White Paper

Elmo Rietschle
by Gardner Denver

Highlighting the importance of pumps in vacuum packaging

How to minimise potential contamination risks and machine downtime and maximise air quality and pump performance

Introduction

Supermarkets and other food retailers are generally well informed about the issue of compressed air in food packaging and how to manage the contamination risks. Nowadays no questions are asked about the how and why the process has the potential to contaminate food during the production process. Like many other packaging methods, the use of compressed air is covered within the hazard analysis and critical control point principles (HACCP) and everyone is clear about their responsibilities and how they can avoid any problems.

But that control is missing from another key process in the food manufacturing industry; vacuum packaging. As a preservation technique used with multiple food products, vacuum packaging technology has been utilised for more than 70 years to lengthen the shelf life of dry goods such as cereals and coffee as well as fresh meat, vegetables and ready-made soups.

With the knowledge we have accumulated over decades here at Gardner Denver across Europe and beyond, we strongly advocate that the same HACCP principles should be applied to the vacuum packaging process as they are with the use of compressed air. Without these safeguards, the risk that food could become contaminated will continue to exist along with the associated threats to consumer health and business continuity and reputation. Furthermore, if greater attention is paid to the function and importance of vacuum pumps, there is more likelihood that they will be better maintained and so less risk of interruptions to food production.

By taking a forward-thinking, proactive and responsible approach, the risks associated with vacuum packaging can be virtually eliminated. This white paper explores the issues affecting vacuum pumps, paying particular attention to air contamination but also the care and choice of pumps, to outline the measures food producers can take to minimise potential problems.

So, whether you are reviewing your current facilities or planning for new or improved equipment, do take time to consider your vacuum packaging process in detail. We hope our white paper - with the five-point check list, examples of best practice and case studies - can be the catalyst to help you start.

Gareth Topping
Business Line Director EMEAI

Vacuum & Low Pressure Solutions
Gardner Denver Industrials Group

Food contamination

For food producers reliant on their reputation and trustworthy relationships with customers, the threat of a food contamination scandal is a nightmare scenario. Perhaps the most extreme example of modern times is the contamination of baby milk scandal in China a decade ago which caused international outrage. Tragically babies died and thousands became seriously ill. The owners and managers of the milk production plants and the supply chain were prosecuted; several companies went out of business or were forced to shut down. The industry has never recovered in China and the country relies on imported baby milk.

Closer to home, the horsemeat scandal in 2013 didn't result in serious health implications for consumers, but it rocked the meat processing industry across Europe when it was found that horsemeat was in products labelled as beef. Commercially, some big names in the sector were hit financially and their reputations left tarnished.

When sentencing two men involved in the scandal Judge Owen Davies QC summed up how the issues had hit supermarkets and the public. He said: **"The confidence in the food chain was affected adversely, and the share prices of big supermarkets were affected, and it is difficult to recreate the feeling of anxiety that the public had at the time this all emerged."**[1]

