Low Pressure Vacuum Carburizing offered at Solar

Vacuum carburizing is a powerful heat treating process for improving the wear life and surface hardness of various materials. This process is achieved by placing the part to be treated in a vacuum furnace, where it is heated in the presence of a controlled atmosphere. The process removes the oxidizing gases from the part surface and substitutes a highly protective carbon rich gas mixture, which reacts with the material surface and diffuses into the part, producing a case with a surface hardness much higher than the base metal. Process conditions are established to produce a specific and desired depth of case without affecting the hardenability of the base metal.

The advantages of the Solar Atmospheres vacuum carburizing process include:
- No need for consumable fluxes
- No post-process cleaning
- Produced parts require no finish grinding
- Produces parts that must be non-magnetic due to the absence of flux
- Quenching and tempering times are significantly reduced
- The hardenability of the base material is not affected
- Parts can be removed from the furnace with little or no distortion
- Does not require large furnaces
- No harmful chemical emissions
- Environmentally friendly

Solar Atmospheres, a pioneer in the field of vacuum heat treating, has developed a unique process that is suitable for a wide range of applications. The process is designed to produce parts with a high degree of case depth uniformity and maximum case hardness, ensuring that the parts meet or exceed the requirements of the most demanding applications.

Vacuum Atmospheres of Western PA is proud to be a pioneer in the next generation of case hardening. The benefits of vacuum carburizing include:
- Wear resistant surface with case depth uniformity
- Maximized case integrity
- Clean parts that do not require post-process washing
- Process results in minimal distortion
- The process provides a controlled atmosphere that is free from oxygen or other contaminants

So, why choose Solar Atmospheres for your vacuum carburizing needs?
- Expertise in a wide range of industries
- Customized solutions for your specific needs
- Process that is reliable and consistent
- Long-term relationships with customers

Vacuum carburizing is a powerful heat treating process that is widely used in the aerospace, automotive, and machine tool industries. Solar Atmospheres is committed to providing the highest quality service and products to ensure customer satisfaction.

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The Firearms Market

The firearms market has been a strong market as of late. The strength is not just in the civilian market but also the military and law enforcement markets. The firearms market has been hard in recent years due to intense amounts of media being brought to the forefront. To combat this, the firearms manufacturers are using technologies such as nitrogen molecular cleaning and heat treating. This is done to improve the performance of the firearm while also improving the longevity of the firearm.

During the “North Hollywood Shootout” in February of 1997, the Los Angeles Police Department used the new HK416D for the first time in a law enforcement operation. For the HK416D, Solar was contracted for process development and metallurgical consultation for any application, which enabled customers to consistently and quickly achieve their performance goals.

Solar Atmospheres also provides services for vacuum carburizing, which eliminates intergranular corrosion characteristics of atmospheric carburizing. Solar’s vacuum carburizing ensures a case with very accurate, uniform, and repeatable case depths. Uniform case depths, such as root to pitch ratios in gears of better than 90%, improve dimensional stability, which in turn enhances the performance characteristics. Solar’s LPVC (low pressure vacuum carburizing) process delivers better control of carbon distribution than atmospheric carburizing. Unlike other vacuum processes, LPVC is capable of handling massive parts too large to be placed inside a vacuum chamber. In one of the largest LPVC applications to date, Solar completed a massive .50 Beowulf chamber and barrel for a local military contractor.

Durability. The principle benefits of nitriding are anti-galling, improved fatigue strength, and the corrosion resistance. Both process development and metallurgical consultation for any application are available. Solar’s LPVC process provides case depth of at least 4.0 to 6.0 in. for the standard use of heat treating.

Vacuum Heat Treating Applications for Performance Racing

Solar’s process produces critical components, valve, and other titanium components. Various powder metallurgy components, but not used to be. A major advantage to using these components is their production of a hard wear surface that is compressive stress in the parts surface for improved fatigue life not achievable with conventional heat treating. The vacuum process provides critical metals of high purity, are produced within dimensional tolerances, and improves performance characteristics.

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Metalloids Engineering degree and background.

Did you know?

Solar Atmospheres provides the highest quality standards of metal in low heat treatment. Using the most advanced equipment, the solid state heating allows for optimum case hardness and increased fatigue strength. No other present alternative processes have been able to duplicate the results shown by Solar Atmospheres.

Sustaining long-term growth and profitability.

Providing our employees with an opportunity for personal growth, challenge and reward.

Maintaining a workplace that is environmentally friendly.

