

Double Planetary Mixers (DPM) for Food Applications



A White Paper Prepared By Ross Process Solution India Pvt Ltd, Pune, India



ROSS Double Planetary Mixers for Jams, Pastes, Chocolates, Creams, and Other Food Products

Abstract

This white paper provides an overview of ROSS Double Planetary Mixers, which are used in the production of chocolates, creams, jams, and other food products. These mixers achieve a variety of processing goals. Based on ROSS's experience as a provider of specialty mixing equipment to the food industry for over 170 years, the recommendations in this paper are geared toward proper mixer selection.

Introduction

In the food industry, mixing is a common part of the production process used to combine multiple raw ingredients, establish consistency, control reactions and modify food structure. Whether a food product requires small-scale hand mixing or high-volume blending of multiple ingredients, both home cooks and process engineers understand the significance of proper mixing. Even with the right amount of ingredients and flavors, a great recipe will not transform into great food unless the components are properly mixed.

Taste, texture, color, appearance, shelf stability and food safety are all crucial parameters that can be influenced by the mixing process. In an effort to reduce faulty mixing processes, food manufacturers are increasingly adopting advanced automated control strategies such as Process Analytical Technology. Sensors can provide both insights into the complex mechanisms of mixing along with effective control.



Operation and Performance Details:

ROSS recently completed a successful trial for a lollipop paste manufacturer using our Double Planetary Mixer (DPM) series. The mixing results were remarkable.

"The process of lollipop paste mixing with tamarind was initially established in a traditional spiral mixer and took 90 minutes to complete. However, with a ROSS DPM, the mixing time was reduced from 90 minutes to 5 minutes, forming an effective paste with 100% dispersion of all the ingredients. Furthermore, the traditional spiral mixer experienced blade failure and required replacement every 15 days. In comparison, the planetary blades and overall mixer design provide a robust, long-lasting solution."

The DPM incorporated modern logic controllers for easy and repeatable mixing of all ingredients into an amalgamated paste. Thanks to the advanced controls and automation of the planetary mixer, the trials were completed without any failure, contamination, or product leftover. Accessories included cleaning-in-place (CIP), sterilization-in-place (SIP) and air blow-off.

As illustrated in the following sections, various planetary tools are employed in the production of a variety of food products. Some of these technologies are relatively new solutions to age-old processing issues. Mixer selection is based on several factors including viscosity profile, shear requirement, order of addition, and throughput.

Construction and Salient Features of a ROSS Double Planetary Mixer:

The classic Double Planetary Mixer is ideal for melting and kneading semi-solid materials or highly viscous pastes. While not considered a high-speed mixer, the DPM is equipped with two identical stirrers which impart increasing levels of shear as the batch gains considerable viscosity. A common processing technique in this very robust machine is mostly high viscosity mixing to ensure satisfactory solids dispersion (from 1.5 million cP up to around 6 million cP), followed by a let-down step towards the end of the cycle.

HV Blades are a breakthrough design now widely used in many applications, cutting operating costs and increasing production. DPMs are mostly used for materials with viscosities above 1.5 million centipoises. At the same time, they are capable of dry blending of powders, vacuum drying of solids and pastes, as well as processing shear-sensitive gels and other friable materials. The ROSS DPM offers a variety of standard features and options that makes it the most powerful, efficient, and convenient Double Planetary Mixer ever built. The standard model includes self-contained pre-wired controls, variable speed inverter drives, and completely enclosed construction.

- Control options include turnkey automation, powerful data logging, and a simple interface with your PLC and production management system.
- Ross can also provide all the equipment and fabrication necessary for vacuum/pressure, heat transfer, orbiting heat sensors, change can design and discharge systems.
- Three blade designs available: Traditional Rectangular Paddles, Finger Blades, and the new HV Blades. The choices allow you to select the right flow pattern for the material you are mixing.
- Automated CIP and SIP systems along with programmable logic controllers (PLCs). Detergent and steam can be utilized for effective cleaning to avoid cross-contamination and product leftovers from previous batches.



**Double Planetary Mixer with High Viscosity
Blades (US Patent No. 6,653,137)**



**Double Planetary Mixer with
Rectangular Paddle Blades**



Optional Ross Discharge System



**Automated CIP Skid for cleaning of mix
vessel and connected accessories**

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