

Overcoming the “Zero Trans Fat Challenge”

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QUICK READ

Zero trans fat oils, increasingly used in the food industry for health reasons, are problematic for food manufacturers. This is because they are less stable and more prone to degradation, compared to “traditional” partially hydrogenated oils. Consequently, food manufacturers require state-of-the-art equipment capable of handling the shortcomings of zero trans fat oils.

Responding to this important need, FMC FoodTech’s Stein TFF-IV THERMoFin® Fryer and MicroMAX™ MX hot oil filtration systems can minimize oxidation, polymerization and sedimentation associated with fragile zero trans fat oils. They also possess unique features that conserve cooking oil and extend its “fry life,” which can translate into significant savings.

FMC FoodTech’s TFF-IV fryer and MX filtering systems give food manufacturers a competitive advantage by preserving product quality, increasing operational efficiency and cost savings, while contending with the challenges posed by zero trans fat oils.



Handling fragile zero trans fat oils

FMC FoodTech state-of-the-art equipment helps minimize oxidation, polymerization and sedimentation in cooking oil.

CHANGING TO ZERO TRANS FAT OILS

Chances are, you have probably heard about the growing movement to reduce trans fats in food. In recent years, consumer groups and regulatory bodies have been pushing for trans fat reductions, as they are scientifically linked to heart disease and obesity. In response, dozens of companies — from Kentucky Fried Chicken, to Tyson Foods, to Marriott International — have taken sweeping steps to use zero trans fat cooking oils in their operations.

While this bodes well for consumers, it is potentially problematic for the food industry, which traditionally has relied on partially hydrogenated vegetable oil and other cooking oils high in trans fats. After all, these oils containing trans fats are highly stable, have an extended “fry life,” and even enhance the shelf life of processed goods — which is mainly why food manufacturers have used them in the first place. In contrast, zero trans fat cooking oils, i.e. those containing monounsaturated and polyunsaturated fats, are less stable and more susceptible to the following:

- Oxidation — Exposure to oxygen in the atmosphere, as well as thermal oxidation when oil is heated, reduces its shelf-life, and negatively affects product flavor. And, it can lead to free fatty acid buildup, causing the oil to deteriorate to the point that it must be discarded.
- Polymerization — Heating the oil makes it less stable, resulting in a brown, resin-like residue.
- Sedimentation — The issue of sedimentation is significantly more critical in the case of zero trans fat oil. When sediment burns, the oxidation rate and corresponding destruction of the oil is greater in zero trans fat oil. Consequently, sediment removal is of crucial importance in the case of zero trans fat oils.
- Hydrolysis — Water in the product reacts with the triglycerides in the hot oil to form free fatty acids. This may impart undesired odors and flavors to the oil.

In short, food manufacturers face a serious dilemma. On the one hand, they must respond to growing public and regulatory pressure to use zero trans fat oils. But in so doing, they'll have to contend with zero trans fat oils that are overly sensitive to heat, steam, oxidation and sedimentation.

Unless food processors possess fryers that can alleviate equipment-related oil degradation, they'll likely end up spending more on replacing zero trans fat oil, which has a shorter shelf life and will need to be replaced more frequently.



TFF-IV THERMoFin Fryer

FMC FoodTech's Stein TFF-IV THERMoFin Fryer offers a range of unique features that give food manufacturers a competitive edge, no matter what kind of oil they use.

Of the companies that manufacture frying equipment, FMC FoodTech offers state-of-the-art technology that is well-suited to handle the kinds of challenges posed by zero trans fat cooking oil. FMC FoodTech offers one of the best fryer-filter combinations that deliver advanced, gentle heating and excellent continuous filtration that reduces oil breakdown. It possesses features that limit oxidation, polymerization and sedimentation. This, in turn, extends the life of cooking oils and preserves food product quality.

ONE OF THE MOST ADVANCED FRYERS ON THE MARKET

FMC Foodtech's Stein TFF-IV THERMoFin Fryer offers a range of unique features that give food manufacturers a competitive edge, no matter what kind of oil they use.

