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TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

FOOD & BEVERAGE INDUSTRY | ENGINEERING & DESIGN | SCIENCE & TECHNOLOGY

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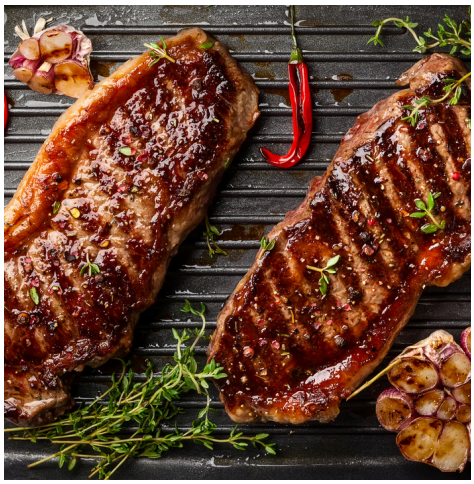
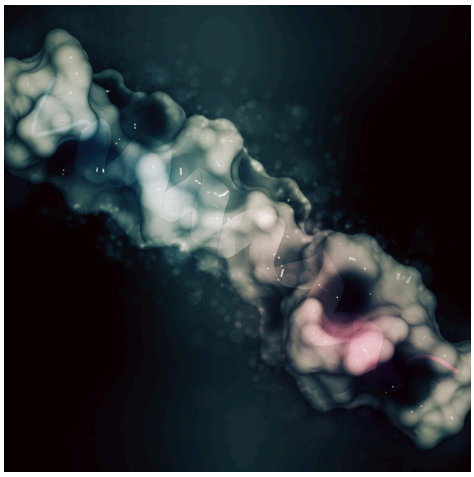


Meat Analogues

Introduction

A meat analog, (also known as a meat alternative, mock meat, fake meat, or imitation meat), approximates sure aesthetic characteristics and chemical traits of the meat. The intake of vegetable proteins in meals products has been growing through the years because of animal diseases, global scarcity of animal protein, sturdy demand for wholesome and religious (halal) food, economic and most importantly environmental motives. A meat-based eating regimen calls for a notably more quantity of environmental sources according to calories compared to a vegetarian meal plan. That is 2 to 15 kg plant foods are needed to produce 1 kg of meat.

Meat Proteins

Meat is considered as the highest quality protein source not only because of its dietary traits especially proteins however additionally due to its attractive taste. The role of meat proteins is two-fold. On one hand, meat proteins have all of the important amino acids carefully equivalent to the human body that, cause them to be exceptionally nutritious. The essential protein functionalities in processed meats are gelation and associated homes (for example, meat particle binding and adhesion, emulsification, and water-conserving ability.

Meat Analogues

Vegetarian foods occupy a larger than ever shelf space in today's market due to the consumers' growing health concerns and the associated environmental problems. Analogue may be defined as the compound that is structurally similar to another but differs slightly in composition. The beef analogue is a meal that is structurally just like meat but differs in composition.

Function of Meat Analogue

The main function of meat analogues is to replace meat in the diet. The market for meat analog does not only includes vegetarians but also the non-vegetarian seeking to reduce their meat consumption for health or ethical reasons, and people following religious dietary laws, such as Kashrut, Halal, and Buddhist.

Usage & Benefits

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Some meat analogues are based on centuries-old recipes for wheat gluten, rice, mushrooms, legumes, tempeh, or pressed-tofu, with flavoring delivered to make the finished product taste like chicken, red meat, lamb, ham, sausage, seafood, and many others. They can be used to reduce formulation costs due to the fact they may be less expensive than meat. Other attributes include the ability to maintain water and moisture at some point of cooking, reheating, freezing, and thawing makes them exceedingly appreciable.

Types of Food Used as Meat Analogue

1. Soya meat /Textured vegetable proteins (TVP): Soya meat, or textured vegetable protein (TVP), is produced from soybeans primarily in Asian countries. The production method is somewhat laborious but, the end product has a fibrous consistency similar to that of meat. With different seasonings, a great variety of flavours can be achieved.

2. Quorn–the mycoproteins: Quorn is the brand name for a line of foods made from mycoprotein. Quorn products take the form of faux chicken patties, nuggets, and cutlets, as well as imitation ground beef. It springs from a single-celled fungus grown in large fermentation vats which are processed and textured to produce a food that can be easily manipulated for meat.