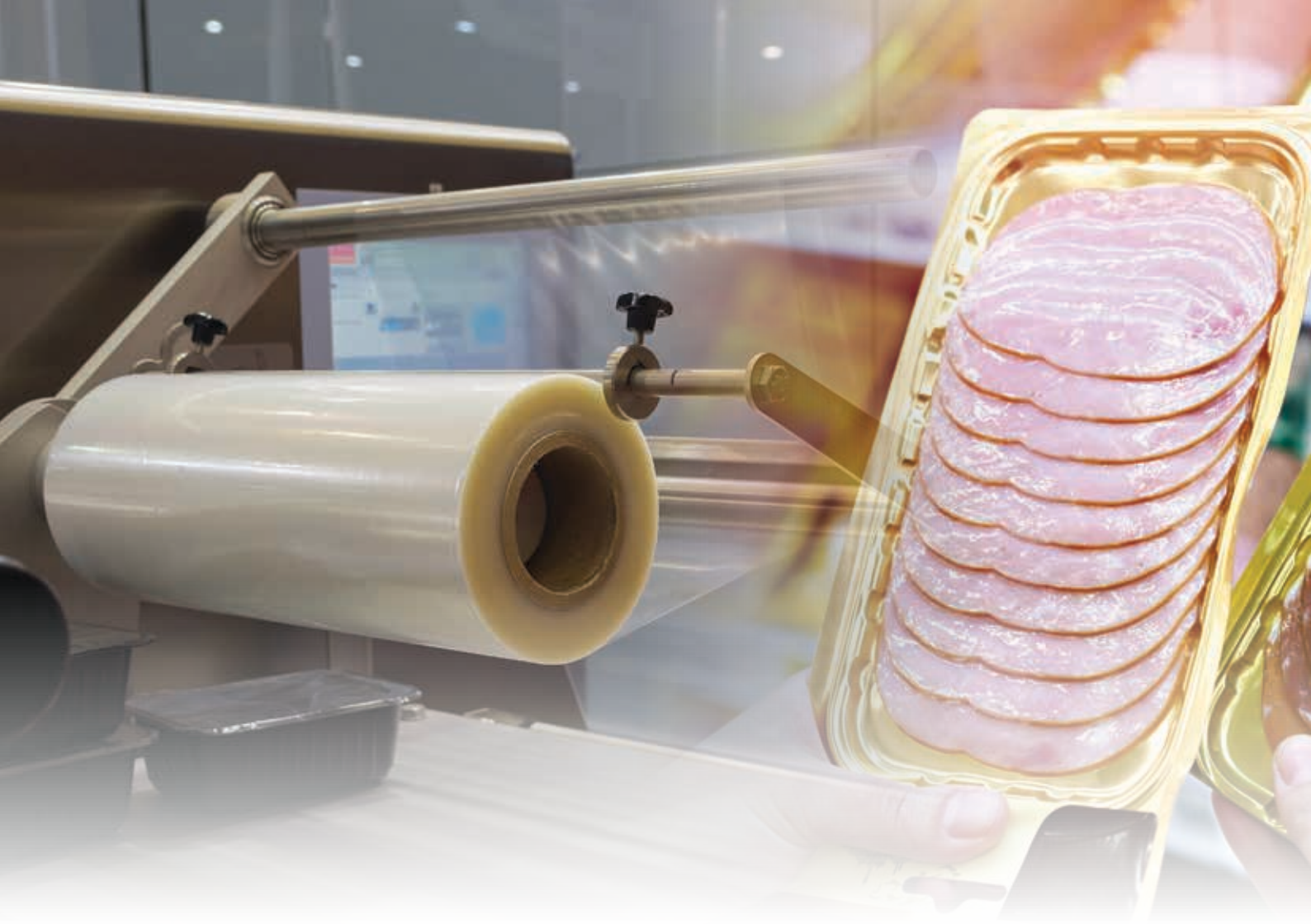
These examples are extreme but they clearly illustrate the effects of food contamination and why supermarkets and retailers will be keen to avoid the risks.

Reputation, reputation, reputation

One of the outcomes a food producer will be keen to avoid is any negative impact on the company's relationship with their customer. Does the retailer still trust the manufacturer to supply food that won't harm their customers or their reputation with consumers? The competition amongst supermarkets is fierce and any reputational risk can send their share price sliding. Food safety is the number one priority and that's why rigorous audit procedures are in place to provide the necessary reassurance that quality standards are being delivered. The more that food producers can do in providing that assurance, the more they can differentiate themselves from other suppliers.

For the food manufacturer, any product recall or investigation has commercial implications. There is the cost of the batch recalls themselves as well as the lost production downtime to find any potential sources of contamination. For a food plant, every minute of lost production is impacting on the bottom line and needs to be avoided.

1. https://www.theguardian.com/uk-news/2017/jul/31/two-men-jailed-in-uk-for-horsemeat-conspiracy



Sealing the success of vacuum packaging in the food industry

Used in food packaging for more than 70 years, vacuum sealing is used extensively for fresh, processed and frozen foods. The technique removes oxygen from the package holding the product and the method protects the contents from contamination or decomposition that might result from exposure to air, moisture or dirt. By removing atmospheric oxygen, the vacuum environment protects the food from spoiling by limiting the growth of aerobic bacteria or fungi and preventing the evaporation of volatile components. The method ensures the taste, flavour, aroma and nutrition are not lost in the packaging process and the shelf-life of food can be extended by up to five times.

But the use of air in food packaging inevitably introduces the risk of contaminants coming into contact with the food itself, such as dust and droplets of oil . Like vacuum packaging, compressed air is also widely used in food packaging, but unlike vacuum packaging, there is a vast supply of guidance for manufacturers to help the manage the potential contamination risks.