The TFF-IV CoolHEAT® vertical fin heat exchanger saves manufacturers thousands of dollars while delivering superior efficiency. This heat exchanger provides the largest heat output for a given surface area/internal thermal fluid volume combination than any other available in the market today. The CoolHEAT vertical fin heat exchanger is efficiently packaged inside the fryer to take up less space. As a result, less oil is required in the fryer, leading to faster oil turnover rates.

Gentle, efficient heat transfer

Thanks to the large surface area of its patented CoolHEAT vertical fin heat exchanger, the TFF efficiently transfers heat to the cooking oil, eliminating hot spots and scorched oil that often plague other thermal fluid systems. The large heat transfer surface areas are more responsive to fluctuating production loads and interruptions inherent in the cooking process. Gentle, efficient heat transfer is enhanced by the TFF-IV's

two-zone oil temperature controls, which provide uniform direct heat from side-to-side and end-to-end.

The CoolHEAT heat exchanger's vertical fins are electro-polished to prevent crumbs from depositing on their surfaces. This prevents burned crumbs from contaminating the cooking oil.

Because of its stable heat transfer system, the TFF-IV reduces unwanted thermal oxidation, polymerization and concomitant oil breakdown.

By minimizing thermal oxidation in particular, the TFF-IV's stable heat transfer system curtails fatty acid buildup which can ruin the oil. Consequently, with prescribed oil turnover no oil needs to be thrown out — resulting in significant savings. In fact, manufacturers can recoup their investment in the TFF-IV within 10 to 18 months.

Additionally, the minimal amount of thermal fluid in the system offers the fastest response to changing heat requirements. As a result, the TFF-IV's quicker reaction times minimize temperature spikes, which can damage the cooking oil.

Intelligent oil management

Intelligent oil management is an integral part of the TFF-IV. Because it uses less oil, the TFF-IV delivers improved oil turnover rates and enhanced oil quality. Another key advantage is its effective sediment removal system. For most products, 80 percent of the bread crumbs fall into the infeed, and eventually enter the cooking oil where they can burn and ultimately contaminate the oil, and increase its oxidation rate. The TFF-IV avoids this problem with its unique sediment conveyor that moves in the opposite direction of the product conveyor, removing sediment immediately before it enters the fryer. This significantly reduces the amount of sediment in the cooking oil — a vital feature for zero trans fat oil use, as mentioned above.

Additionally, the TFF-IV is equipped with features to continuously remove any floating sediment from the oil. A special discharge chute separates the floating debris from the product and transfers it to a filtration system designed to separate the crumbs from the cooking oil. The clean, filtered oil is then returned to the discharge end of the fryer.

The aforementioned features of the TFF-IV are particularly advantageous when using zero trans fat oils that are more sensitive to burning and scorching stemming from sedimentation. Above all, they extend the life of the cooking oil, which translates to significant cost savings over the long run.

Efficiency, versatility

Efficiency is built into the TFF-IV's exhaust system. Dual exhaust vents at the infeed and discharge sectors help to preserve a uniform steam blanket on top of the cooking oil, which further reduces oxidation occurring from exposure of the hot oil surface to the air. The dual vents reduce the volume of material that need to be exhausted from each vent, which results in lower venting velocities, thereby minimizing the amount of oil carried up the stack to the roof.

The TFF-IV's patented convertible infeed for breaded and battered products improves product quality by efficiently transferring products from the final breading/battering stage to the fryer. Breaded products (containing dry product surfaces) move from the last breading step to the fryer via a special fryer feed conveyor, which minimizes breading carryover into the fryer thereby ensuring longer oil life. In the case of battered products (possessing wet surfaces), Teflon-coated slats help set the coating before it is transferred on to the wire belt. This keeps the product from sticking to the surface of the wire belt conveyor, again, reducing the amount of debris in the oil.

The convertible infeed lowers operating costs by eliminating the need for two separate main product conveyors — one for breaded products and another for battered products. The approach saves initial purchase costs, as well as the labor to convert back and forth between different conveyor systems. The TFF-IV provides the ultimate in applications flexibility, and it reduces “reject” products — which improves process yield and lowers production costs.



MicroMAX MX-30 hot oil filtration system

FMC FoodTech's Stein MicroMAX MX hot oil filtration system is one of the first continuous centrifugal filtration systems in the marketplace.