Providing our employees with ample opportunities for personal growth.

The other option is to try and heat treat the part as is. As the part is heated to a higher temperature, the material will lose strength; the stored stress will push or pull the part, resulting in part distortion.

An interesting historical tidbit; automotive companies used to leave cast iron engine blocks outside in a yard for up to a year to let them stress relieve in hot and cold weather. This is known as “naturally” stress relieving. Should you be stress relieving your parts or tools?
Vacuum heat treating provides the highest quality standards of obtainable heat treatments. The 787 has become the fastest selling wide body airliner in history, and Boeing has leapfrogged most of its competitors. This is due to the fact that Boeing's 787 is capable of carrying more passengers than any other plane in its category. The 787's lighter weight construction; the plane's materials consist of 50% composite, 20% aluminum, 15% titanium, 10% steel, and 5% other. The titanium that Boeing is vacuum heat treating for this aircraft was received from our front-line troops. The law enforcement market has seen a long and steady growth period after the astonishing "North Hollywood Shootout" in February of 1997. Since then, police departments have been equipping themselves with short-barreled, high-velocity carbines capable of achieving a greater range of effectiveness. LWRCI is a company that provides a wide range of tools and accessories for tactical and competitive shooting. LWRCI has become the primary supplier of high-quality firearms and components to the military.
Vacuum Heat Treat Applications for Performance Racing

Vacuum heat treating provides the highest quality standards of endurance to the heat treating industry by providing manufacturing facilities and processes to make repairs to the racing firearms components, coatings and surface treatments play an important role. Currently, this is a common practice with race cars and is an integral part of the racing industry. It is a process that is used to reduce surface roughness, impart surface hardness, and enhance surface durability. Beowulf is a trademark of Alexander Arms. Solar Atmospheres has a new "oxy-nitriding" process Solar has developed. This process produces a hard wear surface that is resistant to wear and tear. This technology is poised to provide the latest in vacuum heat treat processing to the stringent requirements of the performance racing sector.

Did you know?

Some were shut down in the past due to a lack of data or a misunderstanding of the manufacturing process. Some of the common causes of residual stresses are: cold working, welding, grinding, and machining. These stresses can be relieved by heating a part to the temperature range of 1100 - 1200° F and holding for an hour or two (based on the part's material). This process is known as stress relieving.

Solar Atmospheres of Western PA adds a new face to staff

Eric Carothers for the technical sales position. Eric has been involved in the metal finishing industry for over 10 years. Eric's customer experience will be beneficial and he is excited to be a part of the Solar Atmospheres team. Solar Atmospheres of Western PA, 2590 13th Avenue, Hermitage, PA 16148. Eric can be reached at 724-843-2200 ext. 26.

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Low Pressure Vacuum Carburizing offered at Solar Atmospheres

Solar Atmospheres offers low pressure vacuum carburizing as the optimum case hardening process for your parts. Developed from over 6 years of research and development, this process has proven to produce parts that will outlast the competition. The benefits of vacuum carburizing are wear resistant part integrity. Vacuum carburizing coupled with high pressure cleaning parts that do not require post-process washing. The benefit of minimized distortion is a reduced amount of post heat treating and finishing operations. Heat treating operations in a vacuum furnace, free from oxygen or other contaminants, prevent the formation of inner-granular oxidation and oxide scaling at the surface. Vacuum carburizing offers more accurate control of the case and core properties than any other case hardening method will produce.

Vacuum brazing is a batch process used to join parts by placing them in a vacuum furnace, free from oxygen or other contaminants. The parts are heated under vacuum by radiant heat from heating elements. No flux is used in these furnaces because the pressure and temperature combine to form a filler metal that will melt above 840° F. The liquid filler metal is drawn between the closely fitting surfaces by capillary action. Brazing does not melt the base metal, only the filler metal.

The most important consideration when brazing is part design. It is so important to successful brazing that Solar offers on-site consultation to assist in the design of components. Filler metal is selected to ensure its compatibility with the parts being joined. Typical brazing applications include the case depth root to pitch ratios of approximately 70%. Solar Atmospheres is a leader in the field of vacuum brazing. We can join dissimilar materials such as copper to stainless steel. Some of the other common materials that are brazed include carbon steel, alloy steel, tool steel and high nickel alloys.

Solar Atmospheres has developed a state of the art vacuum equipment that offers cycle repeatability from load to load and digital paperless recording instruments that simplify the customer's review of heat treating charts.

For more information, contact Solar Atmospheres.

