

Ethanol Industry

Plate heat exchanger application

Almost every organic could be transferred into ethanol, even coal, just different on methods and efficiency.

In terms of the global ethanol market, most of the products are produced by Fermentation Process.

Ethanol is used on not only alcohol, but also basic organic chemical material, dyestuff and fuel.

Hofmann has been committed on optimizing energy efficiency through designing customized thermal transfer system for our partners.





Bioethanol is derived from biomass like crops, rapeseed, wasted kitchen oil and animal fat, people use enzymes or chemical solution to dissolve starch into sugar, glucose to be specific, then add yeast to produce ethanol. This approach could usually yield more than one product, for example, 56 pounds of maizes are able to output 2.9 gallons ethanol plus 17 pounds DDGS and 6.5 gallons biodiesel.

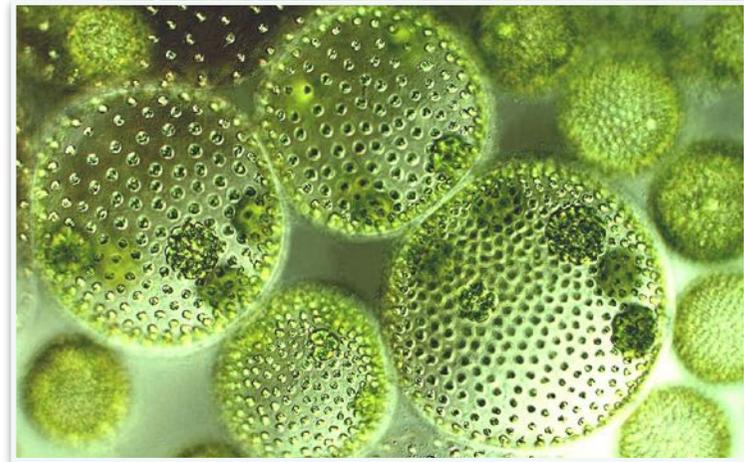
DDGS: Byproduct during ethanol manufacturing.

Although bioethanol is born in arguments, this stable energy is benefit for energy portfolio diversification.

Governments welfare policies on biofuel gave biofuel incredible competitive strength against fossil fuel, multiplex biomass sources enlarge and stimulate energy market, especially gasoline market.

However as the demand for fuel in rich countries is contending the food in poor countries, and some domestic crops price is suspected that there might be some pull up due to the 1st generation Ethyl biofuel by citizen, subsidy on this industry was suddenly canceled.

The second and third generation biofuel technology on the other hand avoid the conflict between food and energy supply by converting no-food-biomass and micro-algae into ethanol and biodiesel.



Syngas

The main advantages of using synthetic gas as a raw material to prepare ethanol are:

- ① Wide sources of raw materials: raw materials can be solid (coal, coke, biomass), gas (natural gas, acetylene tail gas, coke oven gas) and liquid (light oil, heavy oil, tar) The difference in ethanol production from different raw materials is mainly reflected in the production of synthesis gas. Solid raw materials are gasified, gas raw materials are transformed, liquid raw materials are produced by steam reforming, partial oxidation and other technologies;
- ② The synthesis process is simple, and the raw materials for the synthesis of ethanol Gas, synthesis equipment, synthesis process conditions (temperature, pressure, hydrogen-carbon ratio, space velocity, etc.) are very similar to ethanol synthesis, except for the different reaction catalysts, the other processes are basically similar, so you can refer to ethanol production organization for ethanol production;
- ③ CO₂ can be used to synthesize ethanol, forming a closed cycle of ethanol production and CO₂ consumption, thereby realizing CO₂ emission reduction and slowing the global greenhouse effect;
- ④ The economic benefits of ethanol production are fine. According to preliminary analysis and calculations, 1 ton of ethanol raw material gas can produce 718kg Ethanol, but the market price of ethanol is usually more than twice that of ethanol.

The main reaction processes for preparing ethanol from syngas are:



It is obvious from reaction equation above that the the molar ratio of H₂/CO is 2:1 to synthesize ethanol, and the molar ratio of H₂/CO is 3:1. When CO and CO₂ exist at the same time, the molar ratio of H₂/CO_x is required to be $f = \text{H}/(\text{CO} + \text{CO}_2) = 2.05 - 2.15$

In order to increase the reaction rate, it is necessary to appropriately increase the reaction temperature. However, as the temperature rises, some side reactions will occur and inhibit the formation of ethanol. In order to promote the reaction to the main reaction direction, it is necessary to find a A kind of catalyst with higher performance and better catalytic performance.