THE ULTIMATE HIGH-VOLUME MICRO-FILTERING SOLUTION

Keeping oil clean is crucial to extending the life of cooking oil and maintaining its quality. This especially holds true in the case of fragile zero trans fat oils. Obviously, all oil filtration systems are designed to reduce the buildup of sediment. However, few compare to FMC FoodTech's Stein MicroMAX MX hot oil filtration system, which is one of the first continuous centrifugal filtration systems in the marketplace. The MX may be used for battered and breaded applications, particularly those involving flour, which typically remains suspended in the oil. Using centrifugal force, MX series filtering systems effectively separate coating sediment and product debris from the oil continuously, thereby maintaining consistent oil quality over an extended period.

Single-digit micron filtration

In fact, the MX could double the amount of sediment removed over existing technology by removing particulate matter that is as small as five microns, compared to a minimum particle size of 60 to 80 microns for some filters. Not only that, but it can filter up to 95 percent of single-micron particles in a single pass. If left in the oil, these particles would burn, leading to increased oxidation and free fatty acid buildup, the latter of which is associated with increased rancidity. As stated earlier, oxidation, free fatty acid buildup and rancidity are particularly acute in zero trans fat oils. This is why MX filtering systems are especially valuable when frying with zero trans fat oils. Yet the micro-fine filtration capability makes these filters suitable for virtually any application involving oils with or without zero grams of trans fat.

Because of their outstanding filtering performance, MX filtration systems practically eliminate the need to discard oil, yielding significant savings. And by removing sediment and debris from the fryer before it builds up to a saturation point, the oil retains its color and clarity. This ultimately adds to the quality of the end product.

Another benefit is that when the MX removes sediment that ultimately is discarded, the sediment itself is drier and less saturated with oil. Thanks to the MX's centrifugal technology, there is fifty percent less oil in the removed sediment as compared to conventional filtration systems. As a result, this drier sediment is much easier and less costly to dispose of, compared to the heavier, oil-saturated sediment typically produced by other filtration systems. Additionally, this means that 50 percent of the oil that normally would be disposed of in the sediment ultimately is filtered and returned to the fryer for further use, resulting in increased oil conservation.

Enhanced operational performance

The MX-20 system is designed for medium- to high-volume frying, capable of processing at a rate of 20 gallons of oil per minute, while the MX-30 handles high volume and multiple fryer applications at a rate of 30 gallons per minute (GPM). Both can replace multiple filters on a line, enabling manufacturers to reduce operating costs and equipment investment.

Compared to the eight- and 15-GPM filtering rates of other filtration systems, the MX-20 and MX-30 continuously filter the frying system's oil faster and more often. As a result, this improves the filtration rate, reducing the need to add more new oil to replace the oil absorbed into the product.

In addition, the MX filter system reduces the heat load on the fryer and saves energy. How? The MX has no reservoir of oil, so the oil is filtered faster and is returned to the fryer with a relatively low average heat loss of eight degrees. In contrast, other filters employ an oil reservoir, where the oil temperature drops as it moves through the filtration system.

The clean in place (CIP) system on the MX reduces labor and sanitation costs, too.

A WINNING COMBINATION

In addition to helping companies contend with oxidation, polymerization and sedimentation, the TFF fryer and MX filter offer other advantages as well.

Studies confirm that this fryer/filter combination is capable of removing allergens from the oil to undetectable levels under high volume production conditions. The presence of allergens in oils depends greatly on the type of oil, operating conditions, ingredients, and most importantly, the binding characteristics of a given allergen to the oil. Therefore, filtering the allergens out can be considered both product- and process-specific.

The TFF fryer and MX filter technologies have been proven time after time to be one of the best frying systems for breading and battered products. The TFF offers exceptionally consistent and uniform heat distribution with extremely gentle oil handling. Combined with the MX, the TFF-IV represents the state of the art in industrial frying applications.

In a world where cooking with fragile zero trans fat oils is fast becoming the norm rather than the exception, the FMC FoodTech TFF-IV fryer and MX filter series offer companies a tremendous competitive advantage.



End product quality

FMC FoodTech offers one of the best fryer-filter combinations that extends the life of cooking oils and preserves food product quality.

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