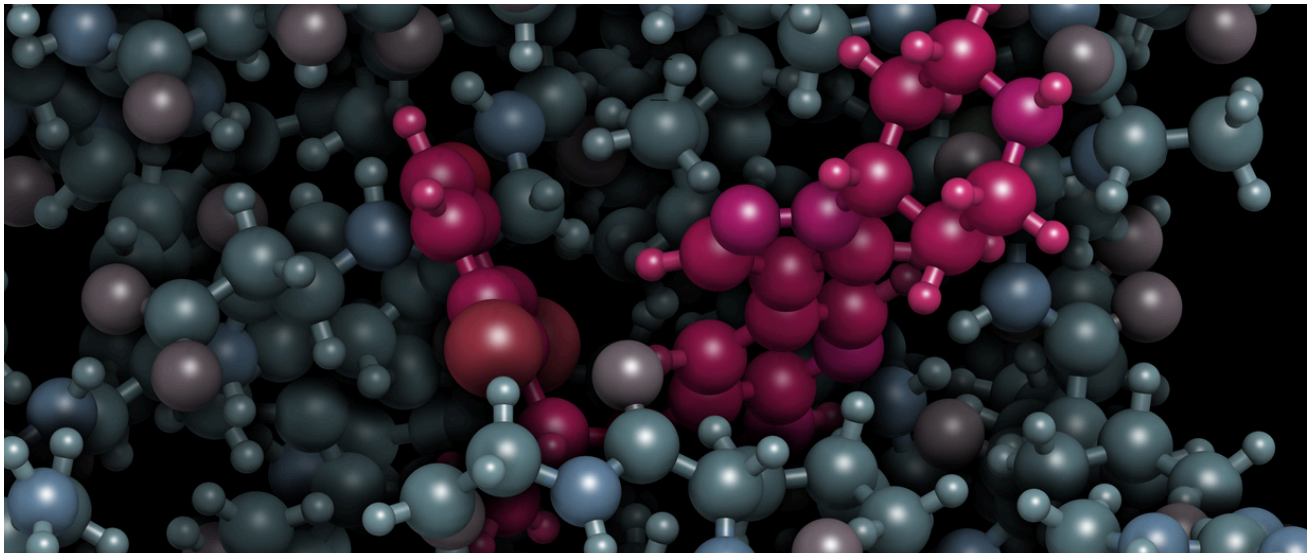
3. Tofu: Tofu derived from soybeans is perhaps the most widely recognized alternative for Paneer. 'Tofu' prepared by coagulation of soymilk by CaSO4 or MgCl2 contains about 8% of total proteins, 4-5% lipids, and about 2% of carbohydrates on a fresh weight basis.

4. Tempeh: Tempeh is made from soybeans that have been soaked and cooked to soften them. Like sourdough bread, tempeh requires a starter culture/inoculum (Rhizopus oligoporus), which is added to the cooked beans. This mixture is left for 24 hours and the result is a firm-textured product with a somewhat nutty flavor and a texture similar to a chewy mushroom.

Conclusion

New plant-based meat anlogues should taste, feel and smell better, or at least as good as animal meat according to the perceptions of the majority of consumers. Probably, flavor (umami flavor associated with meat) and texture (fibre like as in meat products) are the most important keys to success, and at the same time, the biggest challenges for the researchers. It can be concluded that there is a demand as well as bright future of such products in the market keeping aside a few constraints which need a solution but with a heap of opportunities.

Protein Functionalization



Introduction

Proteins are the engines of a living cell. Within and around cells they perform a magnificently diverse set of functions. They do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs. Besides providing structure and stability, proteins are involved in cell signalling, catalysing reactions, storage & transport, and are therefore extensively studied. Over the years, tools have become available for researchers to reveal structure and function relationships, as well as localization and their interactions with other proteins.

Selective Chemical Protein Modification

Chemical modification of proteins is an important tool for probing natural systems, creating therapeutic conjugates, and generating novel protein constructs. Site-selective reactions require exquisite control over both chemical and regioselectivity (regioselectivity occurs in chemical reactions where one reaction site is preferred over another), under ambient, aqueous conditions.

