INDUSTRIAL HOMOGENIZER
SUB MICRON DISPERSER

MANTON-GAULIN MANUFACTURING CO., INC., EVERETT, MASSACHUSETTS
WORLD'S LARGEST AND OLDEST MANUFACTURER OF HOMOGENIZERS AND COLLOID MILLS.
The Manton-Gaulin Manufacturing Company, Inc. presents in this Bulletin the MC series of Industrial Homogenizers. These machines are the culmination of over sixty years of experience in the manufacture of homogenizers using the principles discovered by Auguste Gaulin.

Auguste Gaulin worked out the theory and principles of homogenization in the latter part of the 19th century. In 1900, in Paris, France, Gaulin gave the first public demonstration of a production homogenizer. Auguste Gaulin was responsible for coining the words utilized in describing this type of processing, namely, "homogenizer" and "homogenization". As a result of his work and the proving of his theory, he was awarded Patents in France and other countries and U.S. Patents #753792 and #756953.

The Corporation was founded in New England in 1909 and in that year built the first homogenizer in the United States under rights acquired from Auguste Gaulin. The unit invented by Auguste Gaulin was a high pressure plunger pump which forced the fluid through small holes in a concave agate seat against a precisely fitted agate ball to produce the desired result.

The original concept of homogenization was limited to Dairy Products. It was realized that the principles of homogenization could be applied to other processing uses, however, the design of the machine and available materials of construction limited its use to a relatively few non-abrasive products. The Manton-Gaulin Mfg. Co., Inc., through continuous research and development, has produced homogenizers suitable for a wide range of industrial applications including viscous, abrasive, and corrosive products or combinations of all. Continuity of research and actual applications have resulted in the machines presented in this Bulletin.
Mechanical Features

POWER TRANSMISSION MECHANISM

Plate C shows the motor and V belt drive, enclosed in a compartment of the base. Power is transmitted from the motor through the belts to the drive shaft which turns the pinion and gear (Plate D) rotating the eccentric shaft. The connecting rods drive the crossheads and plunger adapters. All moving parts are lubricated by an automatic pressure oiling system. The plungers (water lubricated) are connected to the plunger adapters and enter the cylinder as shown in Plate E. The drive assembly is isolated from the fluid end by closures eliminating contamination of this area. The design of this machine permits mounting without the need of a special base or bolting to floor.

FLUID END

The stainless steel cylinder is attached to the base and permanently aligned with the drive mechanism. The plungers enter the rear of the cylinder and are connected to the plunger adapters as shown in Plate D.

As shown in Plate E, the product enters a common suction manifold, flows through a suction valve, and is forced by the plunger through a discharge valve to a common discharge manifold, and is processed. From the discharge manifold, it enters the homogenizing valve assembly. A pressure gauge is connected to this discharge manifold.
THE HOMOGENIZATION PROCESS

The basic principle of homogenization is the control of fluid velocity through an adjustable, restricted orifice. The product at high pressure enters a controlled clearance area between the homogenizing valve (A) and seat (B) as shown in Plate G. At this point, energy which has been stored as pressure is instantaneously released as a high velocity stream.

Velocity is a function of homogenizing pressure and may be in excess of 960 ft. per second. In the high velocity area, between A and B, the product is subjected to intense turbulence, hydraulic shear and cavitation.

The product then emerges from the controlled clearance area and impinges with shattering force and change of direction on the impact ring (C).

This series of actions, occurring in as short an interval as a micro-second, is the homogenizing process.

