



Innovation in

High Shear Mixers

High Shear Rotor/Stator Mixers

MORE CHOICES. FASTER PROCESSING. SUPERIOR SUPPORT.

Ross manufactures the world's broadest line of High Shear Mixers – from traditional High Speed Dispersers and single-stage Rotor/Stator Mixers to the new generation of patented ultra-high shear X-Series* mixers.

With five plants in the USA alone, Ross stands behind its mixers with support that no other mixer manufacturer can match.

- Fast production and delivery of new mixers
- Fast turnaround on custom designs
- Replacement parts delivered overnight from our U.S. plants
- Trial units to evaluate our mixer on your process line before you buy it
- A sophisticated test and development center, where you can test your mixer before you buy it
- Our USA-based service network is ready to provide the fastest and most reliable service you can find to support your Ross High Shear Mixer

*Patent No. 5,632,596

INNOVATION. SUPERIOR PERFORMANCE.

While other manufacturers continue to sell virtually the same mixers they built 25 years ago, Ross is continuously introducing design improvements and exciting new design concepts produced by our R&D team.

First, we perfected conventional rotor/stator mixer design. Our high performance rotor/stator mixers are available in sizes from benchtop through full-scale production, in batch and in-line configurations, with a multitude of options to fine-tune performance.

We've also introduced a new, patented family of mixers that have opened up a new horizon in rotor/stator mixing. Our new designs include rotor/stator mixers capable of far greater shear.





MORE MIXERS IN STOCK FOR FAST DELIVERY

Ross maintains the world's largest inventory of batch and in-line mixers – new and rebuilt, fully warranted, and ready to ship when you need them. Our multi-million dollar inventory is your ultimate assurance that you can have the equipment you need, when you need it.

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The driving force in High Shear Mixer design

THE CLASSIC SINGLE-STAGE ROTOR/STATOR MIXER

All rotor/stator mixers are comprised of a rotor that turns at high speed within a stationary stator. In a "single-stage" unit, the rotor includes a single set of four blades. As the rotating blades pass each opening in the stator, they mechanically shear particles and droplets, and expel material at high velocity into the surrounding mix, creating intense hydraulic shear. As fast as material is expelled, more is drawn into the bottom of the rotor/stator generator, which promotes continuous flow and fast mixing.

The Ross Rotor/Stator Mixer easily replaces other high speed mixers in many applications. With the rotor turning at 3,000-4,000 feet per minute (fpm), the generator applies intense mechanical and hydraulic shear, and produces vigorous flow in a low-viscosity batch.

Applications

Homogenization, solubilization, emulsification, powder wet-out, grinding and particle size reduction, in batch and in-line configurations. The single stage rotor/stator mixer is ideal for applications that require fast particle/droplet size reduction.

Ross High Shear Rotor/Stator Mixers are available with a variety of interchangeable stators to fine-tune such functions as particle size reduction, deagglomeration and emulsification.



The **Disintegrating Head** is excellent for general purpose mixing, fast particle size reduction of larger solids, and vigorous flow.



The **Slotted Head** provides the most popular combination of high shear and efficient flow rates. It is well-suited for emulsions and many medium-viscosity mixing applications.



The **Large Square Hole Disintegrating Head** is ideal for applications that require extremely vigorous flow and intense shear.



The **Fine Screen Head** applies the highest shear rates of all single-stage High Shear Mixers. It is generally used for lower-viscosity emulsions and fine dispersions.

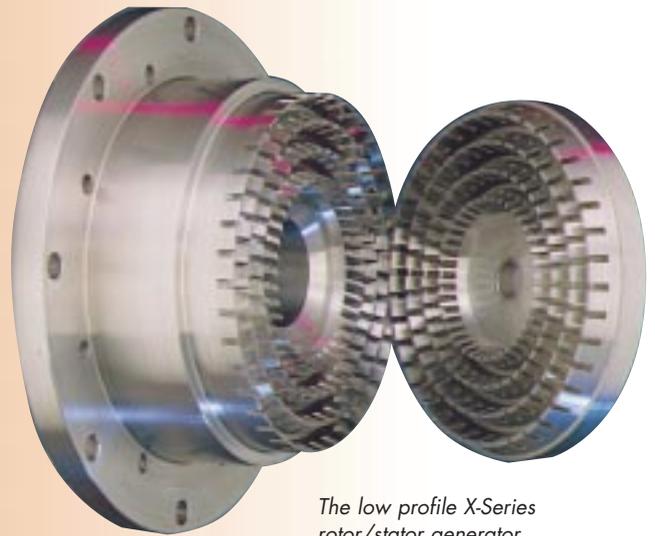
MULTI-STAGE ROTOR/STATOR MIXERS

Multi-stage rotor/stator generators include two or four rows of rotating blades that nest inside a matching stator. The mix material enters the center of the generator through an inlet connection and is accelerated outward by centrifugal force. During each transit through the rotor/stator generator, the material is subjected to a quick succession of increasingly intense shearing events – until it finally exits the generator and is either piped downstream or recirculated for another pass through the mixer.