Constrains of Protein Functionalization

While many past examples of so-called 'bioconjugation' exist, those that teach a strong strategic lesson are rarer. The rigour of the chemical approach (including proper characterization) has been lacking—supplanted perhaps by a pragmatic desire for a useful product. In an era now hungry for precise molecular knowledge of protein function, historical examples of precise protein chemistry become vital.

Strategies of Functionalization

Regardless of the functionalization strategy, careful consideration must be paid to the reaction conditions for protein modification. Due to the fragility and massive size of most full-length proteins, the chemistries employed must occur under mild, aqueous conditions and proceed relatively rapidly on substrates at very low-molar concentrations. Owing to the diversity and arrangement of amino acid residues within each species, the protein targets display a diverse array of chemical functionalities with varying physicochemical parameters.

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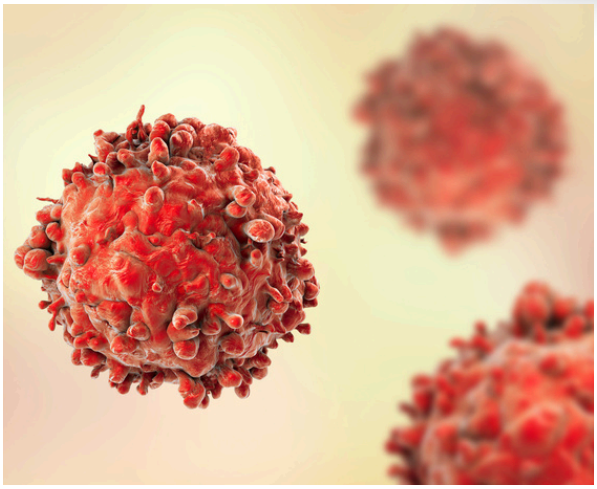


Protein Functionalization in Food

During extraction and food processing, proteins can be modified in multiple ways. Physical modifications (for example thermal treatment) and chemical modifications (for example ingredient interactions) can not only influence each other but also significantly affect the structural properties and functionality of proteins. To obtain pure proteins or to design food products that contain (added) proteins, it is necessary to separate the desired protein from unwanted proteins and non-protein components present in the starting material.

Sources of Food Proteins

1. Conventional

Plants: Food proteins and their component bioactive peptides have been isolated from a variety of plant foods.

Animals: Animal proteins are an important and often essential component of various food products where their physicochemical and biological characteristics serve to enhance the nutritional, organoleptic, and even health-promoting properties of those foods.

2. Novel

Insects: Although the heightened demand for high-quality food proteins and growing food security concerns in recent years have contributed to the increased use of proteins from insects for both food and feed, the consumption of insects, or entomophagy, is hardly a novel idea given that insects were a part of the diet of the evolutionary precursors of humans.

Algae: Factors contributing to the growing use of algae include their relative ease of cultivation even on non-arable lands, high sunlight utilization efficiency and capacity to be grown using seawater and on residual nutrients. Apart from their protein content, algae are known to contain substantial amounts of other nutrients such as B vitamins and polyunsaturated fatty acids. Proteins from algal sources have also been used to produce health-promoting bioactive peptides.

Conclusion

The growing demand for protein foods presents both opportunities and challenges for researchers and food product developers. For instance, in seeking to produce sustainable, more affordable but also nutritious protein-rich foods from insects, scientists must also confront the microbiological, chemical, physical, and allergenic risks inherent in using members of the class Insecta for food.
Although the use of emerging green technology for food processing continues to enjoy growing popularity, there is a need to increase efforts towards scaling up reported beneficial results. It is also important to understand the mechanisms by which the alteration of protein structure results in functional changes.

INDUSTRY BUZZ

Sabarkantha Dairy, Tetra Pak construct eco-friendly cow-shed roofs with recycled cartons.

Sabarkantha Dairy, a leading dairy cooperative, and Tetra Pak, a global authority in food processing and packaging solutions, have forged a pioneering partnership. This alliance is dedicated to propelling sustainability in the dairy sector. Their first joint venture is a pilot project that uses recycled beverage cartons to create polyAl roofing for a 40-cow shed. The manufacturer of these innovative polyol sheets is Eastern Cargo, a recycling partner of Tetra Pak operating in Gujarat since 2016. They specialize in producing roof tiles and flat sheets.

