

# ROTAMIX®

## PROCESS MIXING SYSTEMS



## What is ROTAMIX?

Vaughan's Rotamix® system is today's most cost effective means of mechanical hydraulic mixing, consisting of an engineered arrangement of floor mounted nozzles fed by a Vaughan® chopper pump. Using custom engineering software, each application is analyzed and sized by Vaughan in order to achieve the desired mixing effect. The Rotamix system may be applied in circular, rectangular, oval tanks and basins and other unique process configurations such as egg-shaped digesters, CSO tunnels and pump stations.

### The Concept

The Rotamix system incorporates several basic principles of physics and hydraulics, including uniform field of flow, vortical field of flow, induced flow and surface contact. Combined together, this unique mixing system optimizes solids contact due to the homogenous state.

### Dual-Zone Mixing

- Uniform field creates velocity at outside perimeter
- Vortical field creates velocity at center
- Uniform & Vortical fields create "Dual-Zone Mixing"

### Induced Flow

- Higher velocities induce entrained fluid

### Surface Contact

- Reduced solids size from Chopper Pump enhances solids contact
- Increased VSR results in increased gas production

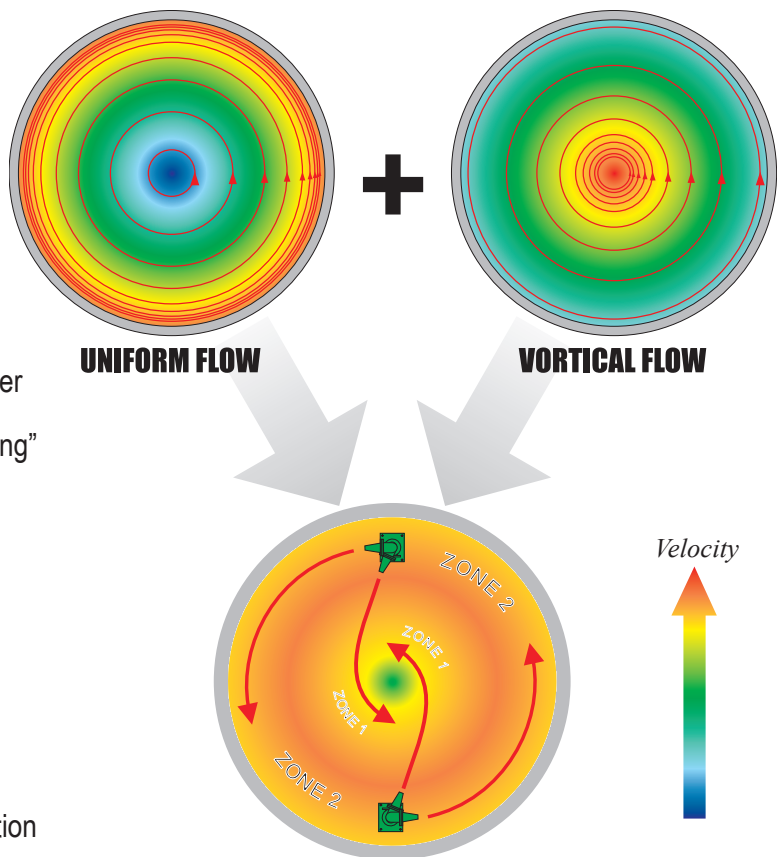


Figure 1 - Dual-rotational zones

### Why Choose Rotamix

- Vaughan reliability & over 50 years expertise as a solids handling specialist
- Process expertise in understanding each application
- Engineering support using state of the art CFD software
- Over 600 systems installed since 2000
- Process testing successes
- Chopper Pump provides reliable operation
- Dual nozzles provide multiple discharge points, reducing piping costs while evenly distributing sludges
- Actual Sludge rheologies are used to produce the most accurate analysis and design

# SYSTEM COMPONENTS

## ROTAMIX MIXING ASSEMBLIES

- Offered in single and double nozzle configurations.
- Designed for permanent fixed installation - no moving parts in the tank.
- 1" thick glass lined nozzle barrels protect against effects of abrasion and corrosion.
- All mixing assembly components are glass lined with 73 Rockwell C hardness.
- Exterior coated with 3M Scotchkote Fusion Bonded Epoxy.
- Mixing assemblies include a 10-year full warranty.



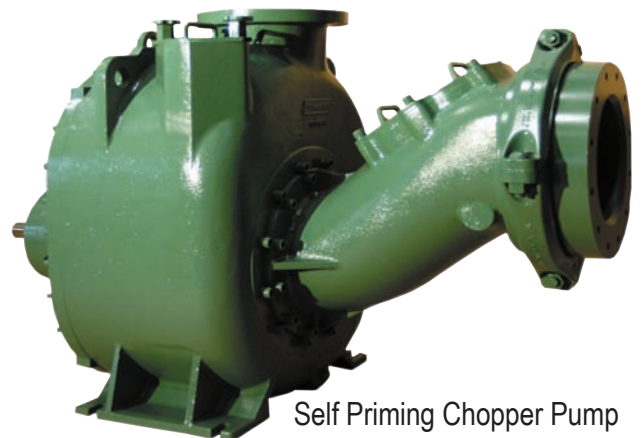
## VAUGHAN CHOPPER PUMPS

- Reliable chopping action reduces solids size.
- Oversized shafting and bearings extend pump life.
- Conditioning of solids increases surface contact and enhances volatile solids destruction.
- 50 Years of expertise behind every pump!

