FAT AND OIL PROCESSING

Seed Oil Refining

Selected thermal and utility duties across edible-oil refining.

Seed oil refining turns a variable crude feed into a product with a defined quality profile. Soybean, sunflower and rapeseed oils do not present identical impurity or thermal requirements. The route is selected from the feed analysis and the intended taste, stability and appearance of the finished oil.



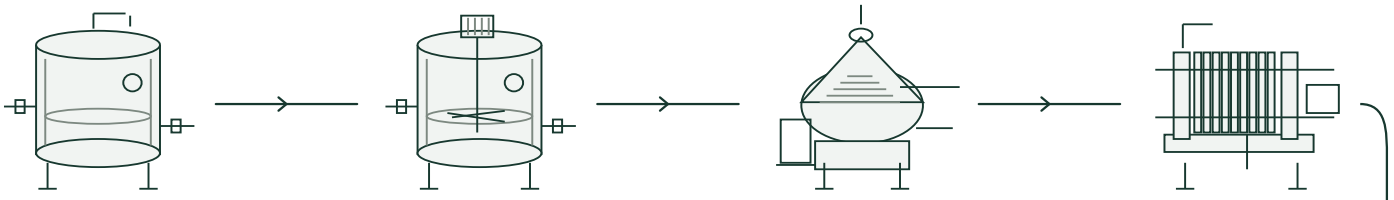
Sunflower: an oilseed crop.

Photo / Todd Trapani

MATERIAL ROUTE / EQUIPMENT / BRANCHES

Refining branches follow the oil specification.

Crude oil / pretreatment / selected refining route



Crude-oil preparation

Composition and quality checks

Degumming

Hydration or selected pretreatment

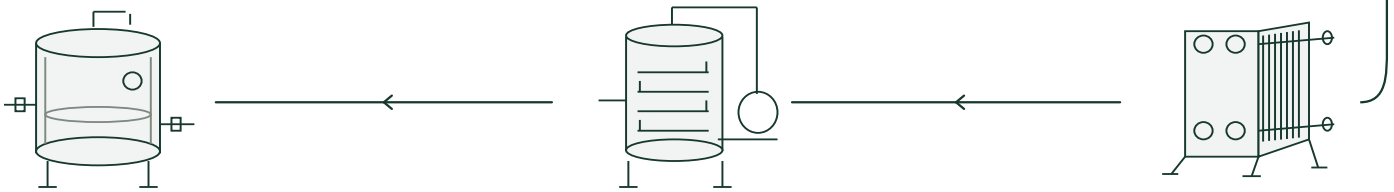
Neutralisation, if selected

Chemical route; soapstock separation

Bleaching and filtration

Adsorbent contact; solids removal

Main product route / follow the connected material path.



Cooling and storage

Protect refined oil; selected finishing

Deodorisation

Specialist vacuum and stripping system

Dewaxing, if required

Controlled cooling and wax separation

Physical refining bypasses neutralisation only with suitable pretreatment.



Adequate pretreatment

Physical deacidification

Refined oil

SonFlow / specified oil or utility heat duty; Mehrer / conditional N2 boosting; ABEL CM / separate wastewater-dewatering route.

PROCESS STUDY / 01

Choose a refining route from the crude oil

This guide begins with crude edible seed oil, after seed preparation and extraction. Assess phospholipids, free fatty acids, colour, waxes and other relevant impurities before choosing the refining sequence. Degumming removes targeted gum fractions through conditioning and separation. In a chemical route, neutralisation converts free fatty acids into soapstock, followed by separation and any required washing and drying. A physical-refining route instead needs suitable pretreatment before downstream deacidification. Pumps and exchangers must be selected for the actual oil or aqueous stream and its temperature. They do not replace the separators or make chemical and physical routes interchangeable.



Sunflower kernels: a raw-material study.

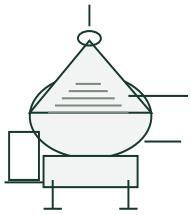
Photo / Lukasz Rawa

PROCESS STUDY / 02

Bleaching and dewaxing have separate purposes

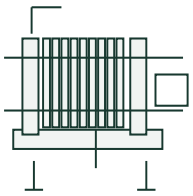
Bleaching treats the oil with suitable adsorbent under defined conditions, then removes the spent material by filtration. The filter and its media perform separation; a feed pump only supplies the hydraulic duty. Oils that require wax removal follow a controlled cooling and crystallisation route before another separation step. Thermal equipment should accommodate the changing viscosity and deposition behaviour, including startup and shutdown. SonFlow sanitary or another suitable plate construction can be assessed within its material and temperature limits. Hot edible-oil duty is not automatically suitable for every gasketed configuration, and suspended adsorbent is not the same fluid as filtered oil.

