

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

The background of the newsletter features a close-up photograph of vibrant green, serrated leaves on the left side. On the right side, there is a clear glass pitcher filled with a bright orange liquid, likely juice, which is slightly out of focus compared to the leaves.

**FOOD & BEVERAGE
INDUSTRY**

**ENGINEERING
& DESIGN**

**SCIENCE &
TECHNOLOGY**

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FRESH AND FROZEN FOOD



Introduction

Food product which has not undergone any processing or is fresh food. The term “fresh” is now used generically to indicate that fruit and vegetables have not been processed (e.g. canned, pickled, preserved or frozen). Fruit and vegetables that have been washed and/or trimmed described as fresh, an indication provided (tags) they have been washed and/or trimmed is evident. In various food product “fresh” implies different meaning. Like, in meat, fresh can be used to differentiate raw meat from that which has been (chemically) preserved. In fish, if kept chilled can be called fresh. In fruit juice, the term “fresh” is not used on juices made from concentrates and “freshly squeezed” is only used to describe juice extracted from the fruit (not prepared from concentrate) where only a short time has elapsed between extraction and packing. In fresh bread, when using terms such as “freshly baked”, “baked in store” and “oven fresh” the implication is that the bread is freshly produced on-site from raw ingredients.

However, some stores sell bread made from part-baked products (usually packed in an inert atmosphere or frozen off-site) which are then baked in-store. The FSA states that use of such terms in this circumstance could “potentially infringe the general legal provisions”.

Fresh fruits and vegetables are an important part of a healthy diet. They contain essential vitamins, minerals, fiber and other nutrients that are essential for good health. In fact, research has shown that a healthy diet rich in fruits and vegetables may reduce the risk of cancer and other chronic diseases.

Key Nutrients in Fruits and Vegetables

Nutrient	Health Benefit	Found In
Vitamin A	Healthy eyes and skin; protects from infection	Apricots, Cabbage, Cantaloupe, Carrots, Grapefruit, Greens, Leaf and Romaine Lettuce, Mangos, Spinach, Sweet Potatoes, Tomatoes, Watermelon
Vitamin C	Healthy teeth and gums; helps heal cuts and wounds	Bell Peppers, Broccoli, Brussels Sprouts, Cabbage, Cantaloupe, Cauliflower, Grapefruit, Oranges, Pineapple, Strawberries, Tomatoes
Calcium	Healthy teeth and bones	Greens, Kale, Okra, Rhubarb, Spinach
Fiber	Healthy digestive system; Reduced risk of heart disease	Apples, Bananas, Beans, Broccoli, Brussels Sprouts, Lentils, Peaches, Pears, Raspberries, Spinach
Folate	Wound healing; normal cell division	Asparagus, Broccoli, Peas, Beans, Greens, Spinach, Strawberries
Iron	Healthy blood; learning ability	Beans, Lentils, Spinach
Magnesium	Healthy bones	Beans, Spinach
Potassium	Healthy blood pressure	Bananas, Beans, Broccoli, Potatoes, Sweet Potatoes, Tomatoes

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Introduction to Frozen foods

Frozen foods are an affordable way to get your daily dose of fruits and vegetables. In fact, families who incorporate frozen foods into their normal routine may have better diet quality. With so many choices in the frozen foods aisle, there are plenty of opportunities to find something you like.

Fruits and vegetables are picked at peak ripeness and often frozen within hours, locking in nutrients and flavor. Generally, frozen foods retain their vitamins and minerals and there is no change to the carbohydrate, protein or fat content.

Fresh or frozen: What's the difference?

1. The carbohydrate, protein, fiber, and mineral content are similar between fresh and frozen.
2. Fresh food can lose half of its vitamins and phytonutrients during storage or cooking.
3. Fewer of the fat-soluble vitamins A and E are lost in the frozen packaging process compared with water-soluble vitamins like C.
4. Frozen produce may contain more vitamins and phytonutrients than days-old fresh items, though additional cooking and storage after defrosting may close that gap.



Conclusion

People make food choices for complex reasons taste, price, and convenience may trump perceived nutritional value. But there's no doubt that for taste and nutrient quality, you can't beat recently fresh-picked local produce.

On the other hand, if fresh produce is unavailable, inconvenient, out of season, or beyond your budget, frozen products provide plenty of nutrition.

