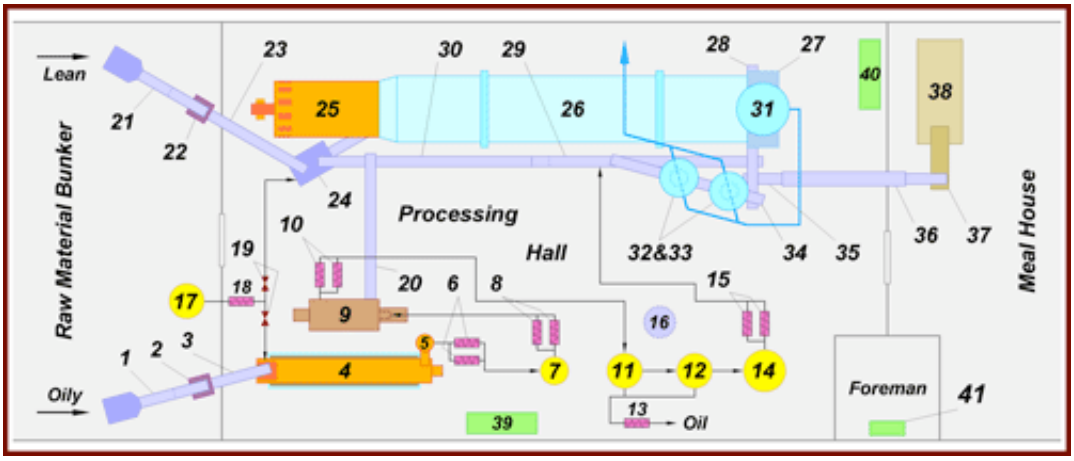
Ultima 80 LF & SD
All-purpose Fish Meal Plant
for lean and oily raw materials
- marine and aquatic -

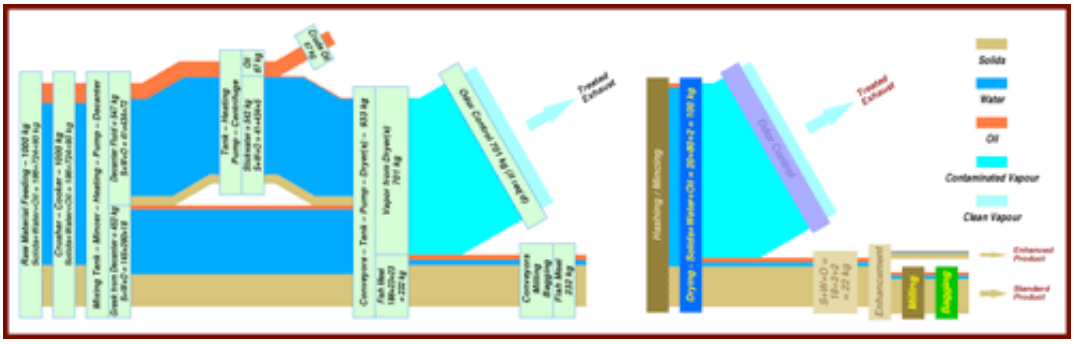
Modus Operandi
Acrobat Printout Version (A4 portrait, four pages; 384 k)

*The **Ultima 80 LF** fish meal plant consists an **Oil Extraction** line (items 1 through 20 in Picture 1) and a **LeanFish Three** direct fired drying line (items 21 through 38). The plant can be equipped with a **steam dryer**, in which case the name changes to **Ultima 80 SD**. In continuous operation, both types will process **80 mTon in 24 hours** or 3,33 mTon/h of all marine and aquatic fish species - including **offal** from processing and **by-catch** from fishing, lean as well as oily - into **WLT-Meal** (**W**hole **L**ow **T**emperature **Meal**).*



Picture 1 - The Material Flow in Ultima 80 LF Fish Meal Plant
(hit the picture for an Acrobat A4 landscape printout document - 2,2 MB)

