Advanced Cyclone Systems

EMISSION CONTROL

CASE STUDY

BASUKI | JAKARTA | 2012

Recyclone MH System *to Reduce Particulate Matter from a Coal or Palm Shell BFB Boiler Flue Gas Below 150mg/Nm³*



FOREWORD

Advanced Cyclone Systems, S.A. (ACS) designed and supplied a Mechanical Recyclone (Recyclone MH) for **Basuki Pratama Engineering**. Basuki, based in Pulogadung (Jakarta, Indonesia) is the Indonesian leading producer of non-polluting high efficiency steam boilers, as well as thermal oil heaters using fluidized bed combustor or chain-grate stoker.

The installed equipment was designed for a Bubbling Fluidized Bed (BFB) biomass boiler burning coal or palm shell, based on availability. The end customer for the boiler and ReCyclone MH is a company operating in the laundry business responsible for the dry-cleaning of a hotel chain.

As the final client's facility is located near Nusa Dua, a well known tourist resort, it was mandatory to maintain air quality in the region. Therefore, ACS was contacted to reduce particulate matter (PM) emissions from the boiler to under 150mg/Nm³ (Fig. 1).

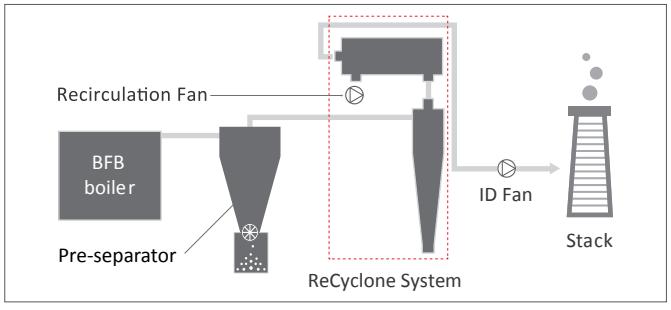

Fig. 1 – Process diagram

IDENTIFYING THE PROBLEM AND SOLUTION

In order to reduce particulate matter from 5600mg/Nm³ to less than 150mg/Nm³, considering a design flow rate of 6972m³/h at 230ºC, ACS installed a Recyclone MH comprised of 4 Hurricane Cyclones and 4 mechanical recirculators.

The goal was to guarantee 150mg/Nm³ under PM Environmental Regulation imposed by the Indonesian authority.

The end customer provided the flue gas operating conditions and a dust sample was collected from a Bag Filter of a similar plant to determine the PM size distribution (Fig.2) and density.

The system was designed to reduce emissions by approximately 98% representing a decrease of dust concentration from 5600mg/Nm³ down to below 150mg/Nm³ with a pressure drop of 2.0kPa (Fig.3).

DESIGN BASIS

- Fuel **[Coal and palm shell]**
- Fly ash particle size distribution **[Fig.2]**
- Gas flow temperature (ºc) **[230]**
- Approximate effective flow rate (m^3/h) **[6972]**
- Normal flow rate (Nm^3/h) **[3595]**
- Inlet concentration (mg/Nm^3) **[5600]**

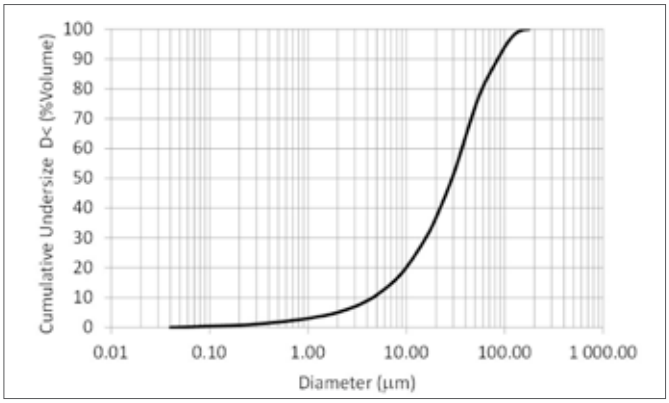

Fig. 2 - Particle size distribution provided by the customer used in computer simulation

SYSTEM SPECIFICATIONS | PARTICLE EMISSIONS

- Guaranteed emissions for coal fuel (mg/Nm^3) **[150]**
- Guaranteed emissions for palm shell fuel (mg/Nm^3) **[100]**
- Expected maximum emissions for coal fuel (mg/Nm^3) **[115]**
- Expected maximum emissions for palm shell fuel (mg/Nm^3) **[80]**

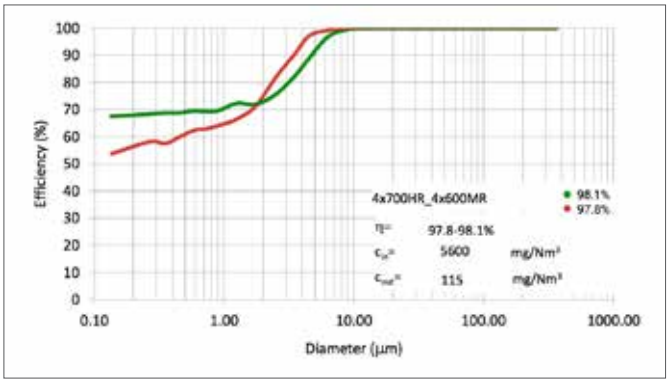

Fig. 3 - Predicted maximum and minimum grade efficiency curves with corresponding global efficiency values

GENERAL ARRANGEMENT

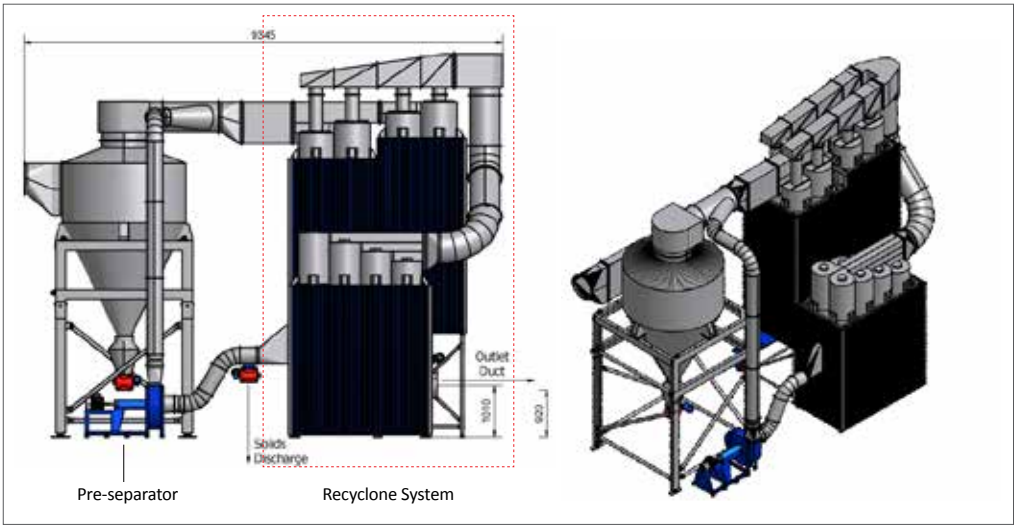



Fig.4 – General arrangement of the Recyclone MH System

CONCLUSIONS

Results confirm that the ReCyclone MH achieves PM emissions below 150mg/Nm³ (legal limits), with an equipment which has lower investment costs. When compared with ESPs, and lower maintenance and operating costs. When compared to Bag Filters. As it is shown in the pictures, smoke is invisible.

