



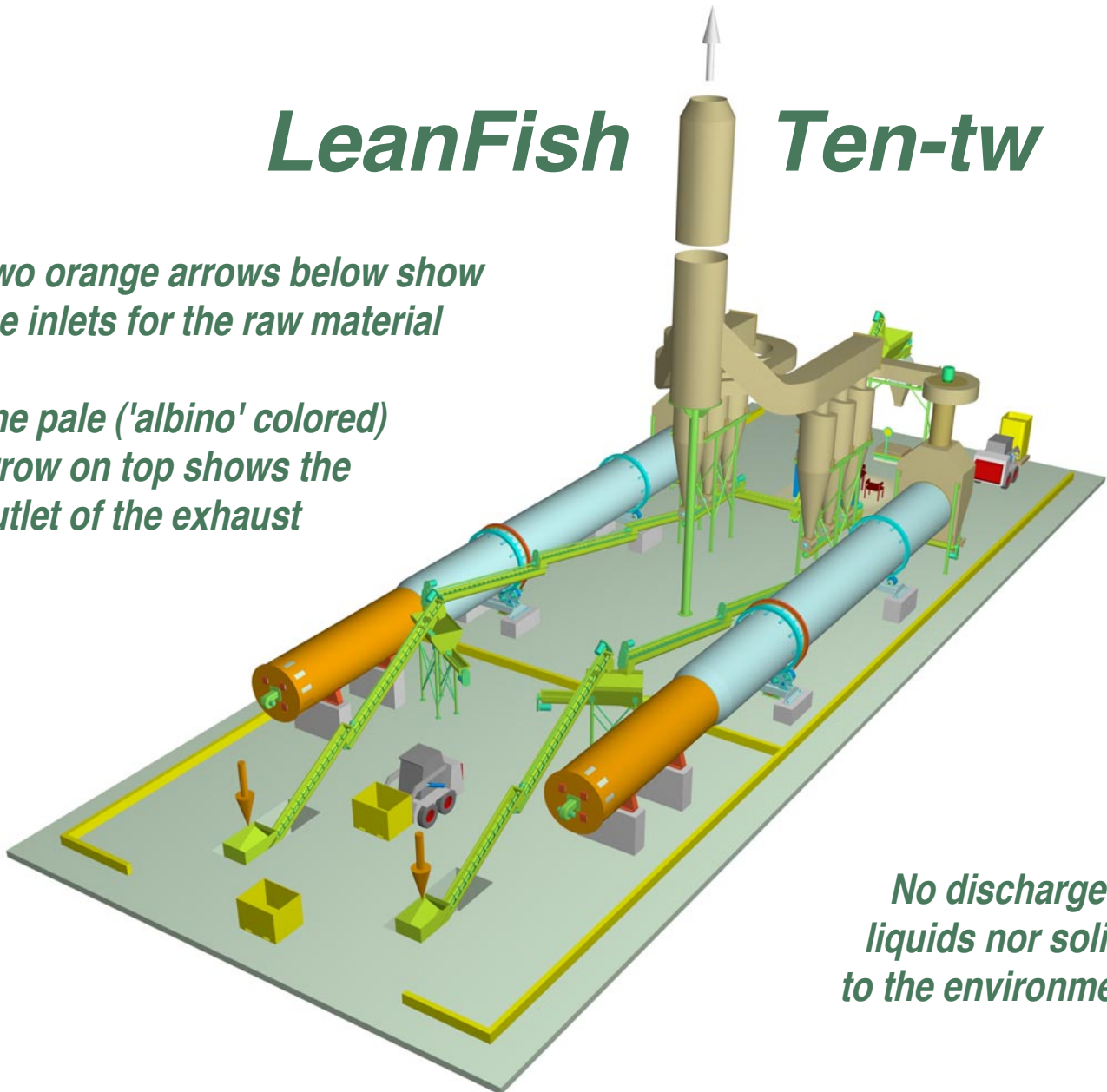
Do-it-yourself

Fish Meal Plants

LeanFish Ten-tw

Two orange arrows below show the inlets for the raw material

The pale ('albino' colored) arrow on top shows the outlet of the exhaust



No discharge of liquids nor solids to the environment

Raw Material: Lean Offal & By-catch

Wet Input: 10.000 kg/h (raw material)

Output: 2.250 kg/h (fish meal)