OPERATION STUDY / SELECTED PROCESS DETAILS



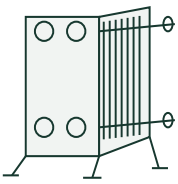
Neutralisation, if required

A chemical-refining route removes free fatty acids before further treatment.



Bleaching and filtration

Remove pigments and other impurities, then separate the adsorbent.



Dewaxing, where required

Cool and separate waxes for the applicable oil and product specification.

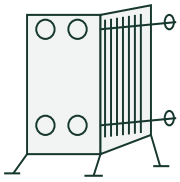
Explanatory equipment studies / configuration, controls and treatment conditions follow the selected product route.

PROCESS STUDY / 03

Deodorise, cool and store deliberately

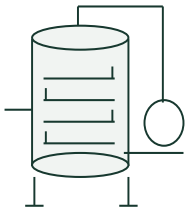
Deodorisation uses a controlled combination of temperature, vacuum and stripping conditions to remove selected volatile components; physical refining also removes free fatty acids in the relevant arrangement. The complete high-temperature vacuum system is a specialist process. Heat recovery and final cooling can be assessed around it, with equipment selected for each duty's temperature and pressure. After cooling, storage and packaging should limit avoidable oxidation. A Mehrer nitrogen booster is relevant where an engineered inert-gas system needs extra pressure from its defined source. Nitrogen generation, gas quality and blanket regulation remain separate functions. The compressor image represents a family option rather than a universal refinery specification.

OPERATION STUDY / SELECTED PROCESS DETAILS



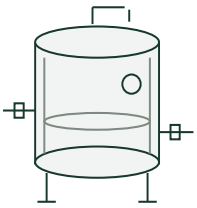
Dewaxing, where required

Cool and separate waxes for the applicable oil and product specification.



Deodorisation

Treat the oil under the specified temperature, vacuum and stripping conditions.



Cooling and storage

Bring refined oil to its required handling condition before storage and packing.

Explanatory equipment studies / configuration, controls and treatment conditions follow the selected product route.

SONFLOW / GASKETED PLATE EXCHANGER / THERMAL DUTY STUDY

Recover heat within the duty limits.

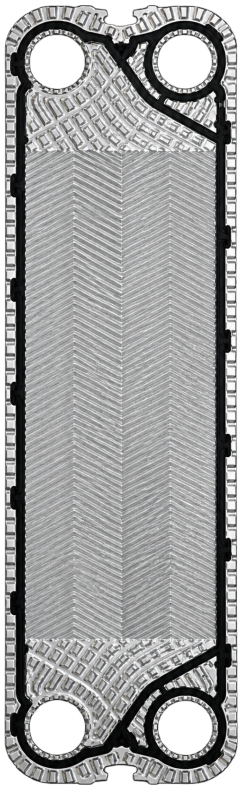


PLATE / FLOW PASSAGE

Assess a plate arrangement for the selected heating, cooling or recovery circuit. Composition, temperature and allowable pressure loss determine the configuration.



FRAME / COMPLETE UNIT

Confirm plate and gasket materials, temperature limits, fouling and access. The depicted family is specified separately for each product or utility duty.

EXPLORE SONFLOW /

MEHRER / TZW / NITROGEN BOOSTER STUDY

Supply the pressure the gas route needs.

Assess nitrogen boosting only where the defined source pressure is insufficient for the engineered storage or packaging duty. Compression is one component of the gas supply.



