Aerodynamically Assisted Jet (AAJ)

Nisco Engineering AG
Wehntalerstrasse 562
CH-8046 Zurich, Switzerland

Tel: +41 44 380 06 30
Fax: +41 44 380 06 31
e-mail: mailbox@nisco.ch
http://www.nisco.ch

Aerodynamically assisted jetting (AAJ) does not have the limitations or hazardous elements the other jet-processing routs such as ink-jet printing (IJP) or electrospray have, namely, residues, needle size limits, high voltage and recirculation.

AAJ, a pressure driven jetting process is an **economical** and **versatile** jetting technology capable of handling nanoparticulate suspensions with **high viscosity** and producing **fine droplets.**

The jetting equipment consists of the aerodynamically assisted jetting device (Fig. 1), which has a chamber of height and internal diameter of 16.2 and 8.2 mm, respectively, made of stainless steel DIN 1.4435 with a threaded needle of internal diameter of 0.35mm. When fitted, the threaded needle is ~0.18 mm above the exit orifice. The exit orifice has a diameter of 0.35 mm and is externally countersunk, assisting jet formation. In addition to the threaded needle already fitted, which holds the flow of the media into the chamber, another entrance to the chamber exists which accommodates the flow of compressed air, giving rise to the pressure difference over the exit orifice which assists the drawing of a jet. The needle within the chamber holding the flow of media has a syringe connected to it via silicone tubing to a hypodermic needle. The syringe fits firmly on a syringe pump. The input of compressed air is regulated by way of a precision regulator.

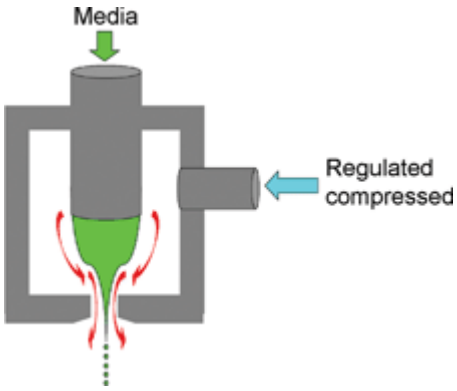

Fig.1. Schematic representation of the AAJ device

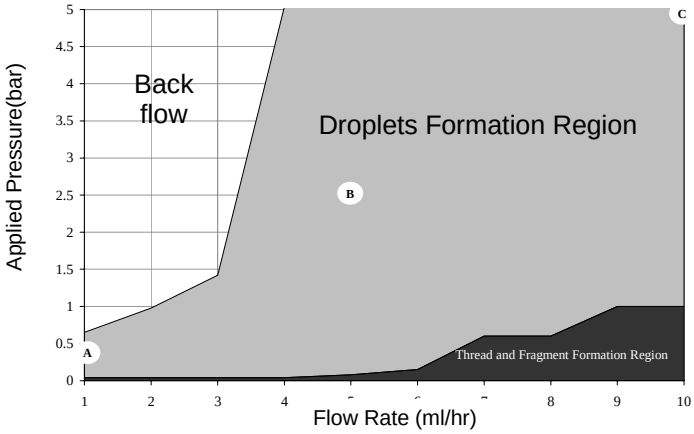

Fig.2. Operational guide identifying where droplets and threads are generated

This operational guide (Fig. 2) shows parameters which promote the formation of droplets and threads. It also indicates the effective conditions for the generation of the finest possible droplets. Moving along points A, B and C illustrates the generation of smaller droplets with increasing applied pressure.

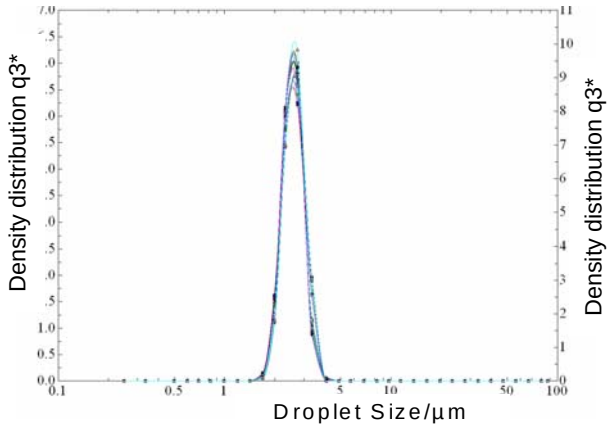

Fig.3. Characteristic repeated droplet size distribution for a flow rate of 10 ml/h and applied pressure of 5 bar

This flyer is based on the following publication:

S. Arumuganathar, S. N. Jayasinghe and N. Suter, Aerodynamically assisted jet processing of viscous single- and multi-phase media, Soft Matter, 3(2007)605-612.

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