MACHINE SPECIFICATIONS versus USE CHART / INDUSTRIAL HOMOGENIZER

<table>
<thead>
<tr>
<th>TYPE OF PRODUCT</th>
<th>PRESSURES</th>
<th>VISCOSITY</th>
<th>ABRASION</th>
<th>CYLINDER MATERIAL</th>
<th>PLUNGER MATERIAL</th>
<th>PUMP/VALVE SEAT MATERIAL</th>
<th>HOMO VALVE ASSEMBLY MATERIAL</th>
<th>SMD VALVE ASSEMBLY MATERIAL</th>
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</thead>
<tbody>
<tr>
<td>(A) Liquid/Liquid</td>
<td>Up to 3000 psi</td>
<td>Low</td>
<td>None</td>
<td>304 S.S.</td>
<td>S.S.</td>
<td>S.S. or Rexalloy</td>
<td>Rexalloy</td>
<td>Not needed</td>
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<tr>
<td>(B) Liquid/Liquid</td>
<td>3000 to 8000 psi</td>
<td>Low</td>
<td>None</td>
<td>15/5 PH S.S.</td>
<td>S.S.</td>
<td>S.S. or Rexalloy</td>
<td>Rexalloy</td>
<td>Not needed</td>
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<td>Up to 3000 psi</td>
<td>Medium or High</td>
<td>None</td>
<td>304 S.S.</td>
<td>S.S.</td>
<td>Rexalloy</td>
<td>Not needed</td>
<td></td>
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<tr>
<td>(D) Liquid/Liquid</td>
<td>3000 to 8000 psi</td>
<td>Medium or High</td>
<td>None</td>
<td>15/5 PH S.S.</td>
<td>S.S.</td>
<td>Rexalloy</td>
<td>Not needed</td>
<td></td>
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<tr>
<td>(E) Solid/Liquid</td>
<td>Up to 3000 psi</td>
<td>Low</td>
<td>Mild</td>
<td>304 S.S.</td>
<td>S.S. or Colmonoy</td>
<td>Rexalloy</td>
<td>Not needed</td>
<td></td>
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<tr>
<td>(F) Solid/Liquid</td>
<td>3000 to 8000 psi</td>
<td>Low</td>
<td>Mild</td>
<td>15/5 PH S.S.</td>
<td>S.S. or Colmonoy</td>
<td>Rexalloy</td>
<td>Not needed</td>
<td></td>
</tr>
<tr>
<td>(G) Solid/Liquid</td>
<td>Up to 3000 psi</td>
<td>Medium or High</td>
<td>Low</td>
<td>304 S.S. or Colmonoy</td>
<td>Ceramic</td>
<td>Carbide</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>(H) Solid/Liquid</td>
<td>3000 to 8000 psi</td>
<td>Medium or High</td>
<td>Medium or High</td>
<td>15/5 PH S.S. or Ceramic</td>
<td>Carbide</td>
<td>—</td>
<td>Carbide</td>
<td></td>
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</tbody>
</table>

* Two stage homogenizing valve assembly available when required

MC TAPERED SEAT CYLINDER

The MC series presents the first truly universal cylinder which is the Tapered Seat, Spring-Loaded Packing Assembly Cylinder design illustrated in Plates E and F.

Previous designs utilized 3 basic types of pump valve seats; the first had a seat machined into the cylinder block and was integral to same, the second was a hardened alloy seat shrunk into the cylinder block, and the third was a hardened alloy seat gasketed into the block.

The Tapered Seat — Spring-Loaded Packing Assembly Cylinder combines the best features of each of these cylinders.

This Tapered Seat design uses a tapered pump valve seat which is inserted into a matching taper, machined in the cylinder block. The operating pressure forms a metal-to-metal leakproof seal. It is readily removable for replacement or regrinding and permits the use of a wide variety of materials as determined by processing requirements. Cylinder valves may be either poppet or ball valves in a wide variety of alloys. The alloy used will depend on corrosion characteristics of product.

Special cylinder materials are available in 316 stainless steel, 347 stainless steel, Titanium, Hastelloy, Monel, Aluminum Bronze and others. Use of special materials is determined by corrosion characteristics of product.

Special cylinder designs — Tapered Seat Adjusting Screw Stuffing Box, Full-Stroke Water Seal, Internal Closed-Purge System, Aseptic design.

SELECTION OF THE INDUSTRIAL HOMOGENIZER versus SUB MICRON DISPERSER

Extensive processing experience has shown the necessity for these two machines; both machines use the same principle of high velocity flow through a restricted orifice, the difference being in the materials of construction.

Listed below are applications of the Industrial Homogenizer and the Sub Micron Disperser. Our processing experience and past history of actual plant operations have shown the following criteria, in general, to be correct. In certain specialized applications, combinations of these may be specified.

Packaging - Processing
Bid on Equipment
1-847-683-7720
www.bid-on-equipment.com
The exact mechanics that cause a product to be homogenized in passing between the homogenizing valve and seat at high velocity is not known. A number of actions take place almost simultaneously and, since the total dwell time of a product in the working area of the valve and seat may be as low as 1/100,000 of a second, it is an extremely difficult field to investigate. The product enters the homogenizing valve seat from the pump section at high pressure but at a very low velocity. It then passes between the lapped faces of the valve and seat where, at the moment of entrance into this close clearance area, an instantaneous acceleration to velocities as high as 950 feet per second takes place. At the same time, the product is exposed to an extremely turbulent condition combined with cavitation and, finally, impact as it impinges on the ring surrounding the valve. It is quite possible that all of these actions are responsible for homogenization but, depending upon the particular product, their relative importance will vary.

Homogenizers will produce a smaller particle size in an emulsion or dispersion than will a Colloid Mill. In an emulsion system that can be dispersed to the 1 to 2 micron range with a Colloid Mill, homogenization can produce emulsions having an average particle size of .3 of a micron. This same efficiency is also observed in dispersing solids, provided the ultimate particle size of the solid is sufficiently small, i.e., as in carbon blacks and organic pigments.

