POWDER
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Biomass Conveying Solution

A Thomas & Muller Application Solution

This Solution has been Operating 12 years 24/7 Without Issues.

Project Overview

A university campus power plant transitioned from coal to wood-based biomass as its primary fuel source. This shift aimed to reduce carbon emissions and align with sustainability goals. However, the change introduced new challenges in material handling due to the nature of biomass—comprising chunks, chips, and a significant proportion of fine wood flour. Efficient and safe conveying of this material became critical for uninterrupted power generation.

Challenge

The initial solution—a 45-degree inclined, pocketed, and cleated belt conveyor—proved inadequate for biomass handling. Two major issues emerged:

Housekeeping Problems

Fine wood particles spilled over the conveyor inlet and sides, creating piles of material. This required constant cleanup, increasing labor costs and downtime.

Safety Concerns

Accumulation of wood dust outside process equipment posed a severe explosion hazard under certain conditions, making this a top-priority issue.

Inconsistent Feed to Dryer

The belt conveyor failed to deliver a uniform flow of biomass to the drying process, resulting in operational inefficiencies and variability in fuel preparation.

The combination of these issues highlighted the need for a more reliable and safer conveying solution.

Thomas & Muller Solution

- Powder Process Group partnered with Thomas & Muller Systems to design a robust conveying system tailored to biomass characteristics. The solution featured:

Screw Conveyor Design

- A 9-inch diameter screw conveyor, 15 feet long, installed at a 45-degree incline to replace the problematic belt conveyor.

Force-Feeding Screw Feeder

- Discharges perpendicular into the conveyor via a coping interface, ensuring consistent material flow.

Abrasion-Resistant Construction

- Conveyor flights manufactured from AR-400 steel to withstand wear from abrasive biomass particles.

Variable Frequency Drive (VFD)

- Allows precise control of mass flow rate, compensating for variability in biomass consistency.

Safety Enhancements

- No intermediate support bearings, eliminating spark risk and reducing maintenance complexity.

This design ensured complete containment of biomass, eliminated spillage, and provided controlled, uniform feeding to the dryer.

Impact / Benefits

- **Enhanced Safety**
- Eliminated explosive dust hazards by containing fine particles within the conveyor system.
- **Reduced Maintenance & Housekeeping**
- No spillage meant significant labor savings and cleaner operations.
- **Consistent Dryer Feed**
- Improved process stability and efficiency through controlled material flow.
- **Durability & Reliability**
- AR-400 flights and simplified design minimized wear and maintenance needs.

Results

The screw conveyor system has been operating 24/7 for over 12 years without issues, proving its reliability and effectiveness. The university achieved:

- Safer working conditions
- Lower operational costs
- Improved fuel handling efficiency
- Long-term sustainability in biomass energy production

Conclusion

This case study demonstrates how a properly engineered screw conveyor can overcome the limitations of traditional belt systems in biomass applications. By addressing safety, consistency, and durability, Thomas & Muller delivered a solution that continues to perform flawlessly after more than a decade of continuous operation.

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