# Atomization of Liquid Issued from an Ultra High-speed Rotary Bell

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**Abstract**

The purpose of this study is to investigate how the flow pattern of a liquid film formed on an ultra high-speed rotary bell, and its breakup at the outer edge of the bell, affect the liquid atomization. We observed the breakup pattern produced at the edge of a rotary bell and studied whether or not the characteristics of the atomization produced by a rotary bell in general, or the particular rotary bell used in this study, agree with the results of previous studies. We categorized the flow pattern on the surface of the rotary bell, which varied with the rotational speed and the liquid flow rate, and categorized the liquid breakup patterns at the edge. At lower rotational speeds, it was confirmed that the liquid on the rotary bell's surface was a smooth film, and the liquid breakup patterns at the outer edge were a pseudo-dropwise breakup in which large droplets were formed, in addition to Rayleigh breakup resulting from the detachment of several long ligaments. At higher rotational speeds, it was confirmed that fine ligamentwise breakup wherein the dropsize distribution can be relatively narrow took place as a result of the facts that lots of small waves were generated which in turn developed into serrated waves whose tip-end portions became saw-tooth shapes in the liquid flow, the breakup pattern at that time was such that lots of fine ligaments were elongated and subsequently split into fine droplets. We confirmed promotion of atomization, while we considered that the liquid film as serrated wave was largely attributable to be issued from the edge of rotary bell.

Key words: spray painting, rotary atomization, rotary bell, liquid film, ligamentwise breakup

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