Unique

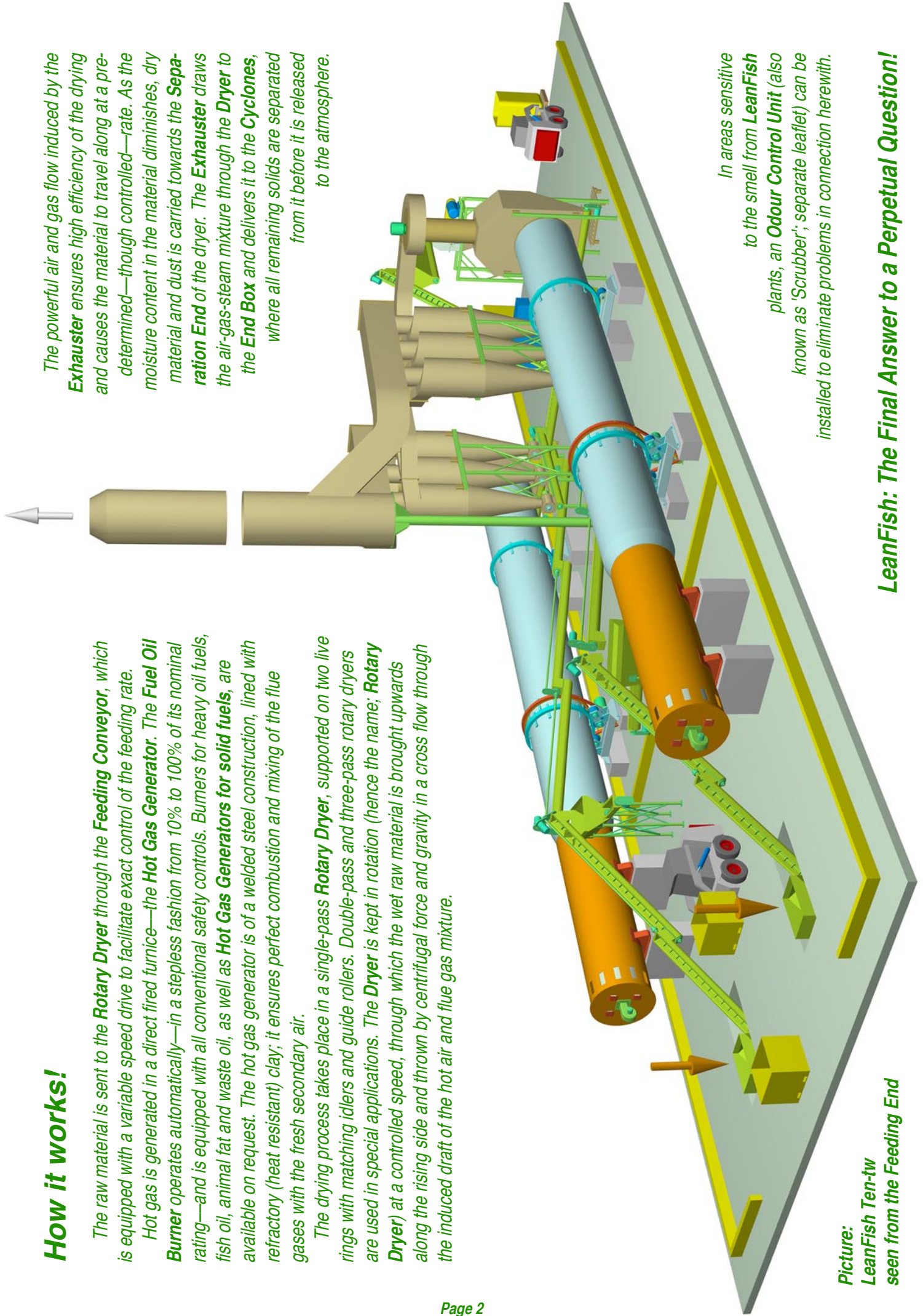
How it works!

The raw material is sent to the **Rotary Dryer** through the **Feeding Conveyor**, which is equipped with a variable speed drive to facilitate exact control of the feeding rate.

Hot gas is generated in a direct fired furnace—the **Hot Gas Generator**. The **Fuel Oil Burner** operates automatically—in a stepless fashion from 10% to 100% of its nominal rating—and is equipped with all conventional safety controls. Burners for heavy oil fuels, fish oil, animal fat and waste oil, as well as **Hot Gas Generators for solid fuels**, are available on request. The hot gas generator is of a welded steel construction, lined with refractory (heat resistant) clay; it ensures perfect combustion and mixing of the flue gases with the fresh secondary air.

