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Popular Article

Industry Specific/Feed Mill Management Software Process

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Process Automation:



1. Raw Material Intake Automation:

Weighed, quality-checked (moisture, temperature, impurities), conveyed to silos, & monitored by SCADA for level control & management

2. Dosing Automation:

Raw materials are dosed automatically per recipe, with SCADA ensuring correct proportions & precise weighing accuracy of $\pm 0.5\%$.

3. Grinding & Mixing Automation:

Grinding & mixing are SCADA-controlled, with real-time monitoring of motor load, temperature, & pressure to optimize particle size & ensure uniform mixing.

4. Pelletizing, Cooling & Screening Automation:

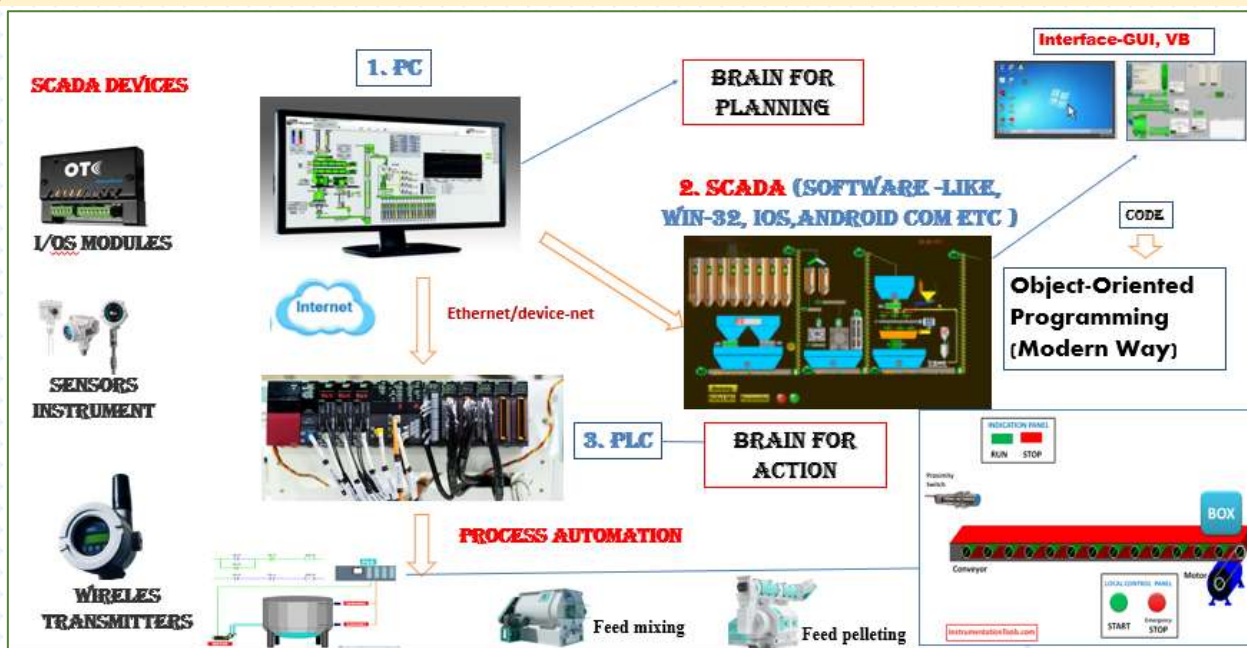
Temperature (80–90°C), humidity (14–17%), & pressure (150–250 bar) are controlled by SCADA.

Screening-Pelleted feed is cooled down to 25–30°C using coolers to enhance its hardness.

Unwanted particles- dust are separated using screening systems

5. Packaging & Storage:

Bagging machines prepare products in 25 kg, 50 kg by Labeling product information from the SCADA database & print it on the bags.



Feed Mill Processing:



Hammer Mills: grinding automation usually is applied to hammer mill to control the feed rate based on programming motor load. the control system monitors and analog signal proportioned to motor load.

Principle: Impact grinder → Striking → Size reduction

- **Application:** Hammer mills are used for crushing, pulverizing & deagglomeration of medium-hard, hard, brittle, tough & fibrous samples
- Coarsely grain (ruminants), finer grain- poultry & swine
- **Size and Capacity:**

Capacity (kg/hr)	Motor Power (kW)	Rotor Speed (RPM)	Screen Size Range (mm)
500 – 1000	15 – 25	1500 – 3000	0.5 – 10
1000 – 2000	30 – 45	1500 – 3000	0.5 – 10
1,500 - 3,500 kg/hour	> 45	>3000	6 - 15

Roller Mills: more sophisticated system provides automatic selection of source grinding.

