

# drive technology

in the food industry

The greatest thing  
since sliced bread!

Rotisserie!  
Air Powered Kebab Skewer



Air Motors used to  
stir Fruit Juices

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## Editorial

Various manufacturers have implemented mechanical solutions and automation into their production process. The food industry is one of the industries that now uses many different automated processes. Besides achieving an increase in their production efficiencies, the manufacturers see the necessary requirements in regards to hygiene as one of the main reasons to automate.

An ideal drive for the food industry is the air motor made from high-grade stainless steel, because it can be used in humid and wet environments and is also certified for usage in potentially explosive areas. These motors are available in a variety of models since they can be combined with many different gears, which are made from high-grade stainless steel as well. Additionally they may be equipped with a holding brake that will expand the application spectrum even further. The smooth surface of a fully-sealed motor is easy to clean and the stainless steel material can withstand humidity and is insensitive to the acid in cleaning solvents.

This special editorial will explain in detail the variety of usage of air motors showing three applications: the processing of fruit juices, dispensing of flour and air motors in meat production.



## Put some juice in your production

**Fruit juices are bursting with health since most are made from real fruits. The drinks provide countless vitamins and minerals, and are perfect for the health-conscious.**

Many scientific studies underline the connection between an ample and varied intake of fruits and vegetables, and the reduction of diet-related illnesses. The initiative "5 a day" has the goal of persuading people to eat five pieces of fruit or vegetables per day in order to meet all the body's needs. If you require a quick fix, then the practical answer is a portion of fruit or vegetable juice.

In Germany, apple juice wins the top spot as the nation's favorite drink, followed by orange, multi-vitamin and grape juice. In 2007, around 800,000 tons of fruit were processed into 4.04 million liters of fruit juice drinks. There are 411 fruit juice manufacturers with approx. 7,000 employees that currently belong to the German fruit juice industry's registered association. There is also a great variety of fruit juice drinks on offer in supermarkets. Glass and plastic bottles, jars and cartons with bright, eye-catching printed designs compete on the shelves to catch consumers' attention.

"Smoothies", fresh fruit-drinks that are more syrupy than standard juice, are the newest fad from the United States. They are another practical way to boost your daily fruit intake. One popular children's drink packaged in an aluminium packet with an attached straw has been on the market for over 40 years.

Lots of people do not drink enough, especially children. Nutritional experts say adults need between 1.5 and 2 liters of fluid a day, while children over 10 need 1.5 liters per day and younger ones a full liter. Mineral water, unsweetened tea drinks, fruit squash, fruit juice and other fruit drinks, are all tasty ways to fulfil your daily fluid intake.

In one litre of apple juice, you get the equivalent of the benefit of three kilos of apples! Before it gets into the glass, though, fruit juice has a long road to travel. Today, the manufacturing of juices, fruit drinks and smoothies is mainly automated. Because hygiene standards are very important, the production and packaging of fruit juice is controlled by computers to ensure high processing safety. When designing automation equipment, only those components are used which fulfil the necessary hygienic requirements. Even drive elements, such



as air motors are required to adhere to all the strict guidelines of the industry.

Only the so-called “direct juice“ is immediately filled into bottles or cartons after the fruit processing. The usual practice is to remove most of the water after pasteurisation, so that the fruit concentrate



## VERSATILITY

# Power through air

### The function of an air vane motor

Because of the large product range, the simple construction, the low weight, the expansive speed range and the explosion-proof design, air motors are used in a wide spectrum of industries.

The function of an air motor is simple:

Basically, compressed air is piped to the motor, which causes it to rotate.

As the rotor is set in motion inside an eccentric cylinder, a series of slot mounted vanes are pushed outward against the cylinder wall by the centrifugal force.

This forms additional working chambers for the compressed air.

The continued expansion of the compressed air transfers the pressure energy into kinetic energy and a rotational movement is generated.

can be stored and transported more easily. Manufacturers then mix the concentrate with water and sugar according to their own secret recipe to create the actual drinks. This is done in large containers where the mixture is both stirred and heated to 80 degrees Celsius so that it will be sterile when it reaches the final packaging station.

The automatic agitators that are used to do this stirring, need to be equipped with motors that are both heat resistant and resilient - making stainless steel air vane motors an excellent choice for applications in the food industry.

For example:

For the mixing and blending of fruit juices, an air motor that generates a power-output of 300 Watt and a nominal speed of 700 rpm is used. This robust and reliable motor is used to rotate the propeller mixer or the dissolver disk of a magnetic mixer.

DEPRAG SCHULZ GMBH & CO., based in Amberg, Germany, has long been a renowned specialist in the field

of air motors, and its ADVANCED LINE motor line is widely recommended for use in the food industry. The motor line includes a comprehensive selection of non-corrosive, sealed air motors, suitable for oil-free use in the food processing industry.

The ADVANCED LINE motors are small and therefore practical for handheld machines and also for larger automated systems. The motors' power spectrum ranges from 20 W to 1.2 kW, beginning with low torque motors and moving up to fast motors with a speed range of 24,000 rpm.

