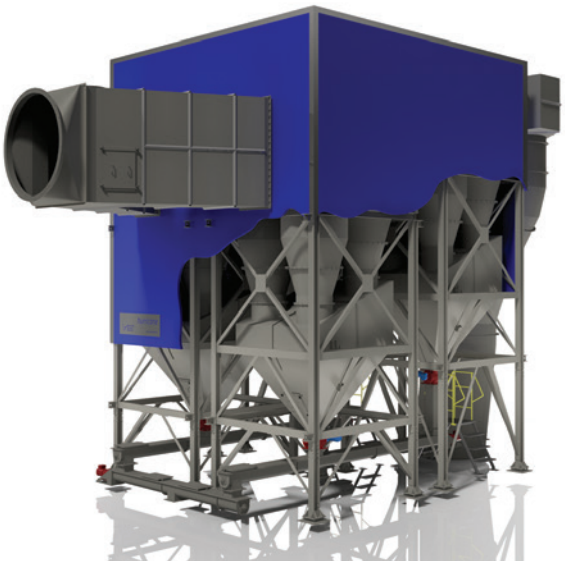
Advanced Cyclone Systems

EMISSION CONTROL

# CASE STUDY

**SUNDS FIBERTECH | DAIKEN** | Malaysia | 2025

## **Hurricane AT$_{23}$ System** to reduce emissions from a biomass boiler burning a variety of wood-based fuels



### FOREWORD

**Daiken** is a globally recognized manufacturer of high-quality fiberboard and wood-based panels, with a strong commitment to sustainability and innovation. The company's facility in **Miri, Malaysia**, is a cornerstone of its operations in Southeast Asia, featuring state-of-the-art production lines and a dedicated focus on optimizing resource use and minimizing environmental impact.

In alignment with these values, Daiken sought to further enhance the performance of the energy plant of the MDF dryer line. The initiative focused on improving the control of particulate emissions from the furnace while addressing durability challenges—laying the groundwork for a new phase of operational efficiency and environmental compliance.

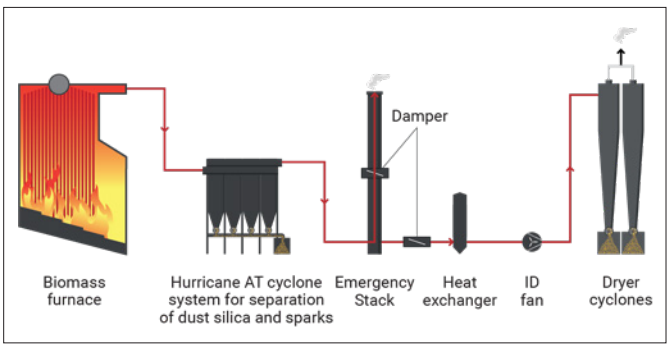



Fig. 1 – Process diagram of the MDF dryer line

### IDENTIFYING THE PROBLEM AND SOLUTION

The multicyclone installed at Daiken's facility exhibited critical performance issues due to prolonged exposure to abrasive particles from the furnace. This resulted in excessive wear, particularly in high-impact zones, decreasing its particulate separation efficiency and increasing maintenance frequency.

**About Long-Term Sustainability and Maintenance**

The client sought a solution that offered greater **efficiency and robustness** — capable of withstanding severe abrasion, improving filtration performance, and reducing the carryover of sparks into the dryer. The new system needed to ensure:

- **Significantly improved capture efficiency** to reduce the passage of coarse fly ashes and sparks.
- **Minimized particulate carryover to downstream equipment**, ensuring higher panel quality.
- **Reduced maintenance needs**, especially concerning fan balancing and saw blade replacements.
- **Elimination of frequent clogging**, a major drawback of the previous multicyclone system.
- **Integration with existing structural supports**, allowing installation with minimal civil modifications.

## IDENTIFYING THE PROBLEM AND SOLUTION

**To solve this issue,** ACS proposed and implemented a **Hurricane® AT$_{23}$ cyclone system**, composed of **16 high-durability cyclones with a 1100mm diameter**, arranged in four batteries. The system was specifically **designed to fit the footprint and structural base of the old multicyclone unit**, facilitating an efficient retrofit.

The cones were lined with **Kalcret BNX**, a high-performance abrasion-resistant lining, ensuring longevity even under harsh conditions. The entire setup was optimized to treat a nominal gas flow of **159 000 m³/h at 350°C**, with a guaranteed emission concentration **below 75 mg/Nm³**.