MEHRER / TZW FAMILY STUDY

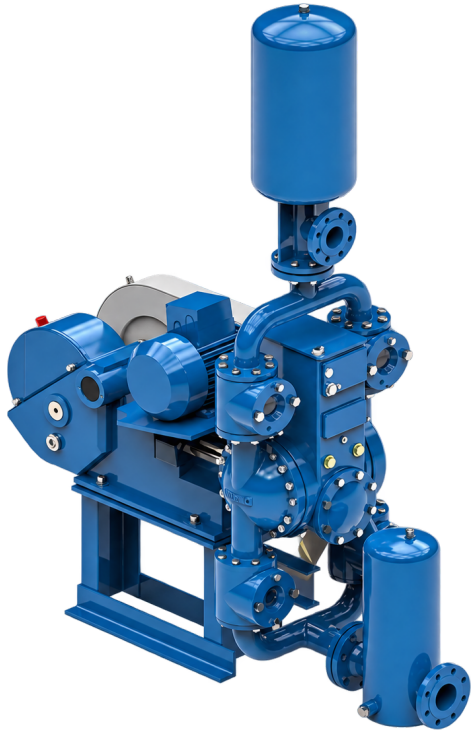
Confirm gas purity, inlet pressure, flow, cooling and regulation. A booster does not generate nitrogen or establish food-grade gas quality by itself.

EXPLORE MEHRER /

ABEL / CM / FILTER-PRESS FEED

Feed the dewatering cycle.

Where the site selects filter-press dewatering, an ABEL CM can be assessed as the feed pump. The pressure and flow change through the filling and pressing cycle.



ABEL / CM COMPACT DIAPHRAGM FAMILY

The press performs separation. Specify solids, abrasiveness, chemistry, suction and the pressure cycle; do not substitute this auxiliary duty for product clarification.

EXPLORE ABEL /

CONTROL THE PROCESS OUTCOME

Check each removal step.

Crude-oil composition determines which operations are necessary. Monitor the specified impurity reductions, oil loss, moisture, colour, oxidation measures and finished-product requirements. Vacuum performance and thermal exposure belong in the deodorisation review. Spent adsorbent and soapstock must have identified handling routes. Avoid transferring operating settings between oils without assessing their different impurity profile and physical behaviour.

A PROCESS SPECIFICATION

Crude-oil impurity profile

Bleaching solids and wax behaviour

Final oil quality and nitrogen demand

VERIFICATION IN OPERATION

A useful thermal review begins with a temperature and duty map. Identify where heat can be exchanged directly before studying a powered recovery system. Include minimum production rate, product changeovers and cleaning so that the chosen equipment works across the real operating envelope, not only at the nominal design point.

THE AUXILIARY ROUTE

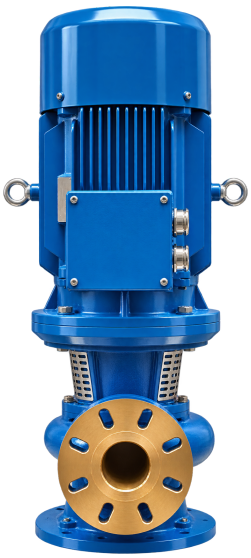
Recover heat without mixing streams.

Hot outgoing oil can provide a useful recovery duty when temperatures and operating schedules align. Keep the oil, cooling water and cleaning circuits separate. Specify exchanger materials and leakage protection for the actual service. Wastewater and sludge from aqueous refining operations may justify an ABEL transfer or filter-press feed assessment. This is an auxiliary treatment application, not a replacement for oil clarification or bleaching filtration.



Industrial vessels and pipework; utility context

Photo / Crystal Kwok



DANPUMPS / S-MP BRONZE-BODY INLINE FAMILY STUDY

EXPLORE THE RELATED EQUIPMENT /

TURN THE ROUTE INTO A USEFUL ENQUIRY

Specify the material. Define the duty.

A useful thermal review begins with a temperature and duty map. Identify where heat can be exchanged directly before studying a powered recovery system. Include minimum production rate, product changeovers and cleaning so that the chosen equipment works across the real operating envelope, not only at the nominal design point.

01 Crude-oil impurity profile

02 Chemical or physical refining route

03 Bleaching solids and wax behaviour

04 High-temperature and vacuum boundaries

05 Final oil quality and nitrogen demand

RESEARCH BASIS / SELECTED PRIMARY REFERENCES

Alfa Laval seed oil processing / Alfa Laval edible oil deodorisation process overview / SonFlow sanitary exchangers / SonFlow sanitary and food industry / DanPumps S-IP/S-MP / Skyven Arcturus

PHOTOGRAPHIC REFERENCES

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BEGIN THE CONVERSATION

A considered process. A useful conversation.

Tell us about your stream, the operating conditions and the result you want to achieve.

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Seed Oil Refining / Fat and oil processing