By applying a series of shearing events with every pass through the generator, the multi-stage mixer accelerates the mixing process dramatically. This action also produces particles and droplets that are quite small – usually well below 1 micron in diameter – and extremely uniform.



The Ross Dual Rotor/Stator is a two-stage generator



The low profile X-Series rotor/stator generator introduced the first quantum jump in rotor/stator design in 25 years.

LOW PROFILE X-SERIES* ROTOR/STATOR MIXERS

The rotor and stator in the X-Series generator are unique. Instead of ordinary blades in a conventional stator, the X-Series rotor and stator are comprised of many concentric rows of intermeshing teeth. The mix material begins at the center of the generator and moves outward through radial channels cut in the rotor/stator teeth. Tolerances are extremely close, and the shear applied to the material in each pass is extraordinarily intense. The shear applied by the X-Series mixer is further intensified since this generator operates at extremely high tip speeds – up to 18,000 fpm.

For the process engineer, the greatest advantage of this rotor/stator design is its ability to produce emulsions and dispersions that otherwise would require a more expensive colloid mill or homogenizer.

Applications

Ultra-high quality dispersions and emulsions, in an in-line configuration only. X-Series units are appropriate for applications in which sub-micron particle/droplet size is desired to achieve the necessary product stability, visual appeal and texture – especially for cosmetics, personal care and food products.

**Patent No. 5,632,596*

Applications

Fine dispersions and high-quality emulsions.

Ross High Shear Batch Mixers

No other company in the world can match the selection and support that Ross offers in High Shear Batch Mixers. In sizes from 1/2 HP to 200 HP, handling batches from 50 ml to more than 6,000 gallons, Ross High Shear Mixers deliver an unbeatable combination of efficiency and flexibility.

Series 100

Our Series 100 High Shear Mixers combine economy and efficiency for mixing under atmospheric conditions. Models up to 10 HP can easily be moved from one vessel to another on an optional rolling hydraulic stand – accommodating a wide range of vessel sizes.

*The Ross Series 100
High Shear Mixer*



*The Ross Series 500
High Shear Mixer*

Series 500

Series 500 High Shear Mixers include a mechanical seal above the shaft and an ANSI flange to allow the mixer to be anchored to the top of an enclosed vessel. Suitable for either atmospheric or vacuum/pressure mixing, these mixers are designed for applications that require an extra measure of protection against contamination. USDA-approved sanitary designs are available.

ROSS QUALITY, VERSATILITY AND VALUE

High-efficiency explosion-proof motors are standard.

With a mechanical seal, the Series 500 High Shear Mixer is ideal for many sanitary applications.

Downthrust and circulation propellers can be added to enhance circulation in the vessel. Ross can also provide an unlimited variety of special tanks.

Standard shaft support bushings are bronze or glass-filled Teflon. Other options include ultra-hard alloy shaft sleeves and continuously lubricated bushing assemblies for special applications.

Standard material of construction is Type 316 stainless steel. Options include special alloys and coatings and specially hardened steel for rotors and stators.

Series 500 High Shear Mixers are available in standard sizes up to 100 HP. A durable epoxy paint finish is standard, with stainless steel an option for sanitary applications. ▶



▶ With a mobile hydraulic lift, your Ross High Shear Mixer can easily be repositioned for use with numerous vessels. Standard lift designs accommodate mixers up to 10 HP. Ross can also provide larger lifts for special applications.