PolyAl, a combination of aluminium and polyolefins, is the non-fibre component of carton packaging. These layers provide a protective barrier for the contents of aseptic carton containers, shielding them from oxygen and moisture. The resulting polyAl roofing sheets are a cost-effective and sustainable alternative to traditional materials like cement and galvanized iron. They are lightweight, waterproof, rust-proof, and temperature-regulating.

Zydus Wellness begins testing Glucon-D Activors, a ready-to-drink beverage.

With the launch of Glucon-D Activors, Zydus Wellness, a science-backed FMCG company, has announced the extension of its renowned brand Glucon-D into the electrolyte energy ready-to-drink (RTD) beverage market.

The demand for energy on the go and consumers' hectic, fast-paced lifestyles are changing the RTD beverage market. With an estimated market value of Rs 1200 crore, the RTD electrolyte beverage category is one of the fastest-growing in India's FMCG industry. A sizeable portion of this volume is generated by Southern India, which accounts for around 50% of national sales.

Based on this attractive prospect and the brand's significant market share in the energy sector, the business has started a trial programme for Glucon-D Activors in Telangana and Andhra Pradesh.

Compass Gr. asserts that addressing global food waste requires comprehensive measures.

Compass Group India believes the worldwide food waste epidemic requires comprehensive methods to be addressed. They should cover every aspect of the food chain, from distribution and production to consumption and disposal. Food waste reduction boosts sustainability, resilience, and equity in our food systems while also resulting in considerable cost savings, resource conservation, and improved food security that benefits businesses and consumers alike. It necessitates actions like cutting waste at the source, enhancing the effectiveness of the supply chain, developing technology-driven solutions, educating consumers, and implementing efficient recycling procedures.

Food waste has become a major worldwide issue with numerous negative effects on the environment, society, and economy.

SMART researchers developed sensor multiplexing for decoding real-time plant stressors.

In partnership with Temasek Life Sciences Laboratory (TLL) and Massachusetts Institute of Technology (MIT), researchers from the Disruptive & Sustainable Technologies for Agricultural Precision (DiSTAP) Interdisciplinary Research Group (IRG) of Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, have created a state-of-the-art nano-sensor that enables real-time monitoring of salicylic acid (SA) during the early stages of stress response.

The remarkable advances that SMART researchers made in plant health monitoring are detailed in a report that was just published in the Nature Communications journal under the title "Decoding early stress signalling waves in living plants using nano-sensor multiplexing." First, the creation of the first-ever nanosensor that can precisely identify SA, a plant hormone essential for mediating plant stress response and adaptability, was confirmed in-planta in living pak choi, also referred to as Chinese cabbage.

PepsiCo releases its first-quarter 2024 financial figures and confirms its 2024 forecast.

PepsiCo, Inc. released the first quarter of 2024 results. "Our businesses performed well and stayed flexible during the first quarter, with our foreign business putting up a solid showing. Despite the impact of several product recalls at Quaker Foods North America and a challenging net revenue growth comparison from the previous year, we delivered a sequential improvement in our volume trends and year-over-year growth in our net revenue, operating profit margin, and EPS, according to chairman and CEO Ramon Laguarta.

Laguarta went on, "Going forward, we'll keep concentrating our efforts on performing well in the market and providing delicious products that give consumers convenience and good value." In order to finance ongoing investments in our brands, capabilities, and pep+ projects, we will also keep stepping up and quickening our efficiency measures. Because of this, we still project at least a 4% increase in organic revenue and 8% growth in core constant currency EPS by 2024.