The ADVANCED LINE has now been expanded to include motors with extremely high torque output. Those compact drive solutions made from a high-grade stainless steel material, generate an extreme high power output while using a small environmental footprint. This size advantage is especially helpful for integration into automation equipment.

The diameter of a DEPRAG high-torque motor, made from stainless steel, is just about 63 millimeter for the 280 Watt,

570 Watt and 900 Watt versions.

These motors are equipped with a high-torque, stainless steel planetary gear for a power output of 900 Watt and a speed of 6,000 rpm.

This standard motor series can be combined with a variety of 7 different planetary gears and because of this gear variety, a speed reduction to 150 rpm is possible. Now, with the addition of 4 new planetary gears, a speed reduction to 20 rpm is possible. In the words of DEPRAG product manager Dagmar Hierl: "The large assortment of stainless steel motors assures that DEPRAG is the market leader for motors in this size. We are now able to offer an ideal solution for any application requirement."

There are many advantages when using an air motor as the drive element. The main benefit of an air motor is its power density. Depending on its design, the typical air motor is a third of the size and a fifth of the weight of a comparable electric motor. This is important not only in handheld machines, but in robot systems or NC machines as well.

The performance yield of an air motor is also nearly constant over a large torque range, which means it can be optimally operated under an equally wide range of loads. Motor power is altered by adapting the operating

pressure, while torque can be smoothly and continuously changed by throttling the air inlet. Unlike an electric motor, an air motor can be loaded to standstill without causing any damage. After reducing the load, the motor will immediately run again, as many times as required, even with a constant 100% duty cycle.

Over the decades, DEPRAG engineers have continued to update the air motor line to meet the needs of the company's customers. In the words of DEPRAG product manager Dagmar Hierl: "The ADVANCED LINE motors have been developed specifically to comply with the high hygiene standards of the food and medical industries. The smooth surfaces are easy to clean and the drive is resistant to harsh cleaning agents".

The motors are completely sealed, so that they will not leak any air or let in any dirt. The motor spindle is resistant to chemical cleaning agents and the radial shaft sealant ring has a particularly long life span. An air motor is insensitive to heat, because the cold compressed air cools the motor. Air is also an unproblematic energy source, without the hazards that can occur with an electric motor.

### For the Food Industry

## Hygiene is a Must!

### Stainless Steel Drives

Air motors made from high-grade stainless steel are the ideal drive solution for production machines in the food industry. The DEPRAG ADVANCED LINE offers a large variety of air motors having immense advantages:

- Made from stainless steel
- Oil-free operation
- Completely sealed: exhaust air will not leak out of the motor; dirt, water or cleaning solvents cannot get into the motor
- Smooth surface is easy to clean
- Material is insensitive to harsh cleaning agents
- Multitude of integrated planetary gears are available
- New high-torque motors, made from stainless steel, offer a torque capacity of up to 600 Nm and a reduced speed of down to 7 rpm
- ATEX certification available for the use of motors in an potentially explosive environment



Sealed

**SUITABLE FOR UNDERWATER  
APPLICATIONS**

## Stainless steel air motors for highest hygienic requirements

Applications:

- Food industry
- Agitators
- Medical technology
- Pharmaceutical industry
- Underwater

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Sterile &amp; Hygienic

**FOR SAFE CLEANROOM  
PRODUCTION**

## The greatest thing since sliced bread!

Drive solutions for the milling industry

**Germany is known worldwide for its wide-ranging selection of breads and pastries. This, in turn, poses a serious challenge for the country's over 700 mills, which supply Germany's baking industry with high-quality milled grains. According to The Association of German Millers, more than 6,000 Germans now earn their daily bread milling grain. In Germany, the per-capita-consumption of milled grains is 67.1 kilograms per year, and increasing. In all, Germany's milling industry generates revenues of about 2.1 billion Euro while producing flour from 7.7 million tons of wheat and rye.**

The job of a miller is an interesting one! Instead of hauling sacks, sweeping floors and changing the millstone, the job now requires an understanding of processing technology in the milling and grain industry. That includes computer control and quality assurance, which are part of the milling process. Especially large mills have integrated automation, which presents a continued challenge for the machine integrators servicing the milling, transfer and processing industry.

Individual components, as well as turnkey systems are needed and the competition is great.

Explosion prevention is a critical issue, because of the amount of dust generated in a typical mill and the hygiene standards are, as demanded by the food industry, very high. The processing safety and traceability are therefore of high importance to a mill. The drive components that are used in the milling, transfer, and processing technology, need to comply



with the highest requirements. Motors need to be hygienic, easy to clean, suitable for use in the food industry and if possible designed for use in an explosive environment. The wish list, directed at the motor manufacturers and system integrators, is a long one.

Air motors made from high-grade stainless steel are the ideal solution for this type of requirement.

DEPRAG SCHULZ GMBH & CO. located in Amberg, Germany, is an internationally known market leader of air motors, screw-driving systems, automation equipment and power tools. Through decades of development, DEPRAG engineers have continued to expand the air motor line. Now, the ADVANCED LINE offers quality stainless motors that combine many advantages.