HACCP principles are applied to compressed air so that the critical points of potential contamination, such as filters and gaskets, are closely monitored for efficiency and effectiveness and the machines have regular services. The larger, stand-alone compressed air machines are purposely located outside of the packaging environment. The system is very controlled.

Furthermore, the British Retail Consortium (BRC) and the British Compressed Air Society (BCAS) worked together to author a code of practice for the food and beverage industry. This code incorporates selections from the ISO 8573-1:2010 purity classes to arrive at recommendations for compressed air that comes into **direct contact** with the product.

Out of sight, out of mind; the problem of the forgettable vacuum pump

But there is no such guidance for vacuum packaging and the associated pumps that are the root of the problem. Much smaller than their compressed air counterparts, vacuum pumps are often contained within a machine – out of sight - making it harder to check on their performance.

As a hidden and often small commodity item, a vacuum pump tends to be ignored until it breaks and needs to be repaired or replaced.

Oil lubricated compressors in the food environment must conform to ISO 8573 – oil free class A – but there is no corresponding standard for vacuum pumps.

But just because they can't be seen and they aren't currently subject to HACCP principles, these pumps should not be dismissed. They have a very real capacity for generating potential problems.

The challenges of oil

With the vast majority being oil lubricated, that oil has the potential to contaminate food directly, or the employees working in the plant. With the vacuum pump sucking air out, that air needs to exhaust somewhere. Filters are installed to absorb the oil but there is only so much they can take before they become saturated. When that happens the exhaust air will contain oil particles and will eventually generate small puddles of oil under the machine.

As Gardner Denver's Food & Beverage UK Sales Specialist, Melissa Kelly-Jones has 18 years' experience of working in the sector and has seen what can happen to vacuum pumps if they are not regularly checked.

She explains: **"I've seen first-hand how vacuum pumps can cause problems. Inside food production halls I've witnessed smoking, oil lubricated pumps. The next stage if it isn't dealt with could well be a fire!**

"Due to a lack of servicing or other issues, such as badly fitting or failing separators, the filters can become blocked and so oil bypasses the filters and blows out of the back of the pump. Oil droplets are in the air circulating in the food environment. No food processor wants that in their plant."

Melissa , and the Gardner Denver team throughout Europe, work closely with food producers to maximise the benefits their customers can gain from vacuum packaging. Because OEMs often see the pumps as a standard commodity product, they often find that companies aren't using the machines to their optimum value and so missing out on a faster throughput, or more appropriate vacuum levels .

To avoid potential problems with air contamination around the food, one of the solutions can be as simple as moving the machine away from direct contact with the production area, behind a wall or above a ceiling.

Basic processes such as cleaning and the environment around the machine are also important to the pump's performance. There is an additional danger that food carryover could get into the pump's oil filters and washing down with harsh chemicals can also cause parts in the pump to corrode.

A five-point checklist aimed at avoiding potential problems has been compiled to guide food producers through the common pitfalls. Key to the success of the list is using vacuum pump experts and not relying on generalist maintenance providers to make sure the equipment is properly cared for.

Five point pump checklist

- The first is to **fit downstream oil filters** to act a further safeguard against accidental food contamination from the failure of blocked filters. This will, in turn, prevent the carryover of oil into the environment.
- It is often poor maintenance, or inadequate maintenance practices, and minor equipment faults that risk oil discharging from the exhaust and the potential for oil contamination from oil-lubricated vacuum pumps. **Regular and timely maintenance** is the best option to avoid potential contamination. This will ensure that pumps run properly with very little or no oil carryover and increases pump efficiency and pump life expectancy.
- Even with a high level of care and due diligence, trace amounts of lubricant can come into contact with a food contact surface, the packaging or the food itself. Choose **food grade or incidental contact lubricants** as they are specifically designed to meet strict regulatory limitations.
- Always **using genuine parts** for pumps is another way of minimising problems. Oil-lubricated vacuum pumps run the risk of oil being discharged from the exhaust and there is a chance the separator element may fail due to disuse, a poor fit or poor quality. Genuine parts will dramatically reduce the risk of this happening, ensuring a longer lower risk of operational life than if non-genuine spares and parts are used.
- The ultimate option to avoid the issues associated with oil-lubricated pumps is to **go oil-free**. Specifically developed to meet the needs of manufacturers requiring only the highest air purity standards, oil-free pumps don't require the same level of maintenance as oil-lubricated models as there is no need to replace oil or filters. This also provides the added benefit of cutting down on costs over a pump's lifetime. Another major advantage is that the oil-free pump doesn't have to be removed to carry out maintenance so there is a considerable reduction in equipment downtime and associated costs from oil, waste old disposal or labour.

