

## New Processing Technology for Encapsulation

Littleford Day Encapsulation Technology offers a highly efficient and economical means of encapsulating a variety of products and ingredients.

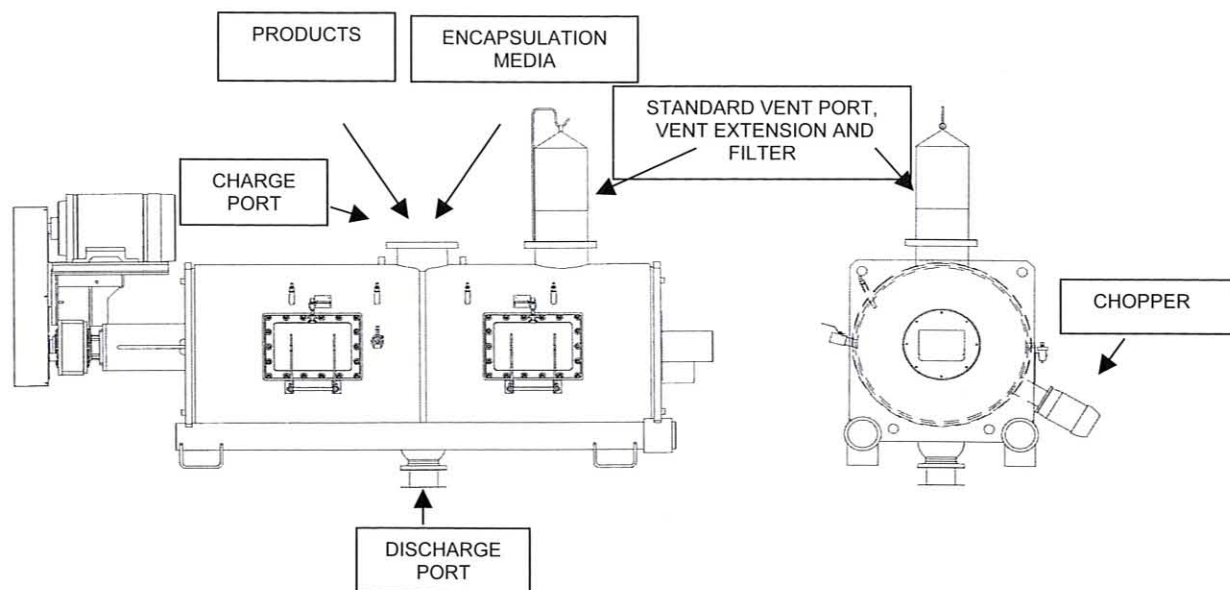
A considerable portion of ingredients in the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries are encapsulated to protect them from the environment (moisture, oxygen, other ingredients) and also to control the time releasing of the ingredient or product.

Processors have been searching for an economical way to encapsulate these products. With the present alternate technologies, in order to guarantee the complete encapsulation of each particle, the processor must spray the encapsulating media onto the product. After spraying they must then dry the excess liquid from the product. Besides being a costly/timely process requiring multiple steps, the drying process also exposes the ingredient to higher temperatures. For heat sensitive ingredients this heat history on the product negatively effects the desired characteristics. Further, these multi-step processes are quite labor intensive. In addition, this type of processing leads to real possibilities of cross contamination.

Littleford Day has drawn upon its process technology and advanced Ploughshare® action to develop a vastly superior encapsulation system. The Littleford Day system encapsulates in a single vessel without the need of drying the product after encapsulation.

**Typically, the Littleford Day Encapsulation Process follows these processing parameters:**

1. Product is charged into the Littleford Day Ploughshare® Mixer. Agitation is initiated (plows), followed by heating or cooling media as required by the customer's product processing objectives.
2. Encapsulation media is added and the high speed shear devices (choppers) are initiated. After a pre-determined time, the choppers are discontinued.
3. The product is then mixed (plows only) for additional processing (other ingredients added, product granulation etc.) or discharged.



**Littleford Day**  
*Where Processing Ideas Become Reality*

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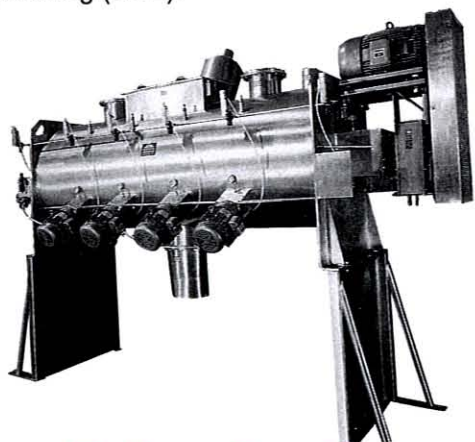
The unique action developed by the Littleford Day Ploughshare® Mixer assures a rapid and complete encapsulation of the products in minimal cycle times. This action is developed by the turning of plow-shaped mixing tools at a speed sufficient to cause the materials of mix to become a pulsating mechanically fluidized bed. The basic plow mix action is supplemented by high speed, high shear chopping devices that are mounted between adjacent plows. This aggressive yet gentle mixing combination allows the encapsulation media to be thoroughly dispersed onto the product without the need of excessive liquid or solvent. The chopping devices can be operated independently of the plows; there is little chance of overworking the mix.

Since certain encapsulated products may require some heating or cooling, the Littleford Day Ploughshare® Mixer can be equipped with a highly efficient ASME Code heat transfer jacket. The Littleford Day Ploughshare® Mixer, specifically engineered to maximize heat transfer, yields heat transfer coefficients that are many times higher than those of traditional units.

We have found that the advanced Littleford Day Encapsulation Process will result in:

1. Improved encapsulation efficiencies
2. Controlled temperatures through effective/optimum heat transfer
3. Improved encapsulation rates
4. Efficient single unit processing of the entire process (i.e. drying, granulation, encapsulation)

The production of all Littleford Day processing equipment for the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries begins with the engineering of quality, performance, and reliability into every order specifically for each customer. This is accomplished utilizing the advanced engineering sciences of today including Finite Element Modeling and Analysis (FEA) and state-of-the-art three dimensional Computer Automated Design (CAD), integrated with Computer Aided Manufacturing (CAM) and Computer Aided Engineering (CAE).



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All Food, Pharmaceutical, Nutraceutical and Biotechnical equipment is routinely manufactured in accordance with "GMP" and can be specified to meet or exceed all of the different sanitary regulations as detailed by the FDA, 3A, USDA and the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries, making Littleford Day equipment the best equipment on the market today.

We ask the customers to bring their raw materials to our facility and put our claims to the "test".

Littleford Day offers an advanced Process Development and Testing Center at its headquarters in Florence, Kentucky. The center is staffed by engineers, chemists and technologists who have the expertise to understand the specific processing requirements for a wide range of industries, and can develop solutions to meet customer needs.

Equipment available at the Test Center includes mixers, dryers, reactors, granulators, intensive mixers/coolers and support equipment such as filtering and vacuum systems.

Littleford Day recommends a minimum of one full day for the typical test program. The testing program allows the customer to observe the mixing procedure and discuss scale-up issues. A confidential, detailed test report is also provided so customers can analyze the results of their test program.

This proven Littleford Day technology has been applied to numerous complex and difficult applications in the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries. The Littleford Day Ploughshare® Mixer can be purchased in a variety of sizes to meet most production requirements. Littleford Day can interface its system controls with existing equipment or supply fully automated process control systems.

**For a free brochure or a detailed discussion, contact us at:**

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