The drying process takes place in a single-pass **Rotary Dryer**, supported on two live rings with matching idlers and guide rollers. Double-pass and three-pass rotary dryers are used in special applications. The **Dryer** is kept in rotation (hence the name; **Rotary Dryer**) at a controlled speed, through which the wet raw material is brought upwards along the rising side and thrown by centrifugal force and gravity in a cross flow through the induced draft of the hot air and flue gas mixture.

The powerful air and gas flow induced by the **Exhauster** ensures high efficiency of the drying and causes the material to travel along at a pre-determined—though controlled—rate. As the moisture content in the material diminishes, dry material and dust is carried towards the **Separation End** of the dryer. The **Exhauster** draws the air-gas-steam mixture through the **Dryer** to the **End Box** and delivers it to the **Cyclones**, where all remaining solids are separated from it before it is released to the atmosphere.



In areas sensitive to the smell from **LeanFish** plants, an **Odour Control Unit** (also known as 'Scrubber'; separate leaflet) can be installed to eliminate problems in connection herewith.

Picture:
LeanFish Ten-tw
seen from the Feeding End

LeanFish: The Final Answer to a Perpetual Question!

LeanFish: The Final Answer to a Perpetual Question!



The **LeanFish Dry Rendering Process** is particularly well suited for the processing of 'lean' marine and aquatic by-catch and offals—raw materials with the average live oil content (LOC) up to 2,5% (right). Most demersal fish species—also known as bottom fish—have oil contents less than 1% of live weight. For the processing of 'oily' raw materials—with LOC higher than 2,5%, known as pelagic fish—**LeanFish** plants can be extended with an **Oil Extraction Unit** (separate leaflet), built up from a cooker, a press, an oil separator and a steam generator—at the time the plant is built or at a later date.

The **LeanFish Process** recovers all solids from the raw materials for the meal production, which ...

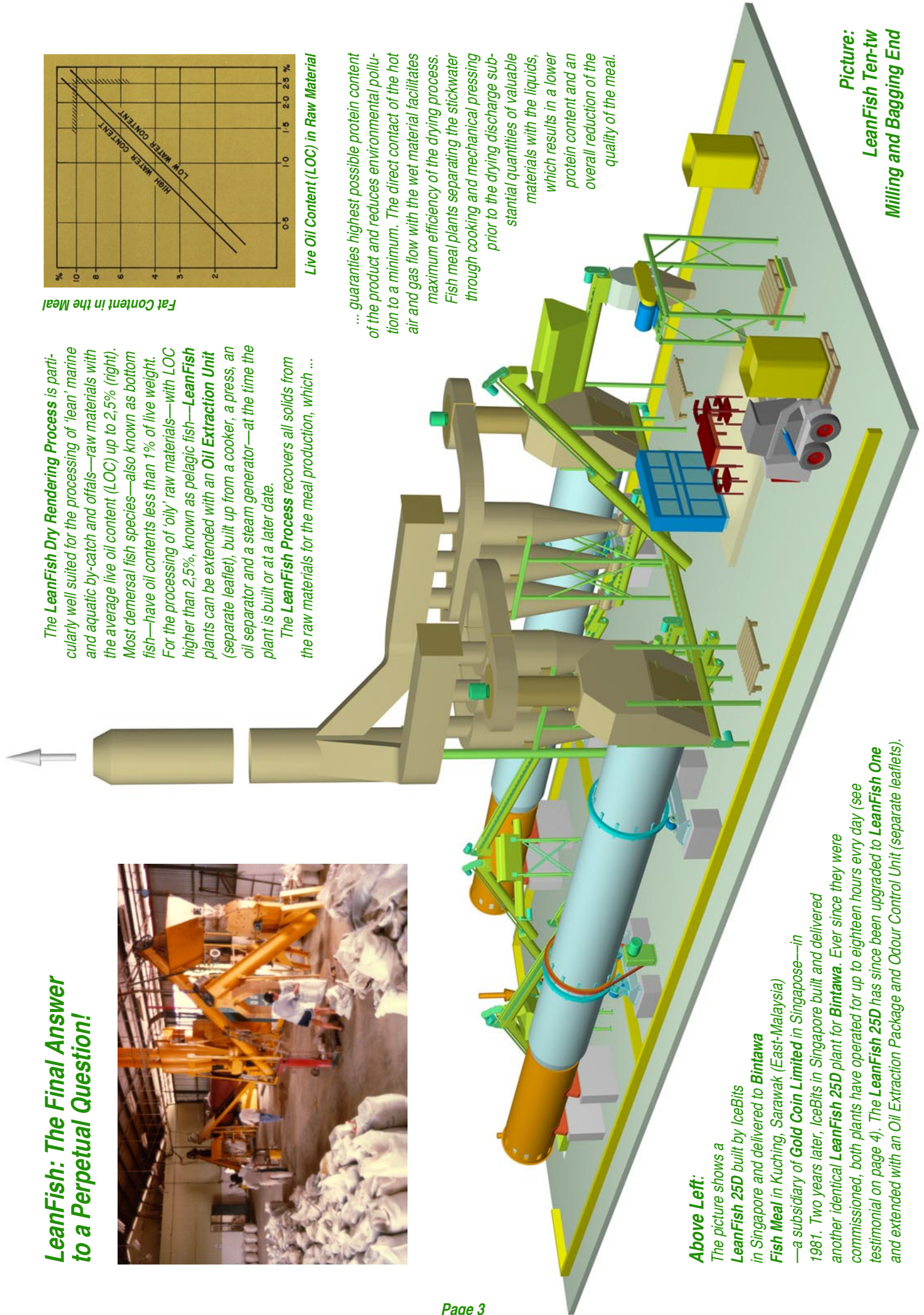
... guarantees highest possible protein content of the product and reduces environmental pollution to a minimum. The direct contact of the hot air and gas flow with the wet material facilitates maximum efficiency of the drying process. Fish meal plants separating the stickwater through cooking and mechanical pressing prior to the drying discharge substantial quantities of valuable materials with the liquids, which results in a lower protein content and an overall reduction of the quality of the meal.



