

Self-Steam Explosion Pretreatment Technology for Milling Application of Wet Biomass Dedy Eka Priyanto ¹, Yuka Ochi ¹, Shunichiro Ueno ², Hidekazu Kasai ¹

¹ Business Development Department, IHI Corporation, Tokyo 135-8710, Japan

² Chemical Engineering Department, IHI Corporation, Yokohama 235-8501, Japan

The main obstacles to the widespread use of lignocellulosic biomass are its high moisture content and low grindability. Thus, we herein report a novel method, viz. the self-steam explosion (SE) method, which utilizes the moisture content of biomass to both reduce the particle size and enhance its properties. More specifically, the moisture content of the biomass sample is fully utilized as a steam resource to auto-hydrolyze the biomass component and yield fine particles with diameters < 1-2 mm through self-explosion. This process differs from conventional steam explosion, which mainly employs saturated steam from external resources and requires waste water treatment due to contamination of the steam, as the self-SE method offers flexibility and recyclability in terms of the heating resources required in addition to a significant reduction in wastewater production. In this study, we demonstrated this method effectively reduced the particle sizes of hardwood, softwood measuring 16–22 mm to produce fine particles with high quality such as higher heating value and hydrophobicity. The moisture content and chips size of biomass affect the milling performance of this method. It consumes much less energy compared with conventional steam explosion and cutter mill. Our proposed method is a promising method for milling application, particularly in a PC boiler.