

# Dynamic Inline Mixers

By: Graham Hicks  
V.P. Manufacturing  
Hayward Gordon Ltd.

**Hayward Gordon's In-Line Mixers** are a relatively simple and low capital cost alternative to conventional blend tanks with top entry mixers for easy blending applications. Retention times for these types of mixers are very short, typically 0.5 to 5 seconds. Therefore, in order to achieve uniform mixtures, very high HP per volumes are applied which normally results in higher operating costs than conventional tank/mixer configurations.

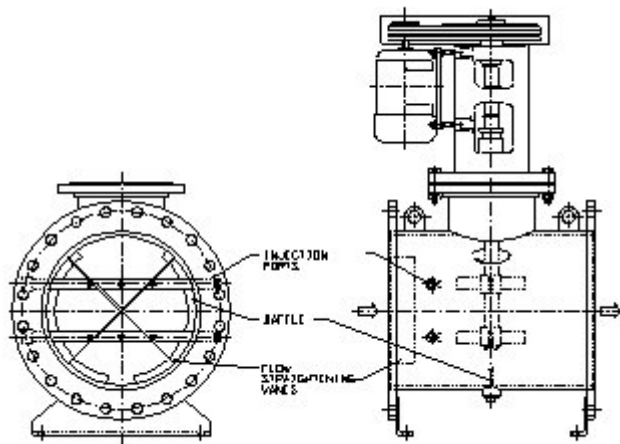
The basic configuration is a vessel divided into two separate, fully baffled compartments by a horizontal separator plate that controls the flow from the first to the second compartment. Each compartment is mixed by a 4RBT90 (four blade radial) impeller with a high impeller diameter to tank diameter (D/T) ratio. This two-stage mixing configuration prevents short-circuiting and consequently ensures thorough blending.

A second configuration, which does not utilize a separator plate, is primarily used in water and waste water applications to disperse water treatment chemicals into the stream, e.g. In-Line Flash Mixing. This configuration will normally employ one or two flow straightening vanes at the inlet of the vessel and a single "ring" baffle attached to the ID of the vessel at the shaft centerline.

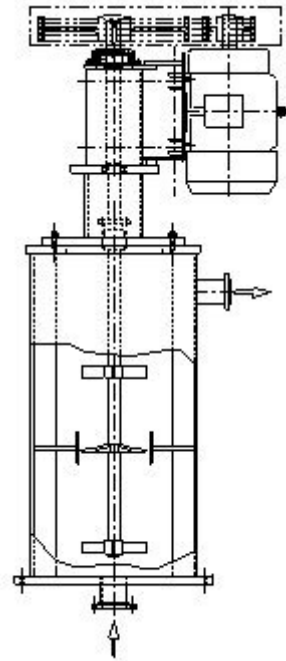
In either case, when a moderate to large amount of additives is to be introduced to the main stream or when two primary streams are to be combined, this is normally done prior to the mixing vessel. When a small amount of additive is to be dispersed into the main stream, it is most effective to introduce it immediately before the mixing impeller(s).

## Applications Include

- pH control
- Neutralization
- Equalization (combining of process streams)
- Pigment addition
- Dilution
- Catalyst addition prior to a reactor
- Dispersions of immiscible liquids into the process for extraction purposes
- Dispersing solids from filters or centrifuges into a process stream
- Smoothing fluctuations in the process stream
- Blending of flavors, syrups and sugars in food processing
- Any simple blending of chemical additives into the main stream of a process



**Figure 1: Typical configuration of a dynamic in-line mixer for water treatment flash mixing service. Impeller configurations are normally either dual radial flow impellers (shown) or dual pitched blade turbines with opposite pumping directions.**



**Figure 2: In-line mixer with standard dual compartment configuration, but with a modified separator plate and third high shear impeller for increased dispersion of immiscible additive.**



**Figure 3: Gear driven mixer with double mechanical seal and lubricator pot. Mixers are also available in direct and belt driven configurations and with other shaft seals including stuffing box and single dry-running mechanical seals**



**Figure 4: In-line mixer combining the two main configurations producing a staged flash mixer with a "Z" flow pattern through the vessel.**