



QUADRO

Application Note



High Shear Mixing Technology for the Manufacture of Salad Dressings



INTRODUCTION

Salad dressings are also categorized as oil-in-water (o/w) emulsions and typically contain around 40% vegetable oil. A 40% o/w emulsion renders the volume fraction of oil too low to build structure in the dressing without the use of additional stabilizers or thickening agents. At even lower levels of oil used in reduced or zero-fat dressings, the amount of oil no longer plays a role in the structure of the emulsion but is simply used for flavor only. The structure of salad dressing therefore, normally depends on the use of thickeners such as alginates, carrageenan, guar, xanthan, or cellulose gums.

Although the primary ingredient in salad dressing is vegetable oil (i.e., soybean, olive, peanut, or sunflower oil) other food ingredients are added to the formulation depending on the type of dressing. Examples of other dressing ingredients may include acidifying agents such as vinegar, lemon or lime juice and flavor additives such as salt, sugar, eggs, honey, spices and herbs, or vegetable bits. Some common salad dressings go through different stages as described below.

- Water (i.e., the continuous phase) is added to a batch tank and the in-tank mixer is started.
- Vegetable oil (i.e., the dispersed phase) and other liquid ingredients such as vinegar or stabilizers are added to the tank and thoroughly mixed until the desired emulsion is achieved.
- Powdered ingredients such as thickening agents, flavorings, and preservatives are then dispersed into the mix tank.
- Mixing is continued until the powder lumps have been smoothed out and the dressing thickens.



The Quadro Approach

Challenges faced when using conventional in-tank mixing technology

- Thickening agents used in salad dressing are prone to forming lumps and are difficult to disperse or break-down with a conventional agitator.
- Filtration is often necessary where agitation fails to smooth out powder lumps or agglomerates.
- Partially hydrated ingredients build up on vessel walls and the mixer shaft.
- Loss of ingredients through filtration and surface build-up lead to increased manufacturing costs and cleaning time.
- Inconsistent emulsions and overall product are common with agitators.
- Long process times are frequently required to improve consistency.
- Air incorporation is a regular problem with surface addition of powdered ingredients.

Quadro's Approach

Quadro Ytron® Mixers are designed to overcome all the difficulties. Batch size, formulation, type of ingredients, and viscosity of the end-product dictate the ideal choice of equipment (Jet Mixer, ZC Powder Disperser, Z Emulsifier or a combination of equipment) that is best-suited to the specific process requirements.

For batches smaller than 500 gals (1900L), Quadro recommends the Y Jet Mixer. The Y Jet Mixer delivers a purely axial flow pattern without the need for tank baffles to provide instant, homogeneous blending of the oil and water mixture. The addition of a bypass tube assembly in combination with the high-speed rotor provides for rapid, sub-surface, air and agglomerate-free dispersion of powders into the liquid phase.

Our three-stage, high shear, in-line Z Emulsifier can be added to the discharge should a high shear in-line mixer be required to finish the product (additional emulsifying and/or texturizing).



The Quadro Approach

For larger batches, Quadro recommends our in-line powder disperser to incorporate the powders in a single-pass without agglomerates. The in-line powder disperser can also be used in a recirculating mode to provide additional shearing if required, to create the desired properties (additional emulsifying and/or texturizing). In this set-up, the Ytron Y Jet Mixer is used as a tank mixer providing good top-to-bottom turnover of the tank ingredients and ensuring homogeneity.

Benefits:

- Pre-blending of the dry ingredients is not necessary.
- Lump-free/air-free mixtures.
- Rapid mixing times.
- Single-pass processing ensures reproducible/consistent product.
- Maximized yield of raw materials as thickening agents
- Fully hydrated and other ingredients are fully dispersed.