Ross offers the unique ability to provide a High Shear Mixer as a component in a larger, multi-shaft batch mixing system. The Ross VersaMix combines the High Shear Mixer with a High Speed Disperser and a slow-speed anchor agitator. With supplemental agitation, the High Shear Mixer – which is normally limited to viscosities of approximately 10,000 cps – can effectively handle materials well over 200,000 cps. ▶



Typical Applications

Food

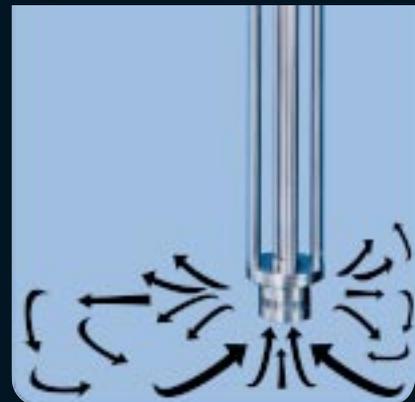
Chemicals

Textile colors

BATCH MIXING: FLEXIBILITY, HIGH FLOW AND FAST MIXING CYCLES

Batch High Shear Mixers can be permanently mounted to the mix tank or suspended over the vessel with a portable lift. The mobile configuration offers you the flexibility to use a single mixer in multiple vessels. It also allows you to vary the position of the rotor/stator generator in the vessel to fine-tune the process to handle a variety of materials.

The flow through a batch rotor/stator generator can be as much as ten times higher than in a comparable in-line mixer. For many applications, this produces fast particle size reduction and short mixing cycles, but only if the flow pattern within the vessel is optimized. Ross engineers will help ensure that high flow through the rotor/stator generator correlates with complete tank turnovers – and a homogeneous end product.



The rotor/stator generator of the batch High Shear Mixer is generally positioned 2-3 head diameters from the bottom of the vessel, and slightly off-center. To ensure adequate suspension of heavier solids, the rotor/stator generator may be located in the center of the vessel.

High Shear Lab Mixers



**100L High Shear Laboratory Mixer:
1/2 HP** – An economical workhorse for process development in the laboratory, the 100L High Shear Mixer is equipped with a 1/2 HP motor and variable speed drive. Speeds range from 0-10,000 rpm, handling batches from 1-20 liters. Four interchangeable rotor/stator heads are standard: a Slotted Head, Disintegrating Head, Fine Screen Head and an Axial Flow Head. All wetted parts are Type 316 stainless steel, and they are easily disassembled for cleaning.

The **Ross 100LX High Shear Mixer** is designed for either laboratory development or small-scale production. It is available with your choice of either a 1 HP or 2 HP motor. **Explosion-proof** motors are standard.



Micro High Shear Mixer attachments for batch sizes of 50-500 ml.

**100LC High Shear Laboratory Mixer:
1 HP** – The most powerful and versatile rotor/stator mixer ever built for the laboratory. A power lift makes raising and lowering the mix head as easy as pushing a button. For improved control and lab efficiency, operation can be highly automated – with a timer, temperature probe and a powerful control package built by Ross Systems and Controls. Available with four interchangeable rotor/stator assemblies to handle an extraordinarily broad range of benchtop applications.



New Technology for High Speed Powder Induction

Powders like fumed silica, calcium carbonate, titanium dioxide, gums, thickeners and many pigments are notorious for driving up processing costs. Even with a strong vortex in an open vessel, they resist wetting out and often float on the surface for hours.

Ross has developed new technology that enables you to mix and wet out powders almost *instantly*. Available in either a batch or in-line configuration, the SLIM (Solid/Liquid Injection Manifold) system injects solids directly into the high shear rotor/stator, where it is immediately wetted out and dispersed into the liquid stream.

The SLIM system accelerates the mixing process dramatically, while it virtually eliminates dusting – minimizing the volume of airborne particles released inside the plant atmosphere.



The In-line SLIM system replaces older design concepts that relied on an additional pump and eductor. In the In-line SLIM unit, solids are combined with the liquid stream and instantly subjected to intense shear – with no need to pump the solids downstream from the eductor to the mixer. The result is far greater capacity and less clogging.

The unit can be wheeled into position easily, used to inject solids into a process stream or stationary mixing vessel, then wheeled away to start work on another process line.



Model 405SB-25 In-line SLIM – Turn-key skid-mounted systems are also available with custom control packages and fabricated vessels. This sanitary, 25 HP In-line SLIM System was built for a personal care products manufacturer. Solids are added using the hopper mounted in the center of the system.



Model 505 Stainless Steel High Shear Mixer with batch SLIM system: 5HP – While the mixer is running, the operator simply inserts the feed tube into a container of powder and opens the feed valve. The vacuum created by the specially modified rotor/stator generator draws the powder through the tube and directly into the high shear zone. Dusting and delays are eliminated.