INTRODUCTION TO EDIBLE OILS



Introduction

Oils and fats form an essential part of the modern diet and have been used for the preparation of food since time immemorial. These are rich source of dietary energy and contain more than twice the calorific value equivalent to the amount of carbohydrates. Functionality of oils and fats not only adds flavor in the food, but it also increases the nutritional value of food also. They serve as a heat transfer medium at elevated temperatures (e.g., frying), improve taste sensation (spreads and salad dressings), give texture and flavor to a wide range of foodstuffs, supply a concentrated source of energy, deliver critical building elements for the body and act as a carrier for essential minor components like vitamins A and D.

Fats and oils are constructed of building blocks called "triglycerides" resulting from the combination of one unit of glycerol and three units of fatty acids. They are insoluble in water but soluble in most organic solvents. They have lower densities than water, and may have consistencies at ambient temperature of solid, semisolid, or clear liquid.

When they are solid appearing at normal room temperature, they are referred to as "fats," and when they are liquid at that temperature, they are called "oils." Fats and oils are classified as "lipids" which is a category that embraces a broad variety of chemical substances. In addition to triglycerides, it also includes mono- and diglycerides, phosphatides, cerebrosides, sterols, terpenes, fatty alcohols, fatty acids, fat-soluble vitamins, and other substances.

Classification of Edible Oil- Source of Raw Material

Based on the source of raw materials, edible oil can be classified into three groups:

1. Animal Oil: It refers to the oil obtained from animals, such as beef oil, pig, fish, etc.

2. Vegetable Oil: It refers to oils extracted /processed from plant roots, stems, leaves, fruits, flowers, or seeds tissue. Example includes soybean oil, rapeseed oil, cottonseed oil, peanut oil, sesame oil, rice bran oil, sunflower oil, corn oil, tea seed oil, flax seed oil, safflower seed oil, etc.

3. Microbial Oil: Single-cell lipids, refer to edible fats extracted and processed from certain microorganisms, including yeast, fungi, and algae.

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Classification of Edible oil- Type of Processing Method Used

Based on type of processing the edible oil receives, it can be classified into following categories:

1.Hot Pressed Oil: These oils are extracted by pressing them at high temperatures due to which acidity of oil increases significantly and it loses most of its natural quality. These oils require refinement for making them fit for human consumption.

2.Cold Pressed Oil: Unlike hot pressed oils, extraction process for these oils takes place at room temperature, at around 27 degrees centigrade due to which acid value is relatively low. These oil products can be directly consumed after precipitation and filtration and thus do not require any chemical refinement process.

3.Leached Oil: When oil is extracted from the crushed mass of plant/animal biomass with the help of solvent, then this kind of oil is known as Leached oil. The leaching process depends mainly on the chemical structure of the solvent and the kind of solute that will be extracted from solid material.

4.Refined oil: Edible oils purchased in stores are known as "RBD" oils. These are oils that have been Refined, Bleached and Deodorized. Each of these steps is used to create a final oil that is consistent in taste, color and stability. As a result, these oils are generally tasteless, odorless, and colorless regardless of the original oilseed type or quality.



5.Hydrogenated Oil: Generally, most of the oils are typically liquid at room temperature, therefore many companies use hydrogenation to get a more solid and spreadable consistency. During this process, hydrogen molecules are added to alter the texture, stability, and shelf life of the final product. Hydrogenated oils are also used in many baked goods to improve taste and texture.

5.Blended Oil: Blended edible oil means an admixture of any two edible oils where the proportion by weight of any edible oil used in the admixture is not less than 20 percent. The blended mixture shall be clear, free from rancidity, suspended or insoluble matter or any other foreign matter, separated water, added coloring matter, flavoring substances, mineral oil, or any other animal and non-edible oils, or fats, argemone oils, hydrocyanic acid, castor oil and tricresyl phosphate.



INDUSTRY BUZZ

As part of the Viksit Bharat Sankalp Yatra, the CEO of FSSAI travels to Kardnur in Telangana.

On December 24, 2023, CEO FSSAI G Kamala Vardhana Rao visited Kardnur village in Sangareddy district, Telangana, as part of the Viksit Bharat Sankalp Yatra, which Prime Minister Narendra Modi started to spread the benefits of Central government schemes across the country with a resolve to reach the unreached.