Key design advantages included:

- **Emission reductions of approximately 50%** compared to the former multicyclones.
- **Larger cyclone size and reduced cyclone count**, contributing to more effective discharge and clogging prevention.
- **Superior air distribution** across cyclones, enabling enhanced efficiency, particularly for coarse particles, which are the most damaging to fans and other equipment.

This robustness and efficiency directly translated into **lower operational costs**, longer equipment lifespan, and **more stable dryer performance**.

## DESIGN BASIS

- Solids **[Fly ash from biomass combustion]**
- Particle size distribution **[Fig.3]**
- Temperature (°C) **[350]**
- Actual flow rate ($m^3/h_{Wet}$) **[159 000]**
- Normalized flow rate ($Nm^3/h_{Wet}$) **[70 000]**
- Moisture content (% $H_2O$ v/v) **[20]**
- CO concentration in gases (mg/Nm³) **[500]**
- Site location **[Outdoors]**

## SYSTEM SPECIFICATIONS | EMISSIONS

- Expected emissions ($mg/Nm^3_{dry}$ at 12% $O_2$) **[66–73]**
- Guaranteed emissions ($mg/Nm^3_{dry}$) **[<75]**
- Pressure drop (kPa) **[1.25]**

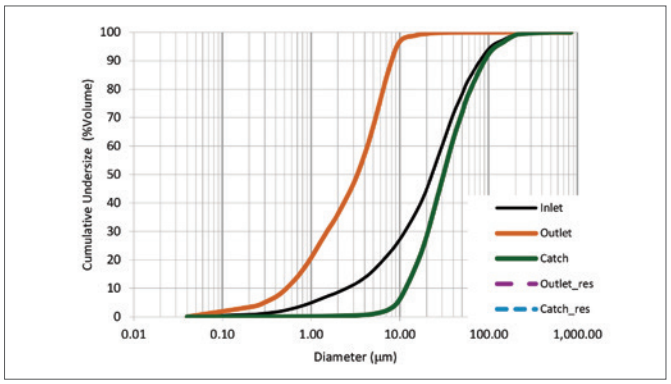



Fig. 3 – Particle size distribution used in simulation

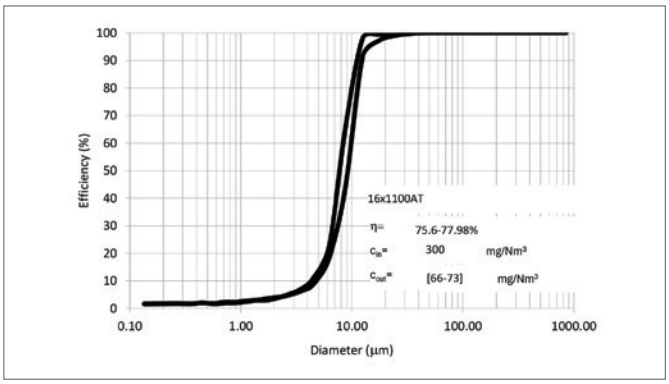



Fig. 4 – Predicted maximum and minimum grade efficiency curves with corresponding global efficiency values

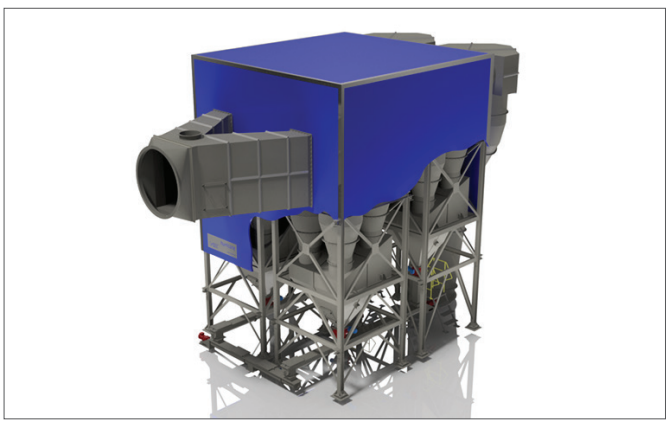


Fig.5 – ACS solution [16 AT$_{23}$ ø1100 (arranged in 4 batteries)]

## CONCLUSIONS

The installation of the Hurricane® AT$_{23}$ system at Daiken's biomass boiler in Miri, Malaysia, represented a significant upgrade in terms of both emission control and system durability. By reducing the number of cyclones while increasing their individual efficiency and resilience, ACS delivered a solution that drastically cut down on particulate emissions and operational interruptions.

Additionally, the **collection efficiency proved to be considerably higher** than the previous setup, confirming ACS's capability to exceed expectations with numerically optimized cyclone technology. The result is a more sustainable, reliable, and cost-effective plant operation.