The Homogenizer, as is the case in the Mill, will not grind. Since Homogenizers utilize high velocity shear, they will not work with extremely high viscosity products which require internal shear. They work most efficiently in the low viscosity regions. At viscosities above 500 cps. the efficiency will gradually decrease with approximately 2000 cps. as an average upper limit. (NOTE: Viscosity limitations are for Newtonian systems. For thixotropic products, the viscosity determined under high shear should be used, not a static viscosity measurement.)
If you desire processing information for your product, we will assist you in determining optimum specifications.

The Gaulin Homogenizer can make important changes in the various properties of your product simply by controlling its particle size.

A slight change in particle size can affect color, taste, chemical reaction speed — almost every chemical, physical and electrical property.

Manton-Gaulin gives you a chance to fully explore the advantages of various particle sizes and find the best type of equipment for your product.

We Invite You to Utilize:

**GTA — Gaulin Technical Assistance**

**A FREE SERVICE**

The Research and Information Center and Laboratory Facilities of Manton-Gaulin are available to you and your company at no obligation.

Our objective is to assist you in utilizing the correct equipment to process your product efficiently and economically.

As the world’s largest and oldest manufacturer of Homogenizers, High Pressure Pumps, Colloid Mills, Emulsifiers and Dispersing Equipment, Manton-Gaulin has aided many individuals and companies.

Ever since Auguste Gaulin received the first patent for a high pressure emulsifier in 1904 and coined the word “Homogenization” this company has covered all phases of emulsion, dispersion, mixing and pumping problems.

For GTA Bulletins, testing information or processing assistance, contact the Manton-Gaulin Manufacturing Co., Inc., 44 Garden St., Everett, Mass. -02149- or any of our listed Representatives.
Capacity - Pressure - HP

<table>
<thead>
<tr>
<th>MODEL</th>
<th>3000 PSIG CAPACITY</th>
<th>5000 PSIG CAPACITY</th>
<th>8000 PSIG CAPACITY</th>
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<tbody>
<tr>
<td></td>
<td>GPH</td>
<td>L/HR.</td>
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</tr>
<tr>
<td>115M</td>
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<td>55</td>
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<td>131M</td>
<td>31</td>
<td>115</td>
<td>2</td>
</tr>
<tr>
<td>M3</td>
<td>275</td>
<td>1050</td>
<td>10</td>
</tr>
<tr>
<td>M6</td>
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<td>25</td>
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<td>MC18</td>
<td>1850</td>
<td>6800</td>
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</tr>
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<td>MC45</td>
<td>4000</td>
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<tr>
<td>MC75</td>
<td>6500</td>
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<td>150</td>
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REMOVABLE TAPERED SEAT — BALL VALVE CYLINDER

<table>
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<th>MODEL</th>
<th>3000 PSIG CAPACITY</th>
<th>5000 PSIG CAPACITY</th>
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<tr>
<td></td>
<td>GPH</td>
<td>L/HR.</td>
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</tr>
<tr>
<td>M3</td>
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<td>10</td>
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<tr>
<td>M6</td>
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<td>3000</td>
<td>30</td>
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<td>7000</td>
<td>60</td>
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<tr>
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<td>150</td>
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INTEGRAL OR REMOVABLE SEAT — POPPET VALVE CYLINDER

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<tbody>
<tr>
<td></td>
<td>GPH</td>
<td>L/HR.</td>
<td>GPH</td>
</tr>
<tr>
<td>M3</td>
<td>275</td>
<td>1050</td>
<td>10</td>
</tr>
<tr>
<td>M6</td>
<td>800</td>
<td>3000</td>
<td>30</td>
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<tr>
<td>MC18</td>
<td>1850</td>
<td>7000</td>
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<td>MC45</td>
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<td>150</td>
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<tr>
<td>MC75</td>
<td>7500</td>
<td>28000</td>
<td>150</td>
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</table>

* Maximum Operating Pressure 1900 P.S.I.G.
† For specifications — See Bulletin LH-63
Any Model shown above may be operated from 0 to specified pressure.
Capacities shown above are maximum allowable to insure satisfactory safety factor for fluid and power end. For your specific product, contact your Gaulin representative or the Everett office.
HP's shown are to the nearest available satisfactory motor size. Actual power requirements may be lower, e.g., 42 HP actual requires a 50 HP motor.