Rao provided information during his participation regarding the directive from Union Health Minister Dr. Mansukh Mandaviya to guarantee the correct execution of government programs and the prompt resolution of public health-related complaints.

He performed awareness campaigns and made inquiries about various government initiatives. He also asked about the locals' way of life, diet, and medical advantages. The CEO of FSSAI promoted eating more millet-based foods and consuming less sugar and salt.

To guarantee that 'Desh ke Millets' are accepted, Tata Soufull goes above and beyond.

A brand from Tata Consumer Soufull, a wholly-owned subsidiary of Tata Consumer Product, Tata Soufull, was present at the Millets & Organics – International Trade Fair, which took place in Bengaluru from January 5–7, 2024. The event was hosted in 2024. Organized by the Department of Agriculture and the Government of Karnataka's KAPPEC (Karnataka Agro Processing and Export Corporation), this event provides a platform for collaboration between farmers, foreign and domestic companies, and central and state institutions involved in the millet and organic industries.

Being a pioneer in the millets market, Tata Soufull is committed to providing every Indian home with "Desh ke Millets" in contemporary forms, such as Ragi, Jowar, and Bajra, through a variety of products like Tata Soufull Millet Muesli, Tata Soufull Ragi Bites breakfast cereals, and Tata Soufull Masala Oats+.





KFC expands its menu to include longer chicken and veggie burgers, rolls, and rice bowls.

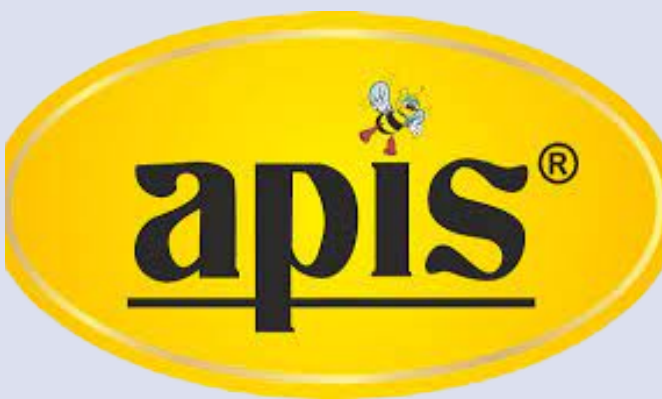
KFC has recently launched its Lunch Specials, consisting of longer burgers, rolls, or rice bowls served with fries, hot and crispy chicken, Peri Peri chicken strips, and cool drinks. The starting price is just Rs 149. Customers have a selection of foods to pick from as lunchtime draws closer and the hunger peaks. According to KFC, there is something for everyone because customers may choose vegetarian and non-vegetarian alternatives. Here, the lunch specials are only offered at all KFC restaurants from 11 a.m. to 4 p.m. KFC's 5X Safety Promise—Sanitization, Screening, Social Distancing, and Contactless Service with Vaccinated Teams—provides peace of mind. All surfaces and frequently handled areas in a restaurant are routinely sanitized, and team members and passengers undergo routine temperature screenings.



Plasma & Heartfulness to work together to enable sustainable food security.

The Heartfulness Institute, one of the top international NGOs in India, and Plasma Water Solutions Inc., a US agritech business, have partnered, according to the company's Indian subsidiary. The two organizations have partnered to advance their shared goals of bringing the Green Revolution 2.0 from India to the rest of the world and allowing food security in the most sustainable way possible.

Water from any source can be transformed into Plasma-ised Water (PW) in real-time and continuous flow thanks to the innovative cold-plasma technology developed by Plasma Water Solutions. This technology is utilized for seed treatment, crop spraying, and irrigation to increase productivity through faster and more effective germination, accelerate growth, stop the spread of plant diseases, and improve stress tolerance throughout the crop cycle.



Apis India Ltd. launches a new product as it prepares for the fitness revolution.

With three generations of experience and a solid track record of locating, manufacturing, and selling high-quality goods, Apis India Limited has established itself as one of the country's top FMCG companies. Leveraging its rich history and unwavering dedication to quality, the company is now prepared to launch a revolutionary new product on January 9, 2024. This innovative product promises to redefine well-being for consumers in India who are health-conscious and fitness enthusiasts.

