

RADIO FREQUENCY (RF) DRYER APPLICATIONS

1. TEXTILE INDUSTRIES:

1.1. ONLINE TEXTILE RF DRYERS

Conventional mode of Drying Textiles after they have been dyed is a slow process. Textile industries can increase Throughput and fill orders more prominently using Radio Frequency (RF) Dryers. RF system has capability to accelerate the drying process and shorten production time. RF drying offers High Volume, High speed and High quality drying which is what exactly needed in textile industries. As wet garments of Acrylic, Cotton, Nylon and Polyester Blends pass through the drying chamber, the radio waves vibrates the contained Water molecules million times per second, vaporizing them. Ventilator Fans are used to remove damp air from the Drying Chamber.

The dryer system comprises the 125kW industrial high frequency generator in conjunction with a drying chamber incorporating an electrode applicator and air extraction system. The equipment is suitable for drying most types of fibres which have had prior mechanical moisture extraction in either, cone, muff, bump or loose stock form. Many types of fibre can be dried. The machine incorporates a modular polypropylene conveyor band and conveyor system.

The typical RF Dryers is shown in figure1.



Fig.1: "RF 2x75 kW" dryer for fine wool tops in 10 Kg bump form, dyed and hydro-extracted on stainless steel spindles and loaded manually to the dryer.

Because of the RF waves concentrate in the wettest