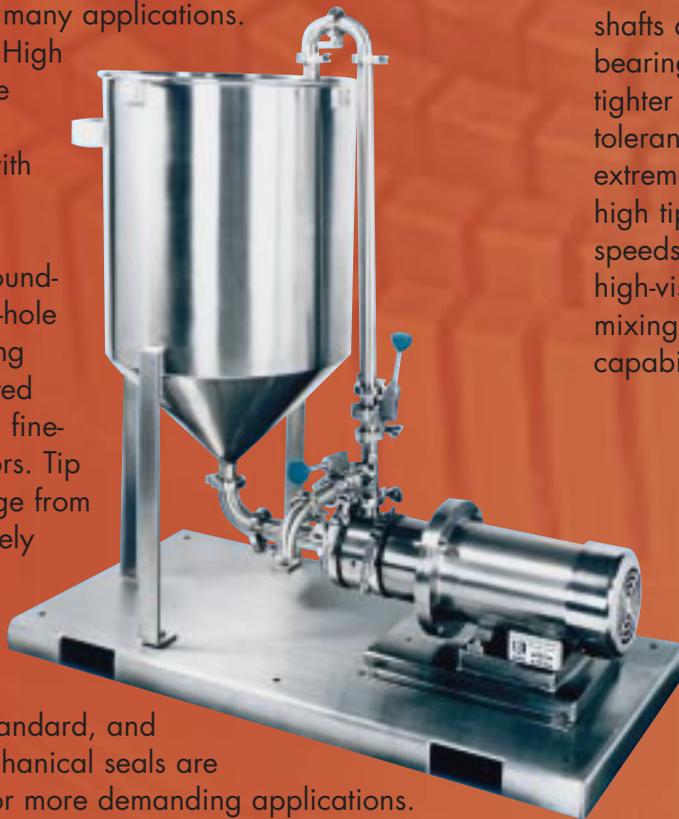
Ross High Shear In-line Mixers

A Ross High Shear In-line Mixer is a versatile choice for process lines that require frequent changeover from one product to another. A simple valve can divert finished product downstream or switch instantly from one source vessel to another. Between-batch cleaning is easy. Interchangeable rotor/stator generators provide virtually unlimited flexibility to adapt to a variety of product recipes.

Series 400

Standard single-stage and dual-stage generators provide a cost-efficient mixing solution for many applications.

Series 400 High Shear In-line Mixers are available with a selection of stators, including round and square-hole disintegrating stators, slotted stators, and fine-screen stators. Tip speeds range from approximately 3,000 to 4,000 fpm. Single mechanical seals are standard, and double mechanical seals are available for more demanding applications.



Model 405S Sanitary High Shear In-line Mixer:

5 HP – This in-line High Shear Mixer produces a pharmaceutical product that requires highly predictable results, batch after batch. All internal and external parts are stainless steel polished to a pharmaceutical finish.

Series 700

Series 700 High Shear Mixers are designed for continuous operation under extreme conditions. Using multi-stage rotor/stator generators, they impart extraordinarily intense shear and produce materials with sub-micron particle/droplet sizes. With Quad-Slot and X-Series rotor/stator generators, our Series 700 High Shear Mixers offer many high performance features including heavy duty shafts and bearings, tighter tolerances, extremely high tip speeds and high-viscosity mixing capability.



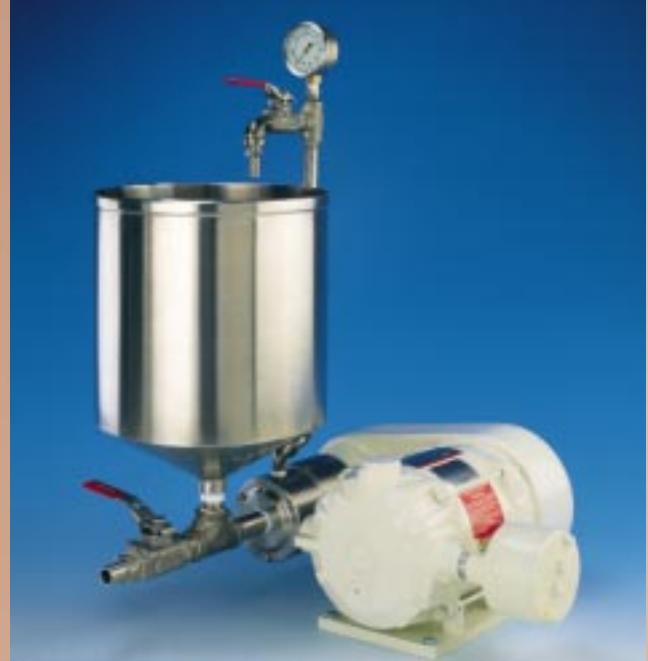
Model 703X-10 High Shear In-line

Mixer: 10 HP – The smallest of the X-Series mixers. Its 3" rotor generates tip speeds in excess of 11,000 fpm – and thousands of intense shearing events with each revolution.