Reputable for its high-quality products, the company is trusted by Indian households for its dedication to responsible sourcing and ethical brand operations. This soon-to-be-released product uses its extensive experience to provide a sustainable, all-natural solution that easily fits into the lives of people concerned about their health and want to improve their everyday decisions and fitness endeavours.

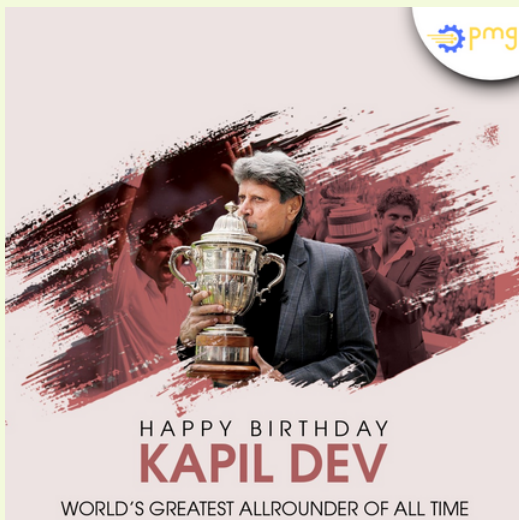
WEEKS HIGHLIGHT



4 JANUARY

WORLD BRAILLE DAY

World Braille Day is observed every year on January 4th to raise awareness about how Braille plays a significant role in the complete realization of human rights in the lives of blind and partially sighted people.



6 JANUARY

KAPIL DEV BIRTHDAY

Kapil Dev RamlalNikhanj is a former Indian cricketer. He was a fast medium bowler and a hard hitting middle order batsman. He led India to win its first Cricket World Cup title in 1983. He was named by Wisden as the Indian Cricketer of the Century in 2002.



9 JANUARY

PRAVASI BHARATIYA DIVAS

PravasiBharatiya Divas is a celebratory day observed on 9 January by the Republic of India to mark the contribution of the overseas Indian community towards the development of India. The day commemorates the return of Mahatma Gandhi from South Africa to Mumbai on 9 January 1915.



10 JANUARY

विश्व हिन्दी दिवस

विश्व हिन्दी दिवस (विश्व हिंदी दिवस) प्रति वर्ष 10 जनवरी को मनाया जाता है। इसका उद्देश्य विश्व में हिंदी के प्रचार-प्रसार के लिये जागरूकता पैदा करना तथा हिन्दी को अन्तरराष्ट्रीय भाषा के रूप में पेश करना है।



11 JANUARY

NATIONAL HUMAN TRAFFICKING AWARENESS DAY

"Empower change on National Human Trafficking Awareness Day. Let's unite against exploitation, raise awareness, and stand up for the rights of survivors. Together, we can break the chains. #EndHumanTrafficking #AwarenessDay"

DID YOU KNOW?



Vinegar is a liquid consisting mainly of acetic acid, water, and trace amounts of other compounds such as flavorings and minerals. It is made through a fermentation process that converts ethanol, the main component of alcoholic beverages, into acetic acid. Vinegar has been used for thousands of years as a condiment, preservative, and flavorings agent.

Types

- 1. White vinegar:** Made from distilled grain alcohol and has a sharp, acidic taste.
- 2. Apple cider vinegar:** Made from apple cider and has a slightly sweet and fruity taste.
- 3. Balsamic vinegar:** Made from grapes and aged in wooden barrels to develop a complex, sweet, and tangy flavor.
- 4. Red wine vinegar:** Made from red wine and has a bold, tangy flavor.
- 5. Rice vinegar:** Made from fermented rice and has a mild, slightly sweet flavor.



Market Scope

The global vinegar market size was valued at over USD 1.2 billion in 2020 and is projected to grow at a compound annual growth rate (CAGR) of around 6% from 2021 to 2028.

The major players in the Market for Vinegar are as follows:

1. Mizkan Holdings
2. Aspoll
3. Acetificio
4. Australian Vinegar
5. Fleischmann's Vinegar Company
6. Kraft Heinz Company
7. Eden Foods
8. Pompeian
9. Mizkan Euro Ltd
10. Galletti



Fact 1

Vinegar, a versatile liquid derived from fermented ethanol, is a culinary staple renowned for its tangy flavor and acidity. Beyond its use in cooking, vinegar serves as a natural cleaner, preservative, and health aid. With various types like apple cider and balsamic, it has found a place in diverse cuisines worldwide. Its acidic properties make it a valuable ingredient, offering both culinary and practical applications.