Cheap doesn't always deliver best value

Alexander Hippmann, Gardner Denver's Key Account Manager for Food & Packaging in Germany believes that if food manufacturers and OEMs (original equipment manufacturers) considered more than just the immediate costs of purchasing vacuum packaging equipment they could reap the benefits down the line.

He explains: **"It is important for food manufacturers to associate vacuum packaging machines with value, not just the initial investment. They often just look at the cost of the machines and go for the cheapest possible. It means they need regular maintenance to check the pumps and change oil separators.**

"If they went oil free - to a claw or screw pump – they would immediately eliminate the oil issue and the need for such regular maintenance. The pumps are more expensive initially but much better value in the long term because maintenance costs are reduced – no oil separators are needed – and you remove the issue of potential oil contamination in the food environment."

Every food manufacturing plant is different – even when they are producing similar products. The age and configuration of machinery, the design of the plant and the operating environment mean there isn't a fix-all solution for the vacuum packaging issues. Mauro Dote, Sales Engineer for Gardner Denver in Italy has worked with all kinds of food producers over his 10 years in the industry. He acknowledges that finding a solution that suits everyone is very difficult as companies have varying priorities but all can do something to minimise the risks of vacuum pumps contaminating the food packaging environment by calling on the advice of experts.

"Everyone is different so we must address their needs with that in mind," explains Mauro. **"For some companies energy consumption is a priority so we must look at how we can gain optimal production from their machines. Efficiency is what they are looking for so we must focus on keeping the pumps operating with a minimum of downtime. This is where our company's expertise is so valuable because can advise on everything to do with vacuum packaging, it's not just about selling a machine."**

Marc Geurts, Sales Engineer for Gardner Denver in the Netherlands believes the lack of knowledge about the different types of vacuum pumps available means that food producers won't always have the best equipment for their particular use.

"Very little regard is paid to the vacuum pump when the machine is bought," explains Marc. **"Food producers require a wide range of different vacuum levels depending on what and how they are sealing and the pump can play a huge part in the efficiency and effectiveness of the machine and what it generates but they aren't often aware of that.**

"Looking to change to dry running pumps can, on the face of it, seem expensive but when you factor in the additional performance you can generate from the machine it can quickly deliver value. Plus there aren't the ongoing maintenance costs. We just need people to open up their minds to what different kinds of pumps can achieve."

OEM expertise – a Case Study

It was specialist knowledge and expert site survey advice that led Gardner Denver to supplying a leading food packaging machine manufacturer with an innovative solution to help ensure it can meet stringent hygiene and safety standards.

UK-based Proseal uses oil-lubricated, rotary vane pumps from Gardner Denver for its vacuum/gas packing applications, to help ensure goods are tightly sealed. For food packaging business, best hygiene practice demands that these machines must be washed down at the end of every shift, which naturally poses a problem for vacuum pumps located in these facilities.

The harsh working environments and corrosive cleaning agents used by food manufacturers mean there is a very real risk of rusting and reduced pump performance over time. To overcome this challenge, Gardner Denver has developed a specially designed enclosure for its Elmo Rietschle VC 303 vacuum pump, which means it can be sited alongside Proseal's vacuum/gas packing machines in wet environments.

The cover has been developed in line with the Hazard Analysis and Critical Control Point (HACCP) principles, which establish the appropriate food safety management procedures that businesses should have in place. Made from stainless steel, the cover means the vacuum pump can withstand wet environments, ensuring Proseal can help its customers maintain the highest hygiene standards, without affecting the vacuum pump's performance.

Steve Windsor, Senior Development Engineer at Proseal, explains: **"If a vacuum pump cannot be sited alongside the food packaging technology, then it has to be installed remotely and piped to the machine. This is a costly process, so it is in our customers' best interest to have the pump positioned as near as possible to the food packaging system.**

"Gardner Denver has created a stainless steel cover for its Elmo Rietschle VC 303 pump that is ideally suited to meet the needs of the wet environments in which our machines operate. These enclosed pumps offer a very attractive 'plug and play' solution for Proseal.

"Developed to meet HACCP standards, our customers can feel confident that they're investing in a system that is robust and built to last, which allows them to easily carry out the necessary hygiene and safety procedures that are required.

