product send out, product transfer and increasing pressure of cryogenic liquids within a system.

Large In-Tank Pumps for LNG & LPG Export Terminals
In-Tank and Suction-Vessel Mounted Process Pumps
Large Suction-Vessel Mounted LNG and Process High Pressure Pumps

Liquefaction Plant Applications
NGL Processing Plant Applications
Regasification Plant Applications
3rd Generation Pumps – Low Pressure In-Tank Pumps

2. Vertical turbine bowl diffusers for more stable operation over entire operating range: eliminates rotating stall and improves pump efficiency.
3. High efficiency impellers with low tip speed: long life.
5. One piece hollow pump shaft: reliable, easy maintenance.
6. Active thrust balance system: longer bearing life.
7. Long aspect ratio/slim profile motors: high efficiency.
8. Robust hollow rotor shaft: easy maintenance.
9. Deep groove stainless steel or ceramic cryogenic bearings.

Technical Data:
Size: Up to 800 kW
Capacity: Up to 3,000 m³/hr
Head: Up to 350 m
Efficiency: Up to 84%
Fluid Temp: Ambient to -196° C
Pump Ns: 1250, 1600, 2000, 2500, 3200
Materials: SS, Aluminum Alloys and Bronze
Motors: 50 & 60 Hz designs, variable speed, 2-pole, 4-pole, up to 6,600 volts.
3rd Generation – High Pressure Pot Mounted Pumps

1. Atlas Copco JC Carter Pumps patented HyPerInducer® has the capability to handle fluids with high vapor fractions.
3. Multistage impeller design with collets, bronze wear rings and bushings: high pressure, high efficiency, high reliability.
4. One piece pump shaft: a constant diameter provides dimensional stability.
5. Active thrust balance system: longer bearing life.
7. Robust hollow rotor shaft: easy maintenance.

Technical Data:
- **Size**: Up to 3,000 kW
- **Capacity**: Up to 600 m³/hr
- **Head**: Up to 3,000 m
- **Efficiency**: Up to 83%
- **Fluid Temp**: Ambient to -196°C
- **Pump Ns**: 1,000, 1,250, 1,600
- **Materials**: SS, Aluminum Alloys and Bronze
- **Motors**: 50 & 60 Hz designs, variable speed, up to 6,600 volts
In-Tank & Suction Mounted Process Pumps

Atlas Copco JC Carter Pumps patented HyPerInducer® has the capability to handle fluids with high vapor fractions.

Multistage radial diffusers:
wide, stable operating range

Multistage impeller design with collets, bronze wear rings and bushings: high pressure, high reliability

One piece pump shaft: a constant diameter provides dimensional stability

Active thrust balance system: longer bearing life

Robust hollow rotor shaft: easy maintenance

Upper/lower AISI 440C SS ball bearing: reliability

Technical Data:
Size: Up to 200 kW
Capacity: Up to 200 m³/hr
Head: Up to 1000 m
Efficiency: Up to 78%
Fluid Temp: Ambient to -196° C
Pump Ns: 800, 1000
Materials: SS, Aluminum Alloys and Bronze
Motors: 50 & 60 Hz designs, variable speed, up to 660 volts
Service and Spare Parts Program

Supporting your Needs
Atlas Copco JC Carter Pumps has been providing SMP service and spare parts longer than any other company in the world.

We understand the importance of excellent service and have developed programs which support your needs from installation and commission through the product’s entire life cycle.

Our service technicians are factory certified and know how to handle installation, commission, on-going support, maintenance and emergency repairs.

Emergency Repairs
We provide programs that schedule regular maintenance as an important part of keeping your system operational and efficient.

We know the importance of uptime and reliability and do our very best to keep your equipment on line and available at all times.

At Atlas Copco JC Carter Pumps, our service team provides regularly scheduled maintenance programs and will perform overhauls as needed to keep your pumps running at peak efficiency.

During routine maintenance, our technicians will support your team with service reports to ensure the pumps receive the proper servicing to ensure optimum reliability.

“Our service technicians are factory certified and know how to perform installation, commission, on-going support, maintenance and emergency repairs.”
Spare Parts Program
Given the lead time for spare parts, we can provide a program to ensure our best effort to get your system up and running as quickly as possible by keeping genuine Atlas Copco JC Carter Pumps spare parts on site for just such an emergency.

Spare Parts Insurance Program — Atlas Copco JC Carter Pumps will stock the most critical components for your pump at our factory. This will ensure that your pump will be repaired as quickly as possible.

We offer spare parts programs with and without sending factory technicians to your site, depending on your comfort level.

Overhauls and Factory Reconditioning Programs
During routine maintenance, emergency repair, or at the end of a life cycle, our technicians may make recommendations to tear down and rebuild, recondition or replace your pump. On site rebuilds carry a limited warranty on all Atlas Copco JC Carter Pumps replaced components.

Our support team can rebuild the pump on site or and send it back to the factory to be restored to original factory specifications, be retested and carry a new pump warranty.

We are experts in rebuilding and reconditioning pumps and have the technical expertise to do it right the first time.

“We are experts in rebuilding and reconditioning pumps and have the technical expertise to do it right the first time.”
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