Fact 2

Mustard, a versatile condiment derived from the seeds of the mustard plant, adds a zesty kick to culinary creations worldwide. Renowned for its pungent flavor and vibrant yellow hue, mustard enhances a myriad of dishes, from sandwiches and dressings to marinades and sauces. Its rich history spans cultures, and its distinct taste continues to captivate palates, making mustard an indispensable element in the global gastronomic tapestry.



MAYONNAISE

1/3

Mayonnaise is a thick, creamy sauce that is typically used as a condiment or spread. It is made from a combination of oil, egg yolks, vinegar or lemon juice, and seasonings such as salt, pepper, and mustard.

Commercial Production

- 1. Mixing:** The egg yolks and vinegar or lemon juice are mixed in a large vessel using a high-speed mixer until they are fully combined.
- 2. Emulsifying:** The oil is added slowly to the egg mixture while continuously mixing at a high speed.
- 3. Seasoning:** Salt, sugar, mustard powder, and other seasonings are added to the emulsion mixture to enhance the flavor of the mayonnaise.
- 4. Packaging:** The mayonnaise is packaged in various sizes and types of containers, such as jars, bottles, pouches, and sachets.
- 5. Pasteurization:** To ensure food safety and increase shelf life, the packaged mayonnaise is pasteurized by heating it to a specific temperature for a certain amount of time.

2/3

Market Scope

North America is the largest market for mayonnaise, followed by Europe and Asia-Pacific.

The major players in the Market for Mayonnaise are as follows:

1. Unilever
2. Kraft Heinz
3. Nestle
4. McCormick & Company
5. Conagra Brands



3/3

Fact 3

Mayonnaise, a versatile condiment, is a creamy emulsion of oil, egg yolks, vinegar, and seasonings. Renowned for its rich texture and tangy flavor, it enhances sandwiches, salads, and various dishes. A culinary staple, mayonnaise's smooth consistency and ability to bind ingredients make it a go-to choice for chefs and home cooks alike, elevating the taste and texture of a wide array of culinary creations.



Ketchup is a condiment made from tomatoes, vinegar, sugar, and a variety of seasonings and spices. It is a thick, sweet and tangy sauce that is used to enhance the flavor of a wide range of foods, such as hamburgers, hot dogs, french fries, and sandwiches.

Commercial Production

- 1. Ingredient selection and preparation:** The first step in ketchup production is to select high-quality tomatoes, vinegar, sweeteners, and spices.
- 2. Cooking:** The tomato mixture is then cooked in large kettles to break down the tomatoes and create a smooth texture.
- 3. Blending:** After cooking, the tomato mixture is blended to a smooth consistency using high-speed mixers or blending equipment.
- 4. Pasteurization:** The blended ketchup is then pasteurized to further eliminate any harmful bacteria and ensure the product's safety and shelf life.
- 5. Packaging:** The finished ketchup is then packaged in bottles, jars, or pouches and labeled for sale.

2/3



Market Scope

- The global ketchup market was valued at approximately USD 11.5 billion in 2020, and it is expected to grow at a compound annual growth rate (CAGR) of 3.6% from 2021 to 2028.
- Some of the key players in the global ketchup market include Kraft Heinz, Nestle, Conagra Brands, Unilever, Del Monte Foods, Campbell Soup Company, and H.J. Heinz Company.

Fact 24

Ketchup, a versatile condiment, has become a staple in global cuisine. Originating from China, it underwent transformations across cultures to evolve into the tomato-based sauce we know today. Its sweet and tangy profile enhances a myriad of dishes, from classic burgers to gourmet creations. With a rich history and widespread popularity, ketchup continues to be a beloved companion in kitchens worldwide, adding a burst of flavor to countless meals.

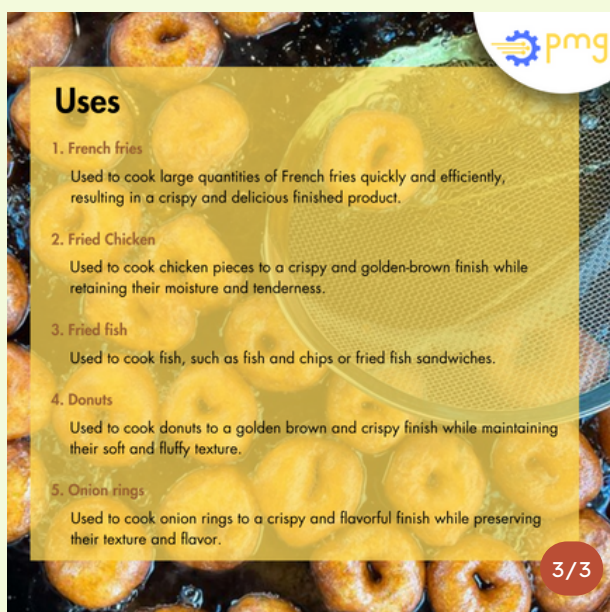


A fryer, also known as a deep-fat fryer, is a kitchen appliance used for frying foods. It is typically a countertop device with a heating element and a deep container for holding oil, along with a basket or tray for holding the food being fried.

- Deep-fat fryers are commonly used for cooking foods such as French fries, chicken wings, onion rings, and doughnuts.

- A high temperature (usually around 350-375°F or 175-190°C) and immersing the food in the hot oil until it is cooked to the desired level of crispiness.

- The global market for fryers and deep-fat fryers is expected to grow steadily over the next few years, driven by the increasing demand for fried food products in both commercial and residential settings.



Fact 5

A deep-fat fryer is a kitchen appliance designed for submerging food in hot oil for cooking. Its efficient heat transfer ensures crispy exteriors while maintaining moisture within. Widely used for preparing indulgent treats like fries and fried chicken, modern fryers often feature adjustable temperature controls and safety mechanisms.

PROVING EQUIPMENT



1/3

Proving equipment, also known as proofing equipment or proofers, is used in the baking industry to provide the ideal environment for yeast-raised dough to rise properly before baking. The equipment is designed to create a warm, humid environment that promotes yeast fermentation, which allows the dough to rise and develop its characteristic texture and flavor.



Types

1. Retarder-proofer

That includes a refrigerated compartment for dough retardation and a warm, humid compartment for proofing.

2. Convection proofer

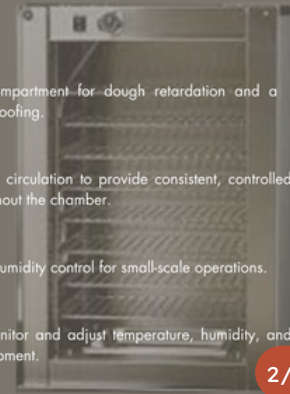
Uses convection heating and air circulation to provide consistent, controlled temperature and humidity throughout the chamber.

3. Cabinet proofer

Provides basic temperature and humidity control for small-scale operations.

4. Automated proofer

Uses sensors and controls to monitor and adjust temperature, humidity, and airflow for optimal dough development.



2/3

Working Principle



- Creates an ideal environment for the yeast-raised dough to rise properly before baking.
- The equipment achieves this by controlling temperature, humidity, and airflow inside an enclosed chamber.
- The controlled environment encourages the fermentation process.
- The controlled temperature and humidity ensure that the dough rises evenly and develops its characteristic texture and flavor.
- *The temperature in the proving equipment is usually set between 75-90°F (24-32°C)*

Some key manufacturers of proving equipment includes:

- Salva Industrial
- Revent
- Rational
- Polin
- Unax
- Wiesheu
- Mecnosud
- Baxter



3/3

Fact 5

Proving equipment for baking plays a pivotal role in ensuring the quality and consistency of baked goods. These specialized tools create optimal conditions for yeast fermentation, allowing dough to rise efficiently and develop desirable textures and flavors. Precise temperature and humidity control, coupled with innovative design, contribute to the production of consistently high-quality baked products, meeting the demanding standards of the ever-evolving food market.



PMG ENGINEERING

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- MAKING CUSTOMERS THE INDUSTRY LEADERS
- ENGINEERING MUST CREATE BUSINESS VALUE
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