Vacuum Brazing at Solar Atmospheres

Solar Atmospheres can provide the most efficient vacuum brazing process for joining metals by heating them in the presence of a filler metal that will not above 840° F. The liquid metal is drawn between the closely fitting surfaces by capillary action. Brazing does not melt the base metal, only the filler metal. The benefits of brazing are: parts that do not require post-process washing, the benefit of minimized distortion is a reduced amount of post heat treating and finishing operations and the parts can be removed from the furnace cleaner than they were placed in.

The most common type of brazing process is that at 800° F, where the filler metal melts at 840° F. Solar Atmospheres is a leader in the field of vacuum brazing. It is so important to successful brazing that Solar Atmospheres offers on-site consultation to assist in the design of components. Filler metal is selected to ensure its compatibility with the parts being joined. Typical brazing applications include the case depth root to pitch ratios of approximately 70%. Because the process is performed at sub-atmospheric pressures, the ability to carburize deep into blind holes is also an inherent advantage.

Vacuum carburizing offers a level of precision not available in conventional carburizing equipment. Solar Atmospheres has developed a state of the art vacuum equipment that offers cycle repeatability from load to load and digital paperless recording instruments that simplify the customer's review of heat treating charts.

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Low Pressure Vacuum Carburizing offered at Solar

Solar Atmospheres offers low pressure vacuum carburizing as the optimum case hardening process for your parts. Conventional vacuum carburizing allows gases to reach even the blind holes of complex parts to provide a uniform case depth. The benefits of vacuum carburizing include:

- No flux or cleaning required
- Longer tool life due to reduced distortion
- Minimized post-process washing
- Clean parts that do not require post-process washing
- Reduced amount of post-heat treating and finishing operations
- Prevents oxidation and oxide scaling at the surface
- Heat treating operations in a vacuum furnace, free from oxygen or other contaminants, prevents the formation of inner-granular oxidation and under scaling at the surface.

Vacuum carburizing offers a level of precision not available in conventional carburizing equipment. Solar Atmospheres has developed a process that can heat treating parts just like the heating elements. The heating elements are placed inside the vacuum furnace. The entire part is heated under vacuum by radiant heat from heating elements. No flux is used in these furnaces because the pressure and temperature combine to reduce surface oxides and allow the liquid filler metal to wet the base metal. Assemblies come out of the furnace cleaner than they went in. By far, the most common type of material brazed at Solar is 300 series stainless steel. Stainless steel is brazed using a vacuum brazing furnace. The vacuum brazing process involves placing parts into a vacuum furnace, heating the parts above the melting point of the filler metal, and then removing the parts from the furnace. The parts are then assembled and sealed. The process is performed in a vacuum to prevent oxidation of the parts. Solar Atmospheres is proud to be a leader in vacuum technology while displaying our dedication to resolving any technical issue, inherent within any new program involving an airplane. The Boeing 787 Dreamliner is a mid-sized, wide body, twin engine jet airliner developed by Boeing Commercial Airplanes. It seats 210 to 330 passengers based on the configuration. The most important consideration when brazing is part design. It is so important to successful brazing that Solar offers a dedicated team of engineers to assist with the design of the art. The team has developed robust tools that offer repeatable success from load to load and digital recording documents that simplify the customer’s review of the brazing charts.

For many different reasons, brazing has been developed and is available to ensure tight case depth requirements. Vacuum carburizing offers a level of precision not available in conventional carburizing equipment. Solar Atmospheres has developed a process that can heat treating parts just like the heating elements. The heating elements are placed inside the vacuum furnace. The entire part is heated under vacuum by radiant heat from heating elements. No flux is used in these furnaces because the pressure and temperature combine to reduce surface oxides and allow the liquid filler metal to wet the base metal. Assemblies come out of the furnace cleaner than they went in. By far, the most common type of material brazed at Solar is 300 series stainless steel. Stainless steel is brazed using a vacuum brazing furnace. The vacuum brazing process involves placing parts into a vacuum furnace, heating the parts above the melting point of the filler metal, and then removing the parts from the furnace. The parts are then assembled and sealed. The process is performed in a vacuum to prevent oxidation of the parts. Solar Atmospheres is proud to be a leader in vacuum technology while displaying our dedication to resolving any technical issue, inherent within any new program involving an airplane. The Boeing 787 Dreamliner is a mid-sized, wide body, twin engine jet airliner developed by Boeing Commercial Airplanes. It seats 210 to 330 passengers based on the configuration.