## AVAILABLE PUMP CONFIGURATIONS

Pumps are available in configurations to fit site specific applications:

- Horizontal or Pedestal end suction
- Submersible (with available recirculation feature)
- Self Primer



### Wastewater

- Anaerobic Digesters
- Sludge Storage Tanks
- Sludge Blend / TWAS Tanks
- Bio-Solids Blend Tanks
- FOG Reception & Blend Tanks
- Acid Phase Digesters
- Egg Shaped Digesters
- Equalization Basins
- Influent Channels
- Pump Stations
- Skimmings & Wasting Pits
- CSO Tunnels
- Anoxic Zones
- Septage Receiving Tanks



### Water

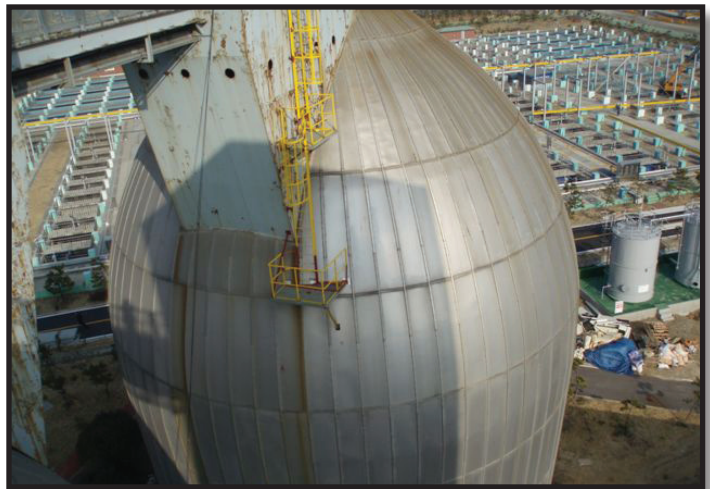
- Alum Sludges
- Lime Slurry Storage
- Ground Water Storage

### Industrial

- Anaerobic Digesters
- Pulp & Paper Black Liquor
- Refinery Waste Containment
- Textile Waste
- Mining Fine Solids Suspension

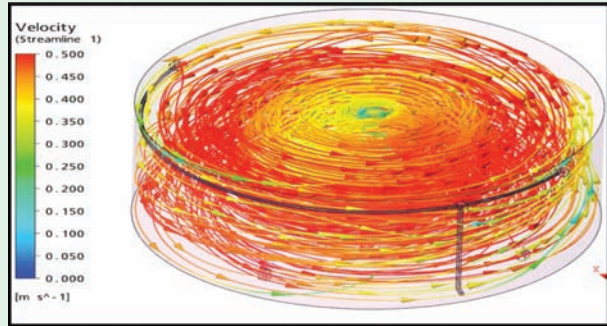
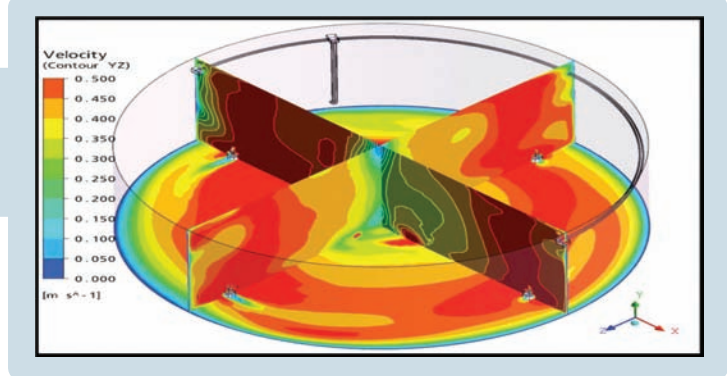


# APPLICATIONS



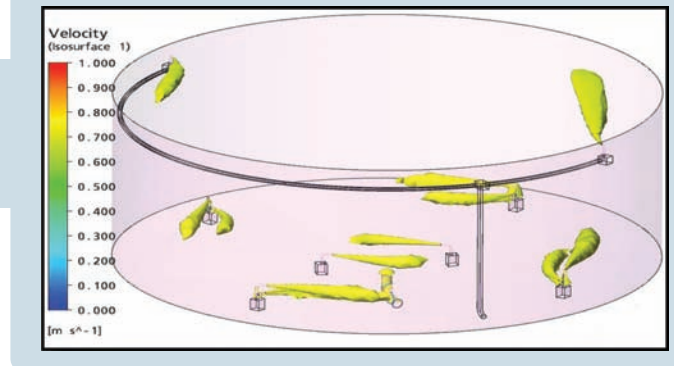
**COMPUTATIONAL FLUID DYNAMIC (CFD) ANALYSIS**, computer flow simulations generated in-house with over 1000 wastewater and bio-solids systems evaluated over the past eight years. Analyses are based on specific customer requirements and sludge rheologies. Vaughan Company CFD Analysis can also include a Tracer Washout Testing simulation, proven to be over 97% accurate when evaluated against actual field testing.