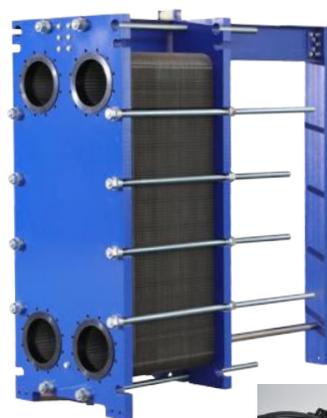
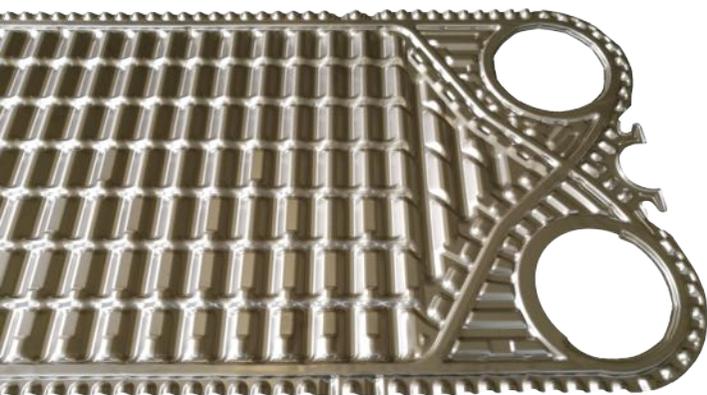
Since the synthesis reaction is a reaction with a reduced number of moles, pressurization promotes the synthesis process. The reaction to synthesize ethanol is carried out at the lowest possible temperature, higher pressure and higher H₂/CO_x ratio, but it is too high A high H₂/CO_x ratio will cause hydrogen waste. Excessive pressure not only fails to significantly increase the conversion rate, but also increases equipment wear.

At present, ethanol synthesis conditions are generally: pressure 3-10 MPa, temperature 250-300°C, H₂/CO_x ratio is 3-5, space velocity 6000-12000h, which is similar to the synthesis of methanol technology. From the current research development and application of synthetic alcohols In view of the situation, the low pressure and 10MPa medium pressure method has more market value and can effectively reduce investment and operating costs.



Our products for ethanol manufacturing

We know better on thermal transfer solution



The Gasket plate heat exchanger is expandable and easy servicing. It is used in low-temperature and low-pressure conditions, such as closed cooling water circuits.



The Semi-Welded Plate Heat Exchanger, one side is sealed by laser welding, and the other side is sealed by gaskets. This increases maintainability, but allows the use of aggressive medium and higher pressure than the completely inflated model.



Gasket plate heat exchanger	
Max connection diameter/DN	500
Max. volume flow m ³ /h	4000
Max. Heat transfer surface/m ²	1520
Designed Pressure rate MPa	2.5
Temperature °C	-40-180
Plate material	316 SS, Avesta 254 SMO, Titanium
Frame material	Carbon Steel, 304 SS, 316 SS

Gasket	Temperature/ °C	Media
EPDM Ethylene propylene diene monomer	-25-150	Water, aqueous solution, lean acid and base
NBR Nitrile rubber	-25-130	Water, aqueous solution, fat, vegetable oil and mineral oil, ethanol and glycol
FPM/Viton Fluoro rubber	-20-180	High concentration inorganic acid (oxidizing acid), hot water and steam, high temperature mineral oil
CR Chloroprene rubber	-40-125	Ammonia and various fluorine-containing refrigerants



Our **service** is better than you expected

HFM offers rich experience in Ethanol manufacturing. We have multiple global warehouses and service teams around the world, the delivery time and freight are reduced to the largest extent, and spare parts can be delivered at the fastest speed. Manufacturing is merely one part of our business, knowing our customers requirements and acknowledge various kinds of working conditions is our daily life.

1, Inventory management

In order to ensuring delivery effectiveness, based on the acknowledge of PHE market and supply chain management, HFM has distributed the warehouses around the world.

