
The AGS2000 Aerosol Generator: Creating a Mist Consolidant for Non-contact Media Consolidation

An alternative application method to brush application (contact) for the consolidation of friable and flaking pigment layers is the introduction of an aqueous consolidant as an aerosol mist (non contact). For years, conservators have used ultra-sonic misting devices by appropriating and retrofitting a commercially-available ultrasonic humidifier, a technique first developed in the early 1990s by the Canadian Conservation Institute for the consolidation of powdery painted surfaces on ethnographic objects.

Dubbed the “CCI Mister,” a room humidifier is coupled with an aquarium pump, a Nalgene bottle, polyethylene tubing, a clamp stand, and reducing /connector nozzles. Paper conservators have seen the value of assembling this device to transform a liquid, aqueous consolidant into an ultrasonic mist for the treatment of such powdery and friable media as gouache paintings on paper or board, illuminations on vellum, charcoal or chalk drawings on paper, and flaking gelatin emulsions on photographs, to name a few.

While the CCI Mister has become ubiquitous for conservation studios treating such media over the last 20 or more years, the set-up is not without its idiosyncrasies, requiring constant attention to maintain a steady flow of mist, and to prevent and control the formation of condensation droplets on the work.

The drive to find an alternate device led conservators to exploit nebulizers from the medical field, which use air pressure instead of ultrasonic waves to produce a very fine particle sized aerosol. Nebulizers have been used successfully to treat works on paper including gouache media, illuminations, and Asian colorants on screens and scrolls. Highly affordable, nebulizers are not without their idiosyncrasies as well, especially with the foaming of the consolidant in the reservoir and the fairly rapid hardening of certain adhesives like gelatin or isinglass as they cool in the reservoir during use.

By 1997 a purpose-built ultrasonic aerosol generator for the application of aqueous consolidants was developed for the conservation field by Becker Preservotec, Leipzig, Germany, in consultation with Dr. Gerhard Banik and Andrea Pataki of the State Academy of Art and Design Book and Paper Conservation Program, Stuttgart, Germany. Originally called the “Becker machine,” production of the device has been taken over more recently by ZFB-Zentrum für Bucherhaltung GmbH, Leipzig, Germany and is now called the AGS2000.

The AGS2000, although considerably more expensive than a medical nebulizer or the components used in the CCI Mister, is an all-in-one unit that completely streamlines the process of transforming a liquid consolidant into an ultrasonic mist. The device comes with adjustable airflow and variable ultrasonic frequency speed, with built-in generator and ultrasonic source. ZFB manufactures two models, one for

the European market (220V) and one for the North American market adapted to 110V.

In June 2008, Dr. Andrea Pataki, now head of the Book and Paper Conservation Program at the State Academy of Art and Design, Stuttgart, presented a seminar and workshop on aerosols in conservation at the J. Paul Getty Museum. Andrea’s visit as a guest scholar in the Department of Paper Conservation occasioned the acquisition of an AGS2000 for the lab prior to her three-month long stay and the workshop. Andrea introduced the principles of aerosols to workshop participants, including paper conservators from the Getty Museum, Getty Research Institute, LACMA, and the Huntington Library, where a range of ultrasonic and air-pressure devices were compared. (Please see references included here for in-depth discussions of the devices and the principles of aerosols.)

As a long-time user of the CCI mister, I must say that the AGS2000 is the BMW of ultrasonic devices.

Like the CCI Mister and the medical nebulizers, the consolidant must be initially prepared in low concentrations (for instance for gelatin and isinglass, a 1% - 1.5% solution in water; for MC400 and Funori a .2% solution in water) for use in the AGS2000. But unlike these other devices, the AGS2000 can be counted upon to work at any moment with only simple adjustments of a lever or knob to obtain the desired velocity of the mist stream.

The device is utterly dependable and requires a minimum of trouble-shooting compared to the CCI Mister. One still might have to watch for the occasional droplet of condensation, but this can be minimized by placing the device on a table below the level of the work bench instead of having it placed adjacent to the work surface.

Even though the concentrations of consolidant are low, I am impressed by the efficiency at which you can work with multiple passes of the nozzles (3 different nozzle sizes come with the device) over the area being consolidated, particularly since you can work without worrying that the aerosol stream will cut-out at any moment and can avoid interrupting work regularly to readjust the position of the bottle of consolidant. In fact, the device is so efficient, that one has to back off of the artwork to avoid too rapid a concentration of consolidant and excess water vapor from collecting and condensing in the area treated.

Moreover, I find it much easier to generate to an aerosol of methyl cellulose in the AGS2000 than I ever found with the CCI Mister. As Andrea made clear in her workshop, using the lower viscosity MC400 is key to this success, but the transference of ultrasonic waves seems to be much more successful with this particular device, perhaps due to the thinness of the cup containing the consolidant and the vertical configuration of the hose that allows the vapor to increase in velocity before traveling to the nozzle.

Thus the AGS2000 offers greater options and success for applying such matte consolidants as methyl cellulose and Funori. The addition of a drop or two of ethanol into the cup of consolidant can aid in penetration and slightly quickens drying. The gloss of the consolidant (particularly for gelatin) is much reduced when applied with the AGS2000, due to the much thinner film when applied as an aerosol compared to brush application.

I have to confess that I had gotten disenchanted with the fussiness of the CCI Mister over time. The AGS2000 has reopened the door for aerosol application of mist consolidants and immeasurably increases success with the vexing task of consolidating powdery and friable media.



Price for device made for North American market with 110V: (as of March 2008): € 2,990.00 plus € 150.00 for packing and delivery.

Vendor information:

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Short list of references using devices mentioned:

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