1 Level 1 - Cargill Corn Wet-Mill Process Overview

1.1 Grain Handling

Goal: Receive, clean, and prepare core for steeping

Step	Description
Truck / Rail Receiving	Core is weighed, sampled for moisture and quality, and unloaded.
Cleaning	Scalpers, magnets, and aspirators remove debris, cob, stones, and dust
Storage / Silos	Clean corn stored and metered to the steep tanks
Dust Collection	Protects workers and air quality

1.2 Steeping

Goal: Soften kernels, loosen gluten and germ bonds.

Step	Inputs	Outputs
Steep Tanks	Hot water (∼50c) + dilute sulfur dioxide (SO2)	Steep liquor (solubles for feed) + soaked corn
Heat Exchangers	Maintain temp via steam and cooling control	-

1.3 Milling & Separation

Goal: Physically break down corn and seperate its fractions.

Step	Description	Main Products
Crude / Wet Milling	Attrition mills rupture kernels.	Mash
Germ Separation	Hydrocyclones or screens float off germ (light phase).	Germ (oil source)
Germ Pressing	Oil extracted; press cake sent to feed.	Corn oil
Fiber Separation	Screens remove hulls and fiber.	Fiber (feed)
Gluten Separation	Centrifuge isolate gluten protein	Gluten (feed)
Starch Refining slury	Washing, filtering ion exchange.	Pure starch

1.4 Startch Conversion & Finishing (depends on product line)

Goal: Different trains run in parallel depending on the business.

A: Sweetener Line

Step	Description	Output
Liquefaction	Enzymes convert starch → dextrin	Dextrin
Saccharification	Enzymes convert dextrin → glucose	Glucose syrup
Isomerization	Converts glucose → fructose	HFCS
Evaporation / Filtration syrup	Concentrate and purify	HFCS 42/55

B: Ethanol Line

Step	Description	Output
Fermentation	Glucose → Ethanol + CO2	Beer (8-12 %)
Distillation / Dehydration	Separate ethanol, recover CO2	Fuel / Industrial ethanol
DDGS Drying	Solids → animal feed	Dried Distillers Grain

C: Food & Industrial Starch Line

Step	Description	Output
Drying / Modifying	Physical or chemical modification	Native / modified starch
Packaging	Baggin, bulk loadout	Flour, starch, or syrup products

1.5 Utilities & Support Systems

These run plant-wide – they're what your simulation already models!

System	Function
Boilers / Stream Plant	Provide process heat.
Cooling Towers / Chillers	Remove process heat.
Air Compressors	Supply instrument and plant air.
Water Treatment / RO	Provide clean water.
Wastewater (WWTP)	Treat process and sanitary effluent.
Electrical Distribution	Power MCCs, VFDs, controls
DCS / PLC / SCADA	Control loops, alarms, trending
Quality Lab	Verify product specs.
Maintenance / EHS	Reliability and compliance.

1.6 Product Handling

Evaporators / Dryers	Concentrate liquid or dry solids.
Packaging	Bulk rail, truck, or bagging lines.
Warehousing & Shipping	Final QA and outbound logistics.