WEEKS HIGHLIGHT

1 MAY

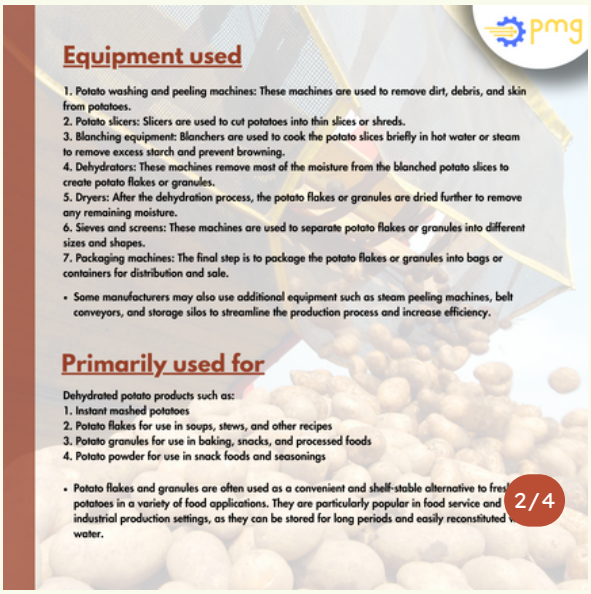
LABOR DAY

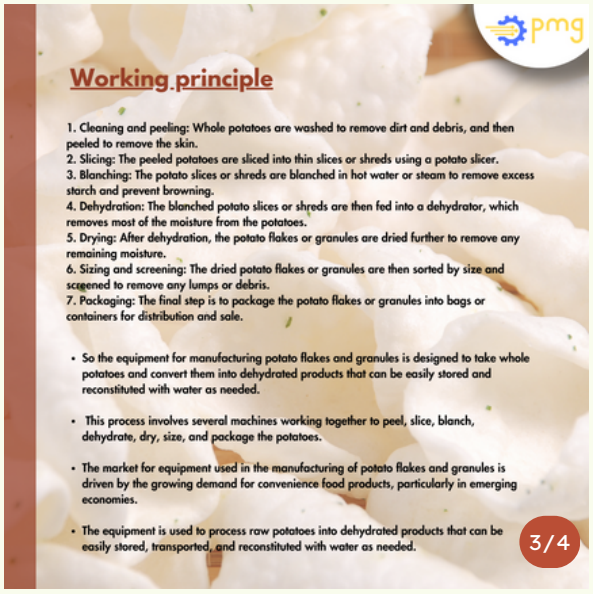
Labor Day, celebrated on May 1st, honors workers' contributions and achievements. Originating in the late 19th century, it advocates for workers' rights, fair wages, and better working conditions globally

MAY

NON-TECHNICAL CONTENT

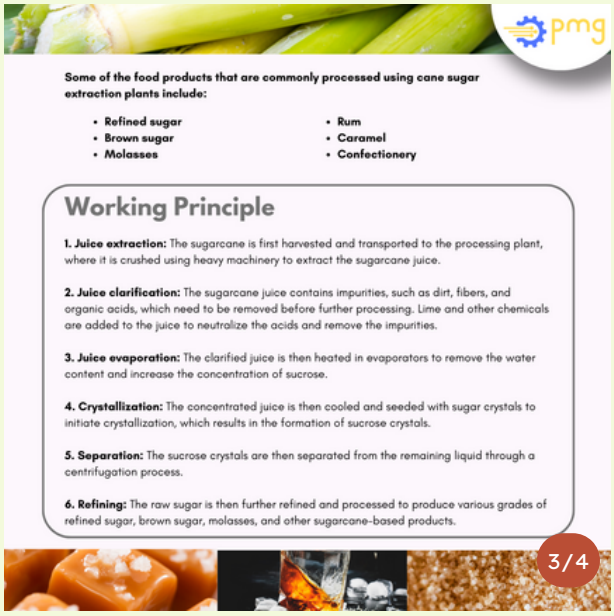
DID YOU KNOW?