Hygiene is a major requirement of the industry that mills the grain for our daily bread. The ADVANCED LINE air motors are uniquely qualified for use in the food industry, because of their robust and fully sealed design and the high-grade stainless steel material. The smooth surface is easy to clean and the material is also insensitive to harsh cleaning agents. The motors are fully sealed; no exhaust air can leak out and no dirt can enter the motor.

The drive spindle is made to be resistant to chemical cleaning agents as well and a customized radial shaft seal-ring with extended longevity has been integrated.

The functionality of an air motor is the reason why they are so well suited for these critical applications. As the decompressing air makes its way through the motor it loses temperature, keeping the motor cool and eliminating overheating even under load. The fact that the motor is pressurized prevents the intrusion of dust and dirt. The stainless steel air motors of the ADVANCED LINE are well suited to oil-free operation, an essential feature with respect to clean rooms and throughout the food industry.

Explosion prevention is an important requirement of the milling industry. The fine dust generated by the milling, storage and packaging process, is highly explosive. Compressed air represents a largely trouble-free energy source. There are no electric lines or other electrical sources causing sparks and other potential hazards. A line of ATEX certified brake motors was developed by DEPRAG in conjunction with the bulk goods expert, BEER Fördertechnik in Bad Koenig, Germany, for a vat drainage application in the



chemical industry. These air motors are now an integral part of the DEPRAG standard product line and the availability of this total solutions package, saves the machine builder additional design and production costs. The brake is already part of the motor and the compact planetary gear, which is tailored to fit the customer's torque and speed requirement, is part of the motor as well.

An additional safety valve is

mounted onto the brake for applications in potentially explosive environments. In this configuration, the air supply is shut down as soon as the pressure falls below 5 bar. This ensures that the air pressure in the control line is equal to zero during the braking process. "With this new complete package, we have been able to launch an attractive system onto the market which fully complies with the ATEX standards (EX II 2GDc IIC T5 (95°)). In this way, we have solidified our



position as the market leader for air motors", says DEPRAG's Product Manager Dagmar Hierl.

## Rotisserie: Using compressed air for delicious kebabs

**It's the best-kept secret of any barbeque! Who took all the time and effort to lovingly and carefully skewer each piece of food into place? Whose job is it in those popular restaurants, where the guest expects high service and quality of presentation?**

In today's market where increasing costs of production are a deciding factor in the survival of every business, the optimal use of resources is the best recipe for profit. Preprocessing and automation can help!

Hygiene and efficiency are two of the most important aspects of the food processing. Additionally, an extremely satisfied client is the best sales and marketing tool a business can have. This makes the presentation of an end product very important. MiVEG not only specializes in food processing but also



in the manufacturing of food processing machines. For their meat skewers, which they produce in-house, they rely on German beech wood. The semi-automatic system produces more than 4,000 skewers per hour. The skewers are designed for piercing poultry, vegetables, cheese or meat. It is important that the final result still looks to the customer, as good and thoughtfully made, as if it were homemade.

"The wish of the customer comes first", says Lars Kracker, Assistant Manager of MiVEG, "therefore we work together with a manufacturer that specializes in providing individual solutions to its client's". DEPRAG, a complete service provider for air motors, offers not only the motors but also a specially designed solution for each particular application.

In this case, mini party skewers loaded with food weighing between 20g and a ¼ kilo, can be produced in a very cost-effective way. The wooden skewers can be produced in lengths of 10 to 25 centimeters. Within a few minutes the machine can be converted to manufacture other products by using a cartridge that can remove the skewers individually. Use of the cartridge also reduces wear and simplifies the changing of parts. The result is a shorter conversion time, as well as a more robust and durable construction design.

Lars Kracker states, "We are very satisfied with the fast reaction time of the DEPRAG engineers". Attending to a customer's every need is a matter of course for DEPRAG. Product manager Dagmar Hierl stated, "85% of all our projects are specially designed solutions. We offer

individually specified standard motors, special motors or even fully automated production systems for all our customer's requirements, even for small quantities".

The primary function of the machine is the turning of the skewer unit, which is powered by two air motors. In this unit the skewer is driven over two belts through the pieces of meat, onion and peppers. Lars Kracker says, "We chose the DEPRAG air motor since it is made from stainless steel". Because of the robust and sealed design of these drives they are ideal for applications in moisture prone areas and they can withstand the aggressive cleaning agents used in the food processing industry.

The use of air power prevents overload of the vane motor and allows it to be loaded to a full standstill. In addition to



the high torque, the air motor offers "a fast and precise energy transfer. We apply a load of 38 kilogram onto the skewer, therefore a powerful air motor with a compact form is needed for our application", says Lars Kracker.

The air motor also operates at a low temperature and is cool in comparison to other drive systems under increased load. The low operating temperature is a result of the expansion and subsequent cooling of the air in the working chambers of the motor.



*Interior of the Kebab Machine*

*Photo courtesy of MiVEG*



## Source

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