incrust
www.incrust.com

ENERGY SAVING

Incrust EV - process

LIVESTOCK FEED (Pigs, Cattle and Poultry):

IFIF (International Feed Industry Federation) states the following:
http://www.ifif.org/pages/t/Global+feed+production

In 2016, world feed production was approx. 1 billion tonnes per year.
Global commercial feed production generates annual sales of over $ 400 billion.
The United Nations Food and Agriculture Organization (FAO) estimates that by 2050, food demand will increase by 60%.

Based on Industry Energy Analysis for the Grain, Feed and Vegetable Drying Industries Sub-report A, Foderstoffabrikker, February 1995 (See appendix: 1995.02.00 - BI - Industry energy analysis - Section) and Statistics Denmark, the following energy consumption can be mapped:
Total production of factory-produced feed in 1995 (When the industry analysis was made).
Total compound feeding stuffs: 5.656 Mill. Tons / year.
Total production of factory-produced feed in 2014.
Total compound feed: 4,312 Mill. Tons / year. (Production has declined)

The pelleting process in the feed industry has not changed from 1995 to today.
The process still takes place by ring matrix pelleting.
The industry analysis shows (page 103) that approx. 75 kWh / ton factory-produced feed.
The industry analysis shows (pages 59 - C) that 49% is used in the pelletization process.
Ie. approx. 37 kWh in the current pelletizing process per tonne.

Annual consumption with traditional pelletizing process:
Annually 37 x 4.312 = 159.544 mill. kWh per year, approx. 160 million kWh per year.

The Incrust E process heats up to max. 30% of the feed mixture
However, the 30% must be heated to 130 GC in contrast to ring matrix pelletization where the entire feed mixture only needs to be heated to 82 GC.

Thermal energy consumption for livestock production looks like this:
For ring matrix pelleting, the feed mixture must be warmed from room temperature to 82 GC, ie. 62 GC.
Added thermal energy for the production of 1 ton of feed with the ring matrix process:
Q = m x c x (T2 - T1), m = mass, C = specific heat capacity, T2 - T1 = heating
Q = 1000 x 1.7 x 62 = 105.400 KJ / ton.
For Incrust E pelleting, the adhesive product must be heated from room temperature to 130 GC, ie. 110 GC
Added thermal energy for production of 1 ton of feed with the Incrust E process:
Q = (1000 x 0.3) x 1.7 x 110 = 56,100 KJ / ton.
Savings = 105,400 - 56,100 = 49,300 KJ = 46.7%
Saving = 49,300 kJ x 0.0002778 = 13.7 kWh / ton (1kJ = 0.0002777778 kWh)

Pelletizing energy consumption in the Incrust E process = (47/100) x 37 = 17 kWh
Energy consumption on the entire feed production with the Incrust E process:
75 - 37 + 17 = 55 kWh per tonne
LIVESTOCK FEED PRODUCTION SAVINGS = 75 - 55 = 20 kWh per. ton = 27%

FISH FEED

Almost 50 million are produced annually worldwide. tonnes of feed for fish farming, and it is expected to have increased to 70 million in 2020. tonnes to keep up with demand.
Aktuelt Naturvidenskab, 1, 2014, Appendix: 2014 - Aktuel Naturvidenskab - 1.pdf
http://aktuelnaturvidenskab.dk/fileadmin/Aktuel_Naturvidenskab/nr-1/AN1-2014fiskefoder.pdf

THE EXTRUSION PROCESS:
The Incrust E process heats up to max. 30% of the feed mixture
The 30% is heated to 130 GC in contrast to the existing extrusion process where the entire feed mixture (100%) is heated to 130 GC.
The thermal energy consumption for fish feed production looks like this:
In the existing extrusion process, the feed mixture must be heated from room temperature to 130 GC, ie. 110 GC.
Added thermal energy for the production of 1 ton of fish feed with existing extrusion process:
Q = m x c x (T2 - T1), m = mass, C = specific heat capacity, T2 - T1 = heating
Q = 1000 x 1.7 x 110 = 187,000 KJ / ton.
For Incrust E pelletization, the adhesive product must be heated from room temperature to 130 GC, ie. 110 GC
Added thermal energy for production of 1 ton of feed with the Incrust E process:
Q = (1000 x 0.3) x 1.7 x 110 = 56,100 KJ / ton. = 56100 x 0.0002777778 = 15.6 kWh / ton
Savings = 187,000 - 56,100 = 130,900 KJ = 70%
Saving = 130,900 kJ x 0.0002778 = 36.4 kWh / ton (1kJ = 0.0002777778)

THE DRYING PROCESS:
The thermal energy consumption in the production of 1 tonne of feed for farmed fish is on average 186 kWh, of which at least 60% can be attributed to the drying process.
Aktuelt Naturvidenskab, 1, 2014, Appendix: 2014 - Aktuel Naturvidenskab - 1.pdf
Thermal energy consumption of the drying process: 186 x 0.6 = 112 kWh / ton
As the Incrust E process does not require drying, an energy saving of 112 kWh / ton is obtained
Saving = 112 kWh / ton = 100%
The total thermal energy savings in the production of fish feed with the Incrust E process are:
Extruder saving = 36 kWh / ton + Dryer saving = 112 kWh / ton a total of 148 kWh / ton
Saving = 148 kWh / ton
FISH FEED PRODUCTION SAVING = (148/186) X 100 = 80%

PET FOOD

Almost 25 million are produced worldwide worldwide each year. Tonnes of Petfood in (2016), and an increase in production is expected.
https://www.petfoodindustry.com/blogs/7-adventures-in-pet-food/post/6207-global-pet-food-sales-update-ending-2016-on-a-high-note

The total thermal energy savings in the production of pet food with the Incrust E process is the same as in the production of fish feed:
Extruder saving = 36 kWh / ton + Dryer saving = 112 kWh / ton a total of 148 kWh / ton
Saving = 148 kWh / ton
PET FOOD PRODUCTION SAVINGS = (148/186) X 100 = 80%