"We couldn't be happier with the solution, which is not only cost-effective but provides assured and efficient vacuum at all times too."

With a capacity of 300 m^3/h and an ultimate vacuum of 0.1 mbar, Elmo Rietschle's VC 303 vacuum pump offers a robust and economical solution to Proseal and other manufacturers supplying to the food industry.

Conclusion

All too often in the food industry, pumps in vacuum packaging machines are treated as a commodity and ignored until they fail, or cause a problem that might impact production.

To avoid potential issues, vacuum pumps deserve more respect!

By applying HACCP principles, acknowledging the risks and putting the right corrective action in place, pumps will deliver many years of productive performance.

Plus the variety of pumps now available, coupled with the advice from vacuum packaging experts, gives food producers a myriad of options to find the right solution for their needs and optimise machine output.

Meet the team

Melissa Kelly-Jones

I have worked in the vacuum industry for 18 years and started the journey by providing after-market solutions across many different industries. More recently I have been dedicated to the food, beverage and packaging market with a focus on best practice, cost and energy savings. Matching the correct technology and size of vacuum pump to the application. Ensuring maximum up-time by tailoring the service package to the customers requirements, and where applicable, systemising the process for running efficiency, reducing installed power and lowering service costs.

I have worked with large and small businesses and provided vacuum solutions for meat and fish processing and packaging, cheese processing and packaging, crisps and snacks and many more. I would be happy to visit your site and review your vacuum process to assess the opportunities you may have to be more efficient.

Marc Geurts

Marc Geurts has been working as a sales engineer at the Elmo Rietschle department of Gardner Denver since 2010. Over the years, Marc has specialized in the vacuum technology applied in the Food & Beverage industry. Whether it is a vacuum pump for a packaging machine, a central vacuum system for different packaging lines or the implementation of a new vacuum pump in a machine with an OEM customer, Marc is able to come up with a ready-made solution.

The availability within Elmo Rietschle of all relevant vacuum pump principles, gives Marc the freedom to translate the wishes of the customers 1 on 1 with a proposal. Energy efficient? Low maintenance? The customer's wish in combination with the knowledge of the industry and the processes enables Marc to come up with the right solution.

As Food & Beverage Vacuum Expert, Marc will become the point of contact for the Benelux when it comes to applications in this sector. One of the spearheads of Marc is the focus on dry techniques that are available, which not only creates a low-maintenance and oil-free environment, but also a sustainable one!

So get in touch with Marc quickly and start talking about the possibilities that Elmo Rietschle can offer you, you will be pleasantly surprised!

Mauro Dote

10 years of experience with vacuum pumps and blowers, heavily involved in leading F&B customer companies, I love food and drink and I am very curious about how their production processes take place: from the land or from the sea to my table, from plants to my plate, from the heart of the earth to my glass, along the entire production chain.

Feel free to contact me if you need help to solve any problem with your current machines and your production processes or if you want to improve them, perhaps using innovative products.

I am sure that my experience combined with the wide range of Elmo-Rietschle products can be the answer to your needs!

Alexander Hippmann

After several years working as a toolmaker and studying precision engineering and micro-engineering, I am familiar with all areas of mechanics and electronics.

In my 23 years working in technical sales, I dealt with a wide variety of products, applications and industries. Especially the area of food packaging has always been in my focus as Sales Engineer, Key Account Manager and Regional Sales Manager.

Since 2010, I have been working for Gardner Denver in sales and represent the product area Elmo Rietschle.

I am looking forward to offering customers in the area of food packaging in Germany, Austria and Switzerland in the future the optimal solutions due to my branch and application knowledge.

About Gardner Denver Industrials Group

Gardner Denver Industrials Group delivers the broadest range of compressors and vacuum products, in a wide array of technologies, to end-user and OEM customers worldwide in the industries we serve.

We provide reliable and energy-efficient equipment that is put to work in a multitude of manufacturing and process applications.

Products ranging from versatile low- to high-pressure compressors, to customised blowers and vacuum pumps, serve industries including general manufacturing, automotive, and waste water treatment, as well as food & beverage, plastics, and power generation.

Our global offering also includes a comprehensive suite of aftermarket services to complement our products. Gardner Denver Industrials Group, part of Gardner Denver Inc., is headquartered in Milwaukee, Wisconsin, USA. Gardner Denver was founded in 1859 and today has approximately 7,000 employees in more than 30 countries.

For further information please visit www.gardnerdenver.com/industrials

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