Model 100 ILC: 1 HP – An in-line rotor/stator generator converts the 100LC Laboratory High Shear Mixer to an in-line mixer with excellent versatility in the lab. The in-line unit is available with either a standard single-stage rotor/stator or a four-stage QuadSlot design for higher shear rates. With a mechanical seal, it can operate under vacuum or pressure.

Model 410V High Shear Mixer with a recirculating tank: 10 HP – This High Shear Mixer is oriented vertically to prevent clogging at the vessel outlet and promote complete discharge.



Model 400DL High Shear In-line Mixer: 1 HP – A recirculating system enables you to fine-tune your final particle/droplet size and distribution. This is particularly useful in benchtop development, since scale-up with Ross High Shear Mixers is highly predictable.

Model 405S High Shear Mixer: 5HP – All Ross High Shear In-line Mixers can be provided with a jacketed vessel to closely control batch temperature during recirculation. Data from temperature probes located in the vessel can be fed to a Ross-designed control system for automated control of a cooling/heating system.



Series 400 Typical Applications

Milk & Juice fortification (calcium)
Clay slurries
Leather tanning solutions
Modified asphalt
Synthetic fuels

Series 700 Typical Applications

Mayonnaise & mustard
Greases & lubricants
Cosmetic raw ingredients
Silicone elastomers
Antimicrobial agents
Silica dispersions



Model 405SB-25: 25 HP – This skid-mounted system includes an In-Line SLIM and a 50-gallon jacketed recirculation vessel for high-speed powder induction. Skid-mounted systems can be wheeled from one vessel to another to accommodate a variety of process lines. Ross can provide a custom-designed skid-mounted system, including the mixer, vessel, piping and valves, pump and complete controls, to meet the demands of any application.



Model 712XS-50 High Shear In-Line Mixer with optional sanitary enclosure: 50 HP – Operating with tip speeds over 11,000 fpm, X-Series High Shear Mixers produce sub-micron emulsions more quickly and cost-efficiently than any colloid mills and high pressure homogenizers in many applications. Sizes are available for lab applications through high-volume production.



IN-LINE MIXING: CLOSE PROCESS CONTROL, ECONOMY AND LARGE-BATCH CAPACITY

A Ross In-line High Shear Mixer offers you excellent control over your mixing process. Whether your system is set up for single-pass mixing or multiple passes with recirculation, the mixer allows you to produce an end-product with a predictable particle size distribution and outstanding reproducibility. Because the in-line system is closed, it also minimizes problems caused by air entrapment during processing.

The in-line mixing system is extremely cost-efficient, especially when mixing material in large volumes. Unlike a batch mixer, which requires a high-horsepower motor to generate adequate circulation in a large vessel, a small in-line mixer can handle a 2,500-gallon batch as easily as it handles a 25-gallon batch. As the vessel size increases, the energy required by the in-line mixer remains low.

High Shear In-line Mixers are self-pumping and normally mix materials up to 10,000 cps without an auxiliary pump. With a pump added, the mixer easily handles materials up to 200,000 cps.

High Shear Mixers for High Speed Dispersion

Ross High Speed
Disperser: 30 HP



ROSS HIGH SPEED DISPERSERS

are the industry standard for durability, faster dispersion and low maintenance costs. Standard models include: explosion-proof, inverter duty motors; heavy duty V-belt drives and bearings; safety switches; an air/oil hydraulic lift system with hand/foot controls; and stainless steel wetted parts and shaft guard. Sizes range from 1/2 HP to 200 HP to handle batches from 1 to 2000 gallons. Custom designs are also available.

Typical Applications

- Pigment dispersions
- Automotive coatings
- Dye stuffs
- High performance ceramics
- Plastisols
- Carbon dispersions
- Graphite and magnetic dispersions
- Paints
- Printing Inks

*Patent No. 6,000,840

THE ROSS PREMAX – POWERED BY THE ROSS DELTA GENERATOR

This single-stage rotor/stator generator is specially contoured to generate both high shear and vigorous flow in a batch mixing environment. Designed especially for pigment dispersions, the Delta rotor/stator generator is used in the Ross PreMax* to produce an intense combination of mechanical, hydraulic and cavitation shear, which results in aggressive deagglomeration.



