

## MEASUREMENT OF NOZZLE SPRAY PARAMETERS AND DESIGN OF ONLINE COMPRESSOR WASHING SYSTEM FOR AERO DERIVATIVE INDUSTRIAL GAS TURBINES

**Roupa Agbadede**

Department of Electrical  
Engineering, Nigeria Maritime  
University, Okerenkoko Warri  
Delta State, **NIGERIA**  
roupaagbadede@yahoo.com

**Biwari Kainga**

Department of Mechanical  
Engineering, Nigeria Maritime  
University, Okerenkoko  
Warri, Delta State, **NIGERIA**  
biwerikainga@gmail.com

### ABSTRACT

This paper presents measurement of spray parameters generated by typical online compressor washing nozzles operated at varying conditions and the design of washing system. Three typical online compressor washing nozzles (N1, N2, and N3) with Equivalent Orifice Diameters (EODs) of 0.38mm, 0.53mm and 0.66mm respectively were selected to ascertain the spray parameters: droplet size and injection flow rate produced at varying injection pressures. A Malvern Spraytec Particle Analyzer and GTMX flow meter were employed to measure the spray droplet size and flow rate respectively. Also, a pressure gauge was employed to measure the pressure of the spray at any given condition. The study demonstrates that droplet size reduced with increased injection pressure, while the injection flow rate increased with injection pressure. Washing system designed with five N2 nozzle which has an Equivalent Orifice Diameter of 0.53mm generates satisfactory water-to-air ratio recommend by original equipment manufacturers for aero derivative gas turbines with less than 50MW of design power output.

**Keywords:** Droplet Size, Injection Pressure, Injection Flow Rate, Water-to-air Ratio.