Gaulin Industrial Homogenizer Applications

**CHEMICAL**
- Alkalis
- Alkyd Resin
- Anti-Freeze
- Antioxidants
- Antistatic Agents
- Aroyl Mercaptans
- Azele (crystalline cellulose)
- Bleaches
- Butadiene-Styrene Resin
- Colloid Alumina
- Corrosion Inhibitors
- Emulsifiers
- Emulsion Cleaners
- Enzymes
- Epoxy Resin
- Fatty Acids
- Magnesium Hydroxide
- Monomers
- Organic Chemicals
- Plasticizers
- Plastics
- Plastisol
- Resin
- Sulphur

**FOODS**
- Aseptic Canning
- Baby Foods
- Baking Products
- Beer
- Beverage Emulsions
- Butter
- Buttereschotch Sauce
- Catsup
- Cheese
- Chicken Products
- Chocolate
- Chocolate Syrups and Fudges
- Citrus Products
- Cream
- Cream Cheese
- Dry Juice Concentrates
- Flavored
- Food Additives
- Fruit Juices
- Honey
- Ice Cream
- Juices
- Mayonnaise
- Margarine
- Milk
- Pie Filling
- Salad Dressing
- Sauces
- Soup
- Sour Cream
- Starch
- Sugar
- Syrups
- Tomato Products
- Toppings
- Vegetable Oil
- Wine
- Yeast
- Yogurt

**OTHERS**
- Adhesives
- Aluminum
- Carbon Black
- Cements
- Clay Dispersions
- Coatings
- Cod Liver Oil
- Collodial Dispersion
- Cosmetics
- Creams
- Cutting Oil
- Disinfectants
- Drugs
- Dyes
- Embalming Fluid
- Essential Oil Emulsions
- Foam Generators
- Glass Cleaners
- Grease
- Gums
- Hand Cleaners
- Hydraulic Fluid
- Insect Repellents
- Ink
- Intravenous Emulsions
- Lanolin
- Lacquer
- Latex
- Leather Finishes
- Lotions
- Lubricating Greases
- Mineral Oil Emulsions
- Mica
- Mixing Fluid
- Paint
- Paper
- Paper Coating
- Petroleum Products
- Pigments
- Polish
- Rubber Compounds
- Sewage
- Soap
- Stain Remover
- Tobacco
- Toothpaste
- Vegetable Oil
- Bleaching
- Wax
- Wood Preservative

MAKE YOUR processing problems OURS...
MANTON-GAULIN MODEL MC HOMOGENIZER

SPECIFICATIONS

NOTE:
Dimensions and weights are correct — exceptions are A and E dimensions (suction and discharge connections) which will vary depending on customer specifications. Dimension H is minimum — adjustment to one inch.

Manton-Gaulin United States and Canadian Representatives are located at:

Akron, Ohio
Birmingham, Alabama
Boston, Mass.
Buffalo, New York
Calgary, Alberta
Charleston, West Virginia
Charlotte, N.C.
Chicago, Illinois
Cincinnati, Ohio
Clearwater, Florida
Cleveland, Ohio
Detroit, Michigan
Denver, Colorado
Hartford, Conn.
Houston, Texas
Indianapolis, Indiana
Los Angeles, California
Louisville, Kentucky
Minneapolis, Minn.
Montreal, P.Q.
Newark, New Jersey
(Newark, New Jersey (Mountainside)

See Chemical Engineering Catalog for the name of your nearest Manton-Gaulin Representative

MANTON-GAULIN OFFICES AND REPRESENTATIVES
IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Detroit, Michigan
Denver, Colorado
Hartford, Conn.
Houston, Texas
Indianapolis, Indiana
Los Angeles, California
Louisville, Kentucky
Minneapolis, Minn.
Montreal, P.Q.
Newark, New Jersey

(Newark, New Jersey (Mountainside)

New York, N.Y.
Pittsburgh, Pa.
Portland, Oregon
St. Louis, Mo.
San Francisco, California
Seattle, Washington
Toronto, Ontario
Tulsa, Oklahoma
Vancouver, B.C.

MODEL M HOMOGENIZER
SPECIFICATIONS

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<thead>
<tr>
<th>Frame Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>Weight Approx.</th>
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<tbody>
<tr>
<td>M3</td>
<td>7&quot;</td>
<td>8&quot;</td>
<td>33&quot;</td>
<td>15&quot;</td>
<td>29&quot;</td>
<td>34&quot;</td>
<td>271/2&quot;</td>
<td>371/2&quot;</td>
<td>5&quot;</td>
<td>1500 lbs.</td>
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<tr>
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<td>10&quot;</td>
<td>111/2&quot;</td>
<td>45&quot;</td>
<td>21&quot;</td>
<td>39&quot;</td>
<td>341/2&quot;</td>
<td>28&quot;</td>
<td>411/2&quot;</td>
<td>6&quot;</td>
<td>3400 lbs.</td>
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Note: Lug extends 21/2" beyond base. Cast lug base optional.