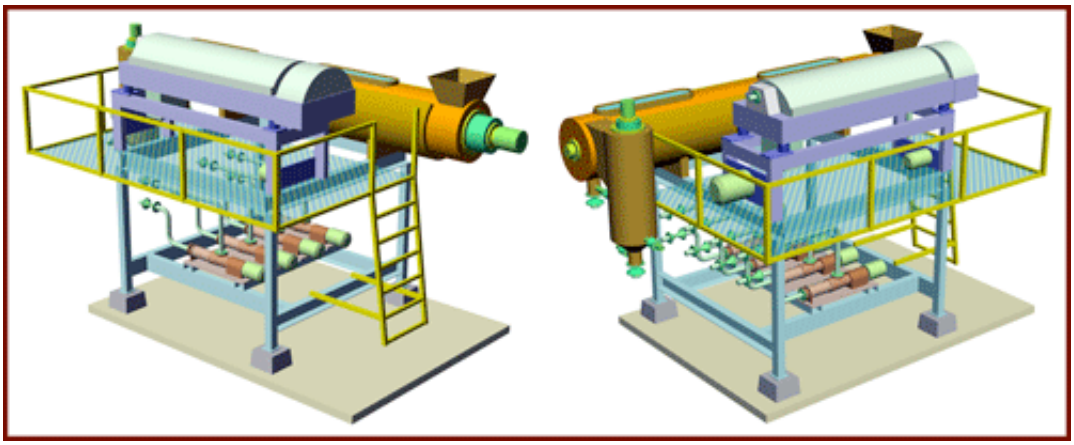
***LOC** stands for **L**ive **O**il **C**ontent and is an indicator for the amount of oil in the live fish calculated as a percentage of the live weight. Raw material with **LOC more than 2,5% is oily** and must be subjected to Oil Extraction, while material with **LOC less than 2,5% is lean** and can be fed directly to the LeanFish dryer. Generally, **pelagic** fish swimming in the surface of the ocean - such as Herring, Capelin and miscellaneous Sardine and Anchovis species - **are oily**, while **demersal** species living near the bottom **are lean**.*



Picture 2 - The Mass Flows in Ultima 80 LF Fish Meal Plant
for oily** (left) **and lean** (right) **raw materials
(hit the picture for an Acrobat A4 landscape printout document - 2,7 MB)

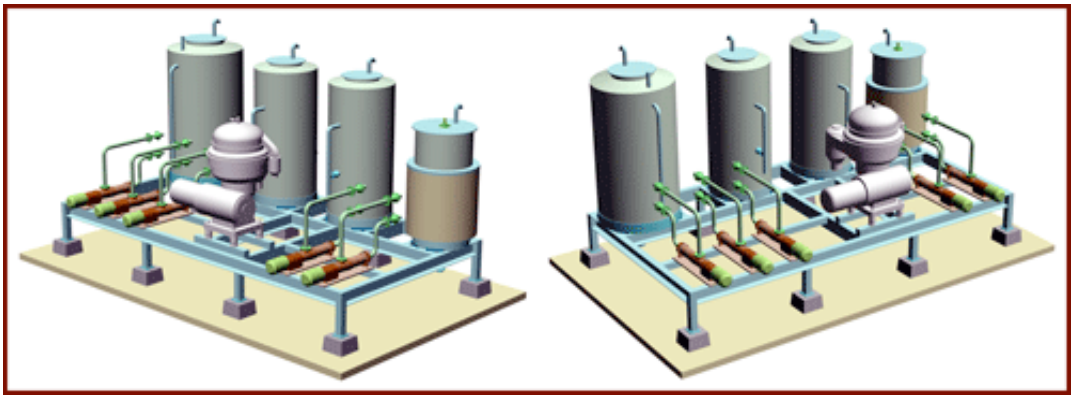
Numbering on the flow diagram (above) follows the flow of material being processed. The components are identified on a separate printout attached hereto. The two mass flow diagrams on Picture 2 on the following page show the performance of various components in the plant - for oily and lean raw materials shown left and right respectively. They appear in full scale on another attached printout. Hence, both processing lines, the Oil Extraction and the LeanFish dryer, must operate simultaneously when oily raw material is processed, while lean material can be dealt with by running the LeanFish line only.