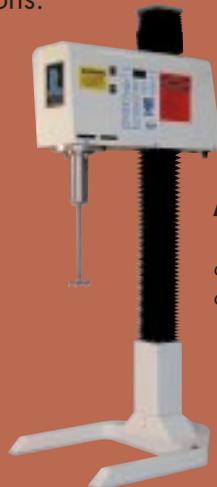
*Patent No. 6,000,840

Ross PreMax: 30 HP – Especially suited for pigment dispersions, the Ross PreMax produces high shear and energetic flow in the vessel. Sizes range from 5 to 250 HP, for vessels ranging from 2 to 2,000 gallons.



PreMax Applications

Grinding and particle size reduction, in a batch configuration, including: flexo, gravure and offset inks, paints, industrial coatings, electronic inks and cosmetics.



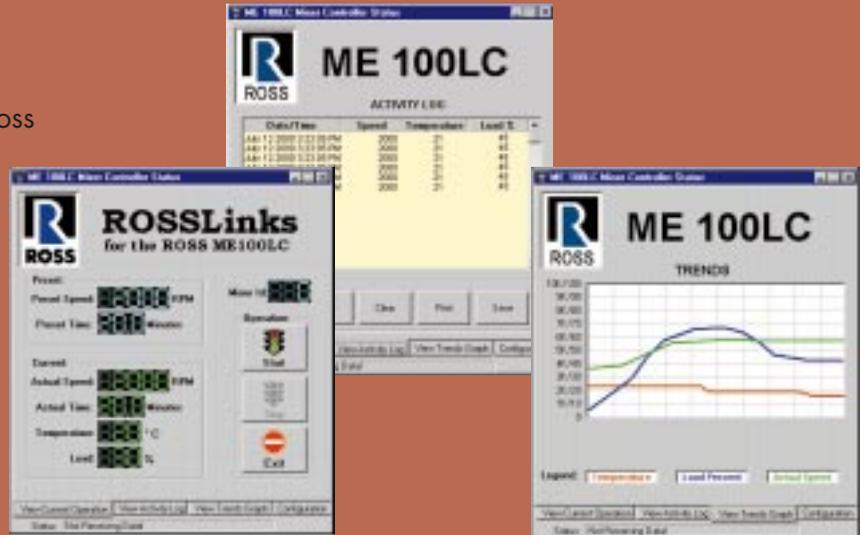
Model 100DLC High Speed Disperser: 1 HP – Fitted with an interchangeable disperser blade, it is ideal for laboratory dispersion applications.

Ross Controls, Fabrication and Development

ROSS CONTROLS AND DATA MANAGEMENT

Our controls are designed and built by Ross Systems & Controls division. Whether you need a simple ON/OFF switch or a multi-axis, PLC-controlled control system, no other company can build controls that are better suited to your new mixer and your process requirements. By choosing a genuine Ross control system, you can save time in engineering, simplify your start-up, reduce costs substantially, and guarantee that your control will be flexible enough to expand efficiently as your needs change.

Ross offers a spectrum of choices to help accelerate your process and make it more accurate and consistent. Our data logging systems can also help you manage your process more effectively – with the data acquisition and analysis capabilities you need for efficient process development and tight quality control.



Using the Ross **DataLink** data management system, data from each mix cycle can be captured and downloaded to your PC in CSV (Microsoft Excel) file format for display, documentation and analysis.



ROSS CUSTOM FABRICATION

With extensive fabrication facilities in the USA and overseas, Ross is equipped to build *all* the components your system requires. This is your best assurance of flawless quality from start to finish, and prompt delivery.



THE ROSS TEST & DEVELOPMENT CENTER

This allows you to simulate your process and test our mixer before you buy it.

Contact Ross today for detailed information on any of the products and services we offer, or to schedule a test in the Ross Test & Development Center, call **1-800-243-ROSS** in the USA, or 631-234-0500. Fax: 631-234-0691. E-mail: sales@mixers.com. Or visit Ross on the web: www.highshearmixers.com www.mixers.com





Charles Ross & Son Company

710 Old Willets Path
Hauppauge, NY 11788-0615
USA Tel.: 800-243-ROSS
Overseas: 631-234-0500
Fax: 631-234-0691
E-mail: sales@mixers.com
Internet: www.mixers.com
www.highshearmixers.com