

Making Real Things That Really Make A Difference

February 2017

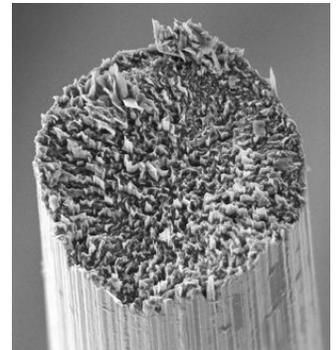
Liquid Ring Vacuum Pumps

Customer: Cytec SOLVAY Group

Solvay is a global company that was created in 1863 to serve markets from consumer goods to energy with one main goal: to improve quality of life and customer performance.

Tuthill products come into play with Solvay's Cytec Aerospace Materials division in South Carolina. This group makes carbon fiber for automotive and aerospace industries.

Carbon fiber products offer advantages for advanced material solutions such as light-weight, high-tensile strength, manufacturing flexibility and heat resistance. Cytec Solvay offers a range of carbon fiber products that deliver superior structural, thermal, electrical and frictional performance for a variety of unique applications, including brakes, defense systems and commercial aircraft. Their carbon fiber portfolio includes: PAN-based carbon fibers and Pitch-based carbon fibers. Polyacrylonitrile (PAN) is a synthetic, semicrystalline organic polymer resin. PAN fibers are the chemical precursor of high-quality carbon fiber. PAN is first thermally oxidized in air at 230 degrees to form an oxidized PAN fiber and then carbonized above 1000 degrees in inert atmosphere to make carbon fibers. Pitch is a viscoelastic material that is composed of aromatic hydrocarbons. Pitch is produced via the distillation of carbon-based materials, such as plants, crude oil, and coal.



Magnified view of carbon fiber



Carbon fiber strands

Carbon fibers are fibers about 5–10 micrometres in diameter and composed mostly of carbon atoms. To produce a carbon fiber, the carbon atoms are bonded together in crystals that are more or less aligned parallel to the long axis of the fiber as the crystal alignment gives the fiber high strength-to-volume ratio (making it strong for its size). Several thousand carbon fibers are bundled together to form a tow, which may be used by itself or woven into a fabric.



Tuthill's KLRC liquid ring vacuum pumps are used in two processes at Cytec Solvay. The first process uses KLRC 525s for the vacuum conveying of carbon fiber strands, miles long, back and forth throughout the plant without breaking them. The second application uses our KLRC 300 to remove excess and by-product gases which react with the fiber to achieve a specific effect or to prevent other undesirable reactions.

While you may not easily recognize a Cytec Solvay component, they are most likely having an affect on you today. Consider that a vehicle's weight directly impacts its fuel consumption and hence its CO2 emissions. Their solutions are designed to replace metal so as to significantly reduce the weight of a vehicle without compromising safety.

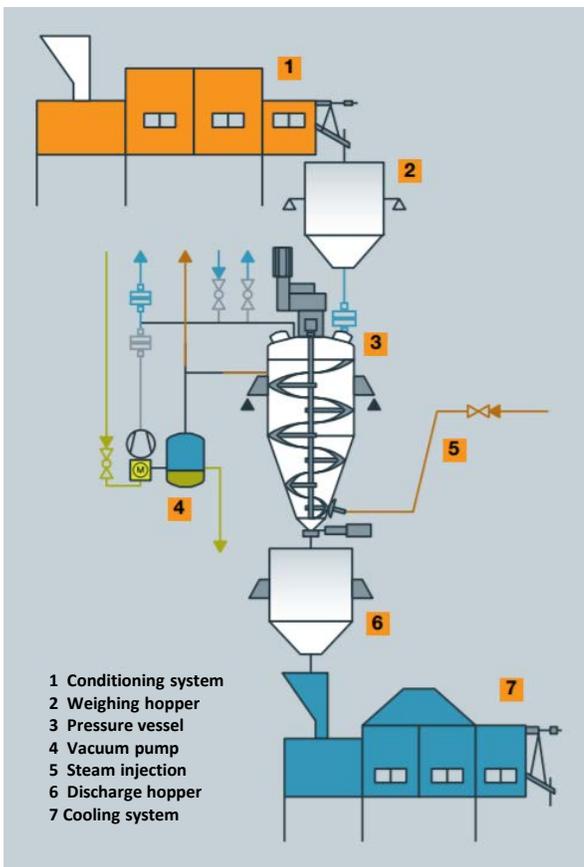
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SDV Vacuum Pumps and Vacuum Boosters

Customer: Planters Co – Fort Smith, AR

Planters is well known for its Mr. Peanut icon and the traveling NUTmobile. While nuts have been a long-time snacking favorite of many, today they are even more popular as a healthy, nutritional snack option. Most likely many of us have never considered how nuts are prepped for consumer consumption though. Without proper care, nuts can actually cause major health problems.



To understand the risk, take a look at almonds. In 2007, it became illegal for raw almonds to be sold in the U.S. What brought about this law was an outbreak of Salmonella in Canada that was traced back to an almond grower in California. The California Department of Health Services stepped in to help this grower increase the safety of his almonds, and that appeared to be the end of it. But a second surprising outbreak of Salmonella occurred shortly after, and several government agencies got together to mandate treatment so there would be no more Salmonella outbreaks. If you are thinking how strange it is that Salmonella would occur in something as dry as almonds, you are not alone. To achieve a dramatic reduction of salmonella, almonds had to be treated in one of two ways: **Exposure to heat sufficient to raise the temperature to 200 degrees OR insertion of the nuts into a closed chamber to be fumigated with propylene oxide gas.** Propylene oxide is classified as hazardous to health under the Globally Harmonized System of Classification and Labeling of Chemicals for its acute toxicity, ability to cause irritation, and its mutagenic and carcinogenic properties. Option two is not so tasty!

For foods with a low moisture content, there are a number of solutions for effective pasteurization and sterilization – tailored to the processing of nuts, cocoa, and seeds. The use of steam is ideal as it is natural, inexpensive and can be produced in an unlimited supply. It is a natural organic process that does not leave behind any chemical residue nor does it create toxins. The heat resistance of pathogenic germs strongly increases as water activity decreases, so in dry food items, the use of steam significantly improves inactivation. Effective steam treatment will eliminate listeria, Salmonella, E. Coli, and a variety of other bacteria and pathogens.

Many sensitive products must be processed at temperatures below 100 °C to maintain their unique properties. It is therefore important for the required pasteurization to be carried out at reduced pressure to keep the evaporation temperature and moisture condensation low during the process. On the other hand, a certain product surface moisture is important to achieve the desired log reduction of salmonella. After pasteurization, products such as almonds show no significant changes in terms of appearance, taste, texture or color, therefore there is no skin loosening and no significant changes in the volatile oil fraction.

In 2007, Planters installed Tuthill's SDV 800/MB1600 dry screw booster system at their Fort Smith, Arkansas facility. The system is used to pasteurize the raw nut meats before they are introduced into the facility for processing. The nut meats are loaded into containers and placed inside a vessel. The vessel is then sealed and the vacuum system lowers the vessel pressure to around 2 torr. Steam is then introduced into the vessel while the pump is still pulling a vacuum, ensuring the steam reaches all of the nut meats for the pasteurization process to be complete.