*Oily raw material enters the hopper of Feeding Conveyor I (1). Big fish pass through Disintegrator/Crusher (2), while small pelagics are sent in Feeding Conveyor II (3) directly to Cooker (4). Cooked material is stirred in Receiving Tank (5) and taken by one Pump (6) to Intermediate Tank (7). Stirring in tanks (5) and (7) is ongoing and one Pump (8) brings the material along to **Decanter** (9), where much of the water and oil, including some solids, referred to as decanter fluid, is separated from the bulk of solids, which is sent with Screw Conveyor (20) for drying in the LeanFish line. One Pump (10) sends the separated fluid to Settling Tank I (11). The second pump in each case (6, 8 and 10) acts as stand-by for the one working on its side.*



Picture 3 - Cooker** (4) **red/brown behind and Decanter** (9) **blue/lilac in front with a platform for servicing and six Pumps** (6 and 10) **below
(hit the picture for an Acrobat A4 landscape printout document - 832 k)

The decanter fluid flows by its own weight from Settling Tank I to Settling Tank II (12). Oil separation takes place by gravity - in two stages, in two tanks - and oil is skimmed off the surface; Pump (13) sends the oil to consumers. The small quantity makes polishing, storage and marketing comparatively costly and mixed body oil - won from a variety of fish species - is not easily marketable in competition with oil won from uniform raw materials (pelagics). Hence, oil produced from offal and by-catch in small fish meal plants can with preference be used to fuel the Hot Gas Generator (25) and the Steam Generator (43), particularly in countries where fuel costs are high, thus reducing the cost of operation.



Picture 4 - Intermediate Tank** (7) **right, Settling Tanks I and II** (11 and 12) **center and Stickwater Tank** (14) **left, all behind light-bluish; Centrifugal Separator** (16) **'albino' and five Pumps** (right to left 8, 13 and 15) **in front
(hit the picture for an Acrobat A4 landscape printout document - 1004 k)

Stickwater, containing residual oil and dissolved solids, flows by its own weight from Settling Tank II to Stickwater Tank (14). It is proportioned into the drying process through one Pump (15), which takes it to Return Conveyor I (29); the second pump is stand-by for the one operating. The Centrifugal Separator (16) is shown 'albino', indicating that it is not delivered with the basic Ultima 80 LF plant. It can be installed at a later date.

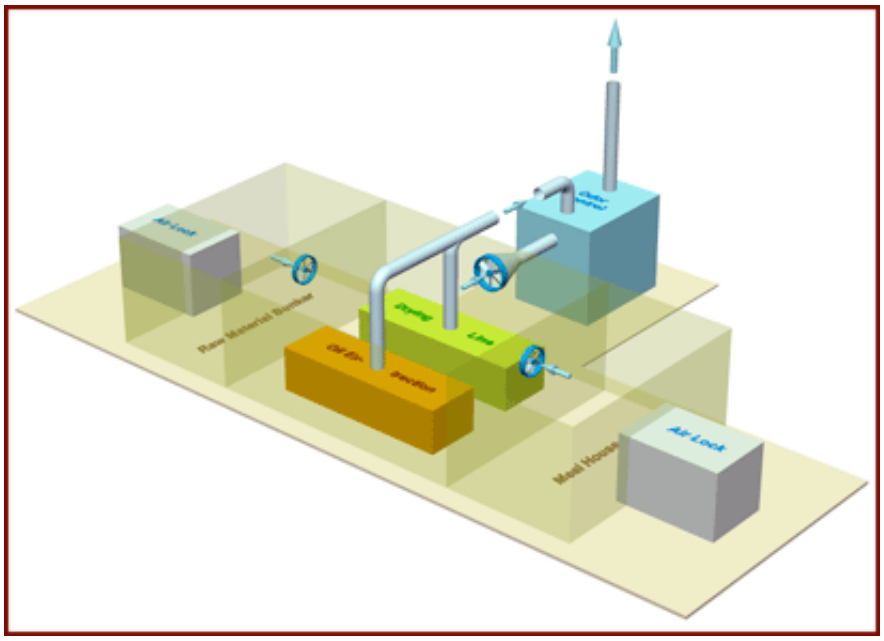
Picture 5 - LeanFish 25D at Bintawa Fishmeal in Kuching, Sarawak
(hit the picture for an Acrobat A4 landscape printout document - 6,4 MB)