Live Oil Content (LOC) in Raw Material

Above Left:

The picture shows a **LeanFish 25D** built by IceBits in Singapore and delivered to **Bintawa Fish Meal** in Kuching, Sarawak (East-Malaysia) —a subsidiary of **Gold Coin Limited** in Singapore—in 1981. Two years later, IceBits in Singapore built and delivered another identical **LeanFish 25D** plant for **Bintawa**. Ever since they were commissioned, both plants have operated for up to eighteen hours every day (see testimonial on page 4). The **LeanFish 25D** has since been upgraded to **LeanFish One** and extended with an Oil Extraction Package and Odour Control Unit (separate leaflets).



Picture:
LeanFish Ten-tw
Milling and Bagging End

A Testimonial from a Valued Client

GOLD COIN LIMITED

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SINGAPORE 2261
REGISTERED OFFICE:
ZUELLIG BUILDING,
14, SHAW ROAD, SINGAPORE 1336.



Please address all mail to:
MAXWELL ROAD P.O. BOX 1849
SINGAPORE 9036
TELEPHONE: 2652044
TELEX: GCLSGP RS 21365

PLEASE ADDRESS ALL LETTERS TO THE COMPANY AND QUOTE OUR REFERENCE NUMBER

Our Ref: 138/M.6

29 October 1984

To Whom It May Concern

This serves to certify that we have operated one LeanFish 25D fish meal processing plant since November 1981 and another identical plant since October 1983 in Kuching, Sarawak, both designed and built by NIELSSONS Pte Ltd. The plants are based on the direct fired dry rendering process, ie. they operate without oil extraction equipment.

The raw material processed consists approximately 20 main species and approximately 30 less prominent species that are obtained as by-catch from traditional fishing vessels off the north coast of Sarawak. Most of the raw material is termed to be "trash", ie. not suitable for human consumption.

The product coming from the plant will typically have the following composition:

Crude Protein	:	60% to 64%
Fat	:	6% to 8%
Moisture	:	9%
Ashes	:	21% to 23%

We are satisfied with the performance, economy and mechanical execution of both plants.

for GOLD COIN LIMITED

H. ALTHERR
DIRECTOR - GROUP OPERATIONS (DESIGNATE)

AH/cl

MEMBER OF THE ZUELLIG GROUP
WITH SUBSIDIARIES IN MALAYSIA, INDONESIA, HONGKONG AND PEOPLE'S REPUBLIC OF CHINA
AND AFFILIATED OFFICES IN THAILAND, PHILIPPINES, AUSTRALIA, U.S.A., SWITZERLAND.

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