**VELOCITY PLOTS** shown as cross sections through quadrants of this tank indicate evenly distributed mixing energy throughout the tank.



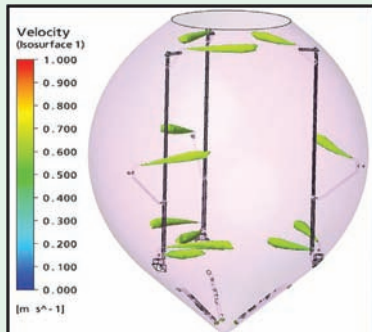
**PATHLINE PLOTS** illustrate the actual path of flow for a particle starting at any given point, confirming both horizontal and vertical movement generated in the pattern.

**ISO SURFACE PLOTS** illustrate the effect of the high velocity nozzle plumes as they drive tank mixing. Dual nozzles provide multiple discharge points to create even mixing.

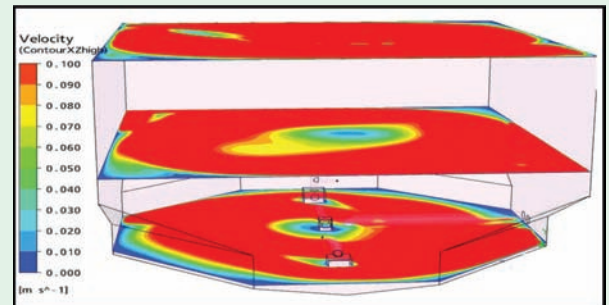


## OTHER GEOMETRIES

**EGG SHAPED DIGESTERS** in spite of their height are effectively mixed at all levels by Rotamix.



**RECTANGULAR TANKS** usually require additional mixing energy depending on the rheology of the sludge in each application.



## Foambuster / Foam Suppression System

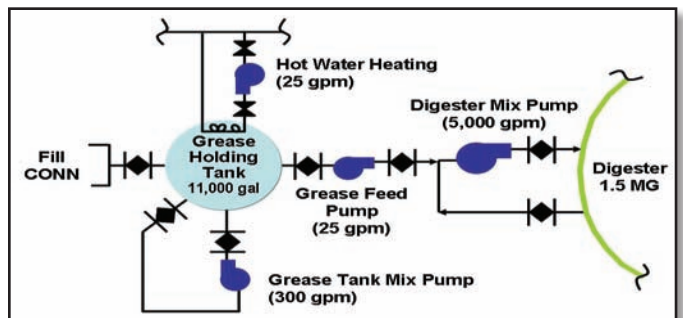


### FEATURES / BENEFITS

- **Evenly disperses** droplets over moving surface in anaerobic digesters
- **Controls** digester upsets
- **Optional scum nozzle** re-suspends floatables & prevents stratification
- Use with Rotamix or add to existing mixing systems to minimize foam and/or scum buildup

## FOG (Fats, Oils and Grease) Enhanced Digestion System

“**JET FUEL FOR DIGESTERS**” is how it’s described! Using the Rotamix System, food waste from restaurants (fats, oils, grease and waste produce) is received, blended and fed to anaerobic digesters. Increased methane produced and subsequent cogeneration can satisfy the electrical needs of the plant without having to purchase outside power. The added benefit? Waste that would normally end up in the landfill is utilized to produce power!



## **Assured Quality and Performance**

- Vaughan's experience with quality mixing and solids handling products for over 50 years
- **Performance Guaranteed** \*
- **10 year full nozzle warranty** \*
- Verifiable with CFD modeling
- Passes chemical dispersion tracing (Lithium, Aluminum Chloride), and other performance tests including temperature profiling analysis and total solids concentration profiling



## **Rotamix System Advantages**

### **Energy**

- Ability to intermittently mix tanks after long periods of storage, offering power savings
- Allows intermittent operation of conventional process systems, further reducing energy costs
- FOG Systems enhance methane production for cogeneration
- Reduced energy alternatives (using variable frequency drives) can provide additional energy savings

### **Operation**

- Complete system conditions solids for better digestion
- Efficient mixing optimizes chemical consumption in sludge dewatering applications
- Operates without liquid level dependency
- Meets or exceeds high rate digester designs

### **Maintenance**

- No scheduled nozzle assembly maintenance required
- No rotating equipment within the process
- Vaughan Chopper pump with flushless seal, eliminates costly seal water stations
- Reduces confined space entry into tanks for maintenance

### **Capital Costs**

- Ability to mix multiple tanks using only one pump
- Ability to fill, mix and transfer using only one pump
- No access walkways, platforms or hoists required
- Complete installed Rotamix system typically costs less than equipment alone for other types of mixing systems
- Potentially reduces aeration requirements
- Easily retrofits into existing tanks
- Ability to work with flat floor design reduces construction costs
- Optional assemblies to control scum and/or foaming

\* Contact Vaughan for further details.

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U.S. Patent No. 7,025,492, 7,628,183, other patents pending.

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