Where pelagic harvests are pumped from fishing vessels to the raw material bunker, bloodwater - the pumping carrier - is collected in Bloodwater Tank (17) and sent by Pump (18) to the Cooker or the LeanFish dryer, selected by two Stop Valves (19). Following the removal of oil, the raw material has become lean and can now be dried in a conventional

manner in the LeanFish drying line or in the steam dryer of Ultima 80 SD. Wet solids from the Decanter and stickwater from the Stickwater Tank enter the drying process at strategic locations to ensure adequate and uniform mixing. Lean raw material enters the hopper of Feeding Conveyor I (21). Big fish and lumps pass through Disintegrator/Crusher (22) and small demersal by-catch and offal from fish processing is sent in Feeding Conveyor II (23) directly to Raw Material Feeder (24).

Picture 6 - LeanFish Fish Meal Plant fired with Biomass Gasifier (left behind)
(hit the picture for an Acrobat A4 WM (web movie) document - 3,0 MB)

Hot Gas Generator (25) is fired with fossil oil or gas fuels, or with biogas (Picture 6). Wet material for drying enters Rotary Dryer (26) and moves along to Dry Material Collector (27), where it drops into Collector Conveyor (28). Some dry material is returned in Return Conveyor I (29) and Return Conveyor II (30) for mixing with wet material coming from the Oil Extraction. Exhauster (31) draws air for drying through the Hot Gas Generator and Rotary Dryer and sends it on to two Cyclones (32) with Air Locks (33) for separation of the dust. From there, the air is sent to Odor Control (44). Cyclone Conveyor (35) can run in both directions, depending on the consistency of the material being processed.



Picture 7 - Complete Odor Control in Ultima Fish Meal Plants
(hit the picture for an Acrobat A4 landscape printout document - 220 k)

Mill Conveyor (35) is equipped with Enhancement (36), permitting meal with protein content higher than that of the average product to be separated before the main stream is milled. Shaker/Doser (37) feeds the mill in Milling & Bagging (38) uniformly. The process is controlled from Electric Main Panel (39), Electric Sub Panel (40), Foreman's Control (41) and Observation Screen (42). Steam Generator (43) provides steam for the cooker.

Most of the odor from fish meal plants comes from the process itself; it can usually be seized right where it happens and sent to the Odor Control. However, the raw material and the finished product also generate odor. To prevent all odor from escaping to the ambient, odor-contaminated air from the Raw Material Bunker and the Meal House must be drawn into the Processing Hall and sent from there to the Odor Control (Picture 7).

Attachments

Modus Operandi	: http://www.ingvar.is/Ultima/ModusOperandi.pdf	- 4,9 MB
Plan with Numbers	: http://www.ingvar.is/Ultima/Ultima80plan.pdf	- 2,2 MB
Mass Flows	: http://www.ingvar.is/Ultima/MassFlowLeanOily.pdf	- 2,7 MB
Decanter	: http://www.ingvar.is/Ultima/Decanter.pdf	- 2,1 MB
Enhancement	: http://www.ingvar.is/Ultima/Enhancement.pdf	- 112 k
Odor Control	: http://www.ingvar.is/Ultima/OdorControl.pdf	- 784 k
Biomass Gasifier	: http://www.ingvar.is/Ultima/AnkurGasifier.pdf	- 2,7 MB
Specification LeanFish	: http://www.ingvar.is/Ultima/SpecLeanFish.pdf	- 3,6 MB
Specification Ultima	: http://www.ingvar.is/Ultima/SpecUltima80.pdf	- 68 k

Less Expensive Fish Meal

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