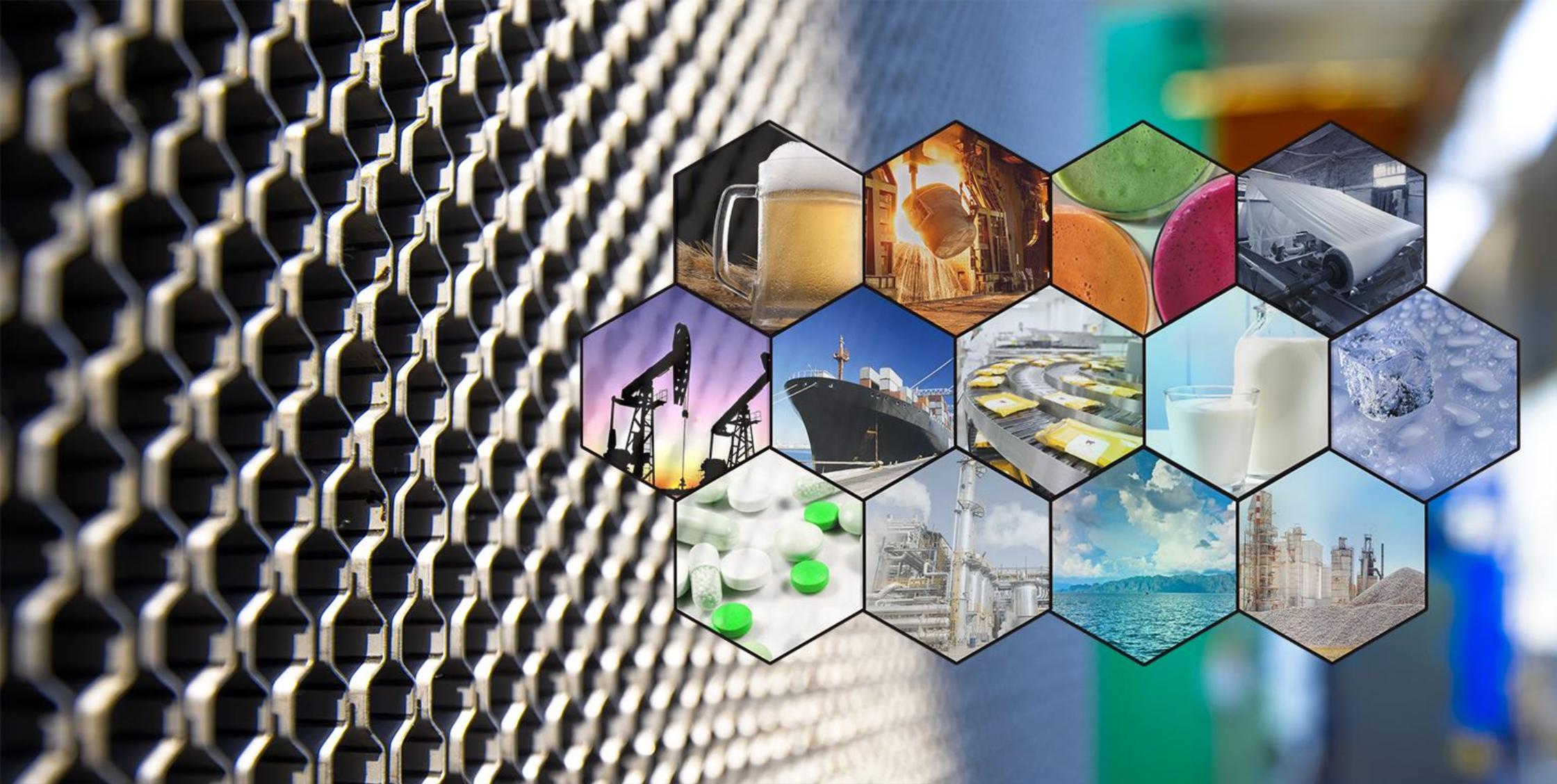
2, Spares replacement

HFM has the full range of plate heat exchanger spares, our service engineers could either travel to the scene or remote guid your team to replace.

3, Cleaning service

HFM can provide both CIP(cleaning in place) and disassembling cleaning services depending on your circumstances.





Professional design solution:

Our technical department dealt with various application year after year, the accumulative experience forged a special team with exploring spirit and critical spirit. The gasket plate heat exchanger is our core business, thousands of units have been in services for many years in different fields.

Service is our cornerstone :

We consider customer as our priority, understanding customers' real needs and rapid feedback are the basics. We and customers are bound to each other for learning and developing, sharing knowledge keeps us growing, which makes accomplishing projects easier and faster.

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