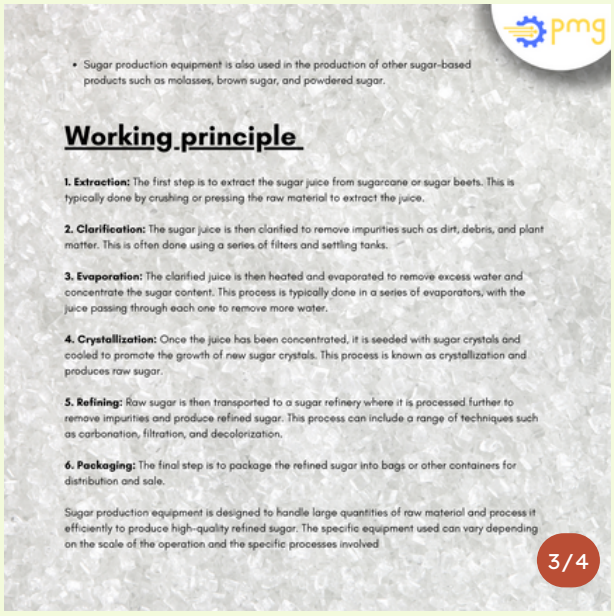
Fact 1

Potato flake and granule manufacturing equipment comprises sophisticated machinery, including steam peeling systems, rotary slicers, and continuous belt dryers, ensuring precise control over processing parameters such as temperature and humidity.



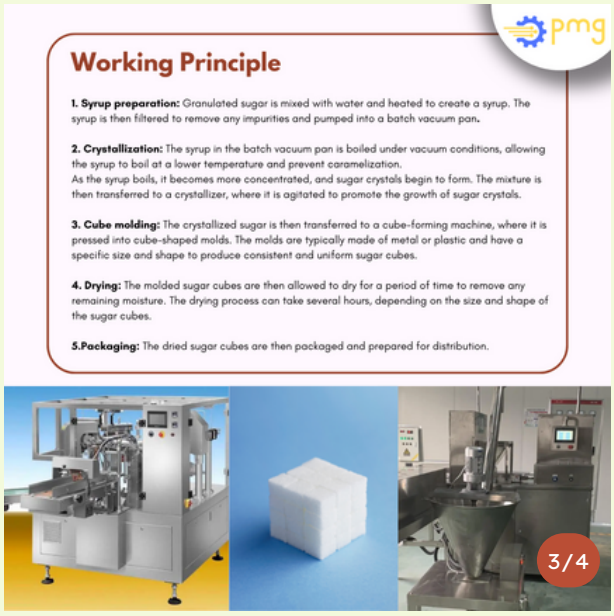
Fact 2

Cane sugar extraction plants employ a series of mechanical and chemical processes, including milling, diffusion, and carbonation, to extract sucrose from sugarcane juice. Through precise control of temperature, pH, and chemical additives, impurities are removed, and sucrose is crystallized and separated.



Fact 3

Sugar production equipment comprises an array of specialized machinery, from cane shredders and crushers to centrifuges and vacuum pans. These units facilitate sequential stages such as juice extraction, clarification, evaporation, and crystallization. Advanced technologies like continuous centrifugation and multi-effect evaporators optimize energy efficiency and product quality.



Fact 4

Cube sugar production plants utilize sophisticated machinery to compress granulated sugar into uniform cubes, employing hydraulic pressure or mechanical force to achieve precise shaping. Controlled moisture content and temperature during molding ensure structural integrity. Advanced drying techniques, such as hot air or infrared radiation, eliminate moisture, optimizing cube hardness and preventing clumping.

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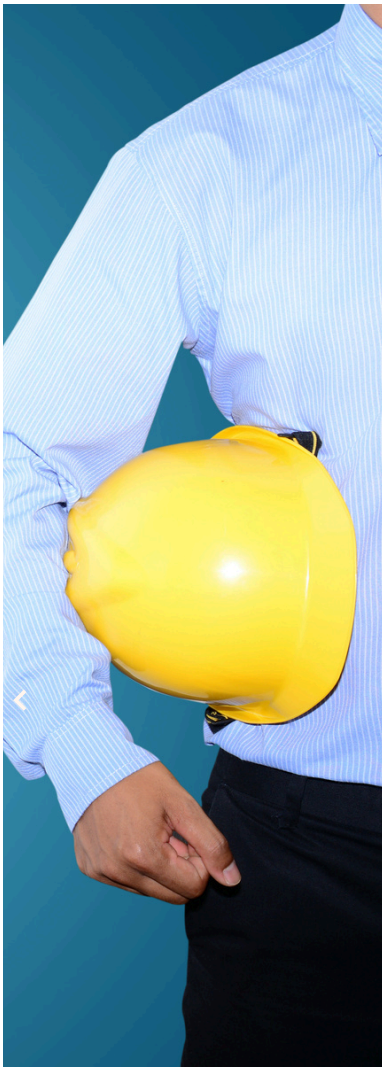

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