Use a combination of cutting & crushing, having smooth or corrugated, rotating at 650–1000 rpm.

Application: (grinding & uniform particle size)

- If rolls are operated at same speed – reduction is mostly by **crushing**
- If rolls are operated at different speed – reduction is mostly **cutting & shearing** take place
- **Size and Capacity:**

Mill Type	Grain size (Micron)	Features	Best For
Single Pair Mill	3,000 – 1,200 microns	Simple, coarse grind	Coarse
Double Pair Mill	≥ 700 microns	More rollers, better control & consistency	Medium-coarse grind, versatile materials
Triple Pair Mill	500 microns – “crack” (4–5 pieces)	Multiple grind profiles in one machine	Flexible grind needs



Mixers Of Feed Mill:

Homogeneous blend of all ingredients, uniform nutrient distribution, prevent nutritional imbalance, toxicity, or poor performance. Mixing & batching are the most commonly automated process in feed manufacturing plant. Automation control to improved performance.

Application:

- **Cost-effectiveness:** Protects the value of automated batching systems by ensuring final uniformity.
- **Species-specific Feeding:** Critical for small animals consuming tiny feed amounts.
- **Size and Capacity:**

Type of Mixer	Advantages	Capacity / Size
Horizontal Mixers	Faster, more uniform mixing	Medium to large FM (500–5000 kg/batch)
Vertical Mixers	Simple design, low cost, low power use	Small to medium FM (100–1000 kg/batch)
Continuous Mixers	High throughput; ideal for large-scale operations	Large FM (>5tons/hour)



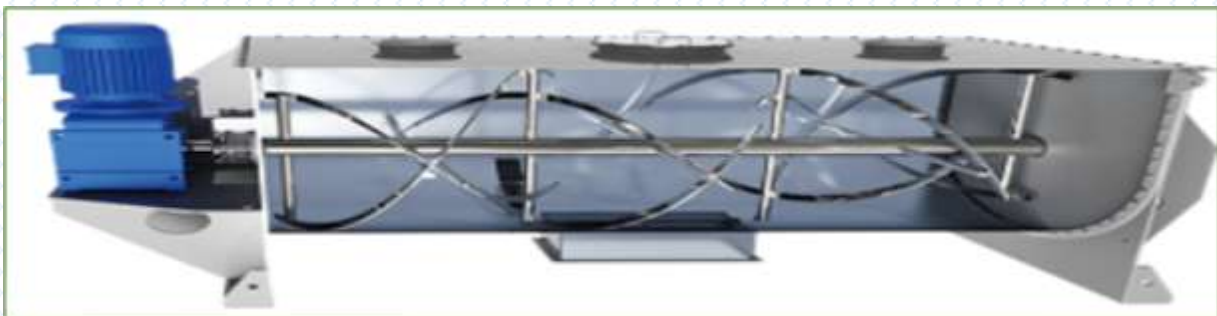
Ribbon Mixers:

Horizontal half-cylinder with **helical ribbons** on central shaft, ribbons move material **end-to-end** during rotation

Application:

- **Animal Feed Industry** → Blending grains, vitamins, minerals, amino acids & additives into uniform feed.
- **Horizontal RIBBON MIXERS – power & capacity:**

Specification details				
Power (KW)	15	30	45	55
Capacity (kg/batch)	1000	2000	3000	4000



Conveyer Belt & Screw Conveyer:

Belt Conveyer: Continuous belt driven by pulleys, moves bulk/granular material horizontally

Screw Conveyer: Rotating helical screw inside tube, moves material horizontally or inclined

Application:

- **Belt Conveyer:** Seeds, grains, maize, pellets, fertilizers, wood chips, granules, etc.
- **Screw Conveyer:** Seeds, grains, maize, pellets, fertilizers sugar, starch
- **Size and Capacity:**

Conveyor Type	Types	Size / Capacity
Belt Conveyor	Flat Belt, Inclined Belt, Conveyor	75 m ³ /h (bulk), 720 bags/h (bagged) , Capacity- 2.2 (power KW)
Screw Conveyor	Horizontal, Inclined , Vertical, Shaftless	100 mm – 1,000 mm) & bulk and inclined transfer

**Belt Conveyor****Bucket Elevators:**

Vertical conveying system, buckets on belt/chain scoop material from lower level, Lift vertically & discharge by gravity or centrifugal force

Applications:

- They are used for making the process efficient by conveying more materials at a time through their high capacities
- **Size and Capacity:**

Type of Bucket Elevator	Key Features	Suitable For
Centrifugal Discharge Elevator	high speed; material is discharged by centrifugal force .	Free-flowing materials (grain, pellets, sand, etc.)
Continuous Discharge Elevator	low speed; gentle handling; material discharged by gravity .	Fragile or friable materials (food grains, seeds, powders)
Z-type Elevator	Multiple inlet & outlet points; flexible layout .	food, pharmaceuticals, packaging



Pellet Mill:

Based on mechanical pressure (controlled compression) & extrusion, rollers force powdered feed through die holes, produces dense, uniform pellets. Diameter of pellet for pig (3.5-6.5mm), cattle (4.5-8mm), chicken (3.2mm), fish (2.0, ϕ 2.5, ϕ 3.0mm) & Pellet length is customized.

Application:

- Densification of low-density biomass (80–200 kg/m³) into high-density pellets (agglomerated feed)
- **Capacity:**

Power (kW)	Capacity (t/h)
90, 132, 160	1–1.5, 1.5–2, 2–2.5
250	3–4
710, 800	10–15

**Pellet Cooler:**

Principle of counterflow cooling, Ambient air flows in the opposite direction (counterflow) to remove heat & moisture from the pellets, Parts of cooler –feeder device(oscillating), product carrying belt, air hamber, Air inlet)

- **Application-**
for cooling the pellet
- **Size and Capacity:**

Capacity (t/h)	Cooling Time (min)	Moisture Reducing (%)
1–2	10–15	≥3.5
3–5	10–15	≥3.5
5–7	10–15	≥3.5
10	10–15	≥3.5



Pellet Cycler:

Resizes pellets into smaller particles, **minimizes fines** during processing, having two type (Lepage cut & Twin-city cut)

Application-

- Widely used in **poultry, swine, aquaculture & mineral feeds**
- **Size and Capacity:**

Size (m2)	Capacity - TPH	Required horse power
9×36	08–12	15HP
12×36	16-20	20HP
12×52	25-30	30HP
12×72	35-40	40HP



Packaging Machine:

The packaging section is the **final stage** in an automated feed mill.

Application-

- Its role is to **weigh, fill, seal & label** the finished feed (pellets, mash, or crumbles) into bags or bulk containers, ready for transport or storage — with minimal human intervention.
- **Size and Capacity**
- **Range of formats:** Handles bags from **kg to tonnes**
- **High production capacity:** Up to **3000 bags/hour**.

- **Unique versatility:** Operates with two packaging systems:
- **Open-mouth bags.**
- **Roll-fed bags,** including **doypack pet food** or **stand-up pouch bags.**



Silo:

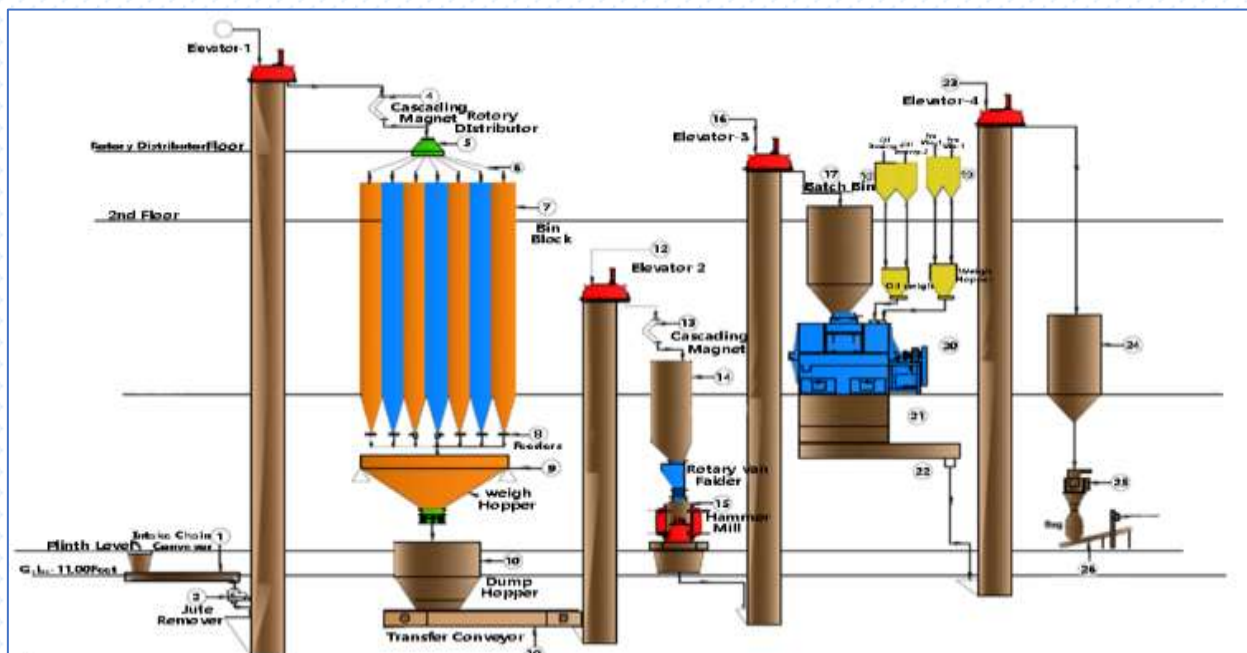
Vertical bulk storage for granular/powdered materials, **gravity-assisted filling & discharge**, maintains quality with **ventilation, temperature & moisture control**, prevents **spoilage, mold & infestation**

Application-

- **Preservation** – Protects nutritional value by preventing moisture, pests, & environmental damage.
- **Transportation Hub** – Acts as an intermediate storage before grains are sent to mills or processing plants.
- **Size and Capacity**

Specification	Details
Storage Capacity (T)	500 MT
Material	Mild Steel
Storage Material	Grain
Size	20 Feet
Product Type	Storage Silo



Process Flow Diagram:**Advantages of Automation of Feed Mill:**

- Cuts operational & Labor Costs
- Boosts production (quantity & quality)
- Ensures Compliance
- Reduces Batching Errors
- Automatic Routing & Boost Supply Chain Management

Disadvantages of Automation of Feed Mill:

- Technical knowledge, Skill are required
- Initial cost more
- Maintenance cost is high
- Any error in single operation can reflected in the entire process

Conclusion:

The automatic feed mill **process flow enhanced** by the integration of **computers & automation technologies** provides a **modern, efficient** solution for animal feed production.

Computers **manage** everything from **recipe selection & batching** to **real-time monitoring & data logging, ensuring accuracy, consistency, & quality.**

Their role in automation minimizes human intervention, **reduces** errors, & allows for **scalable, cost-effective production.**

Overall, computerized control systems make the **feed mill smarter, safer, & more productive**, meeting the **demands of modern livestock** farming with **precision & reliability**

While challenges - particularly in cybersecurity & interoperability, the future of industrial

automation through PLC and SCADA is promising & continually evolving.

References:

- Ahmad, Seraz, and Vipin Kumar Shukla. *Industrial Automation through PLC and SCADA*. International Journal for Research in Applied Science & Engineering Technology (IJRASET), vol. 11, no. 7, July 2023, pp. 1–5.
- Bollinger, Ernie. "Statistical Process Control." *Computer Applications for Feed Manufacturing*, Wisconsin Electrical Manufacturing Co., 2000, pp. X-14–X-19.
- Fleming, D. W and V. pillai. 1999, s88 implementation guide, strategic for the process industries, McGraw – Hill, New York.
- Holder, William B., and Mike Blair. "The Science and Art of Feed Formulation." *Computer Applications for Feed Manufacturing*, Agri-Data Systems, Inc., Aventis Animal Nutrition, 2000, pp. X-19–X-25.
- Paulus, Melissa. "Fleet Onboard Information Systems." *Computer Applications for Feed Manufacturing*, XATA Corp., 2000, pp. X-29–X-30.
- Peterson, Norman, and Jay Davis. "Computer-Based Control Systems." *Computer Applications for Feed Manufacturing*, Repete Corp., 2000, pp. X-3–X-13.
- Roberts, Ryan, and Thomas Tucker. "Bar Code Applications." *Computer Applications for Feed Manufacturing*, Alpha & Central Soya Co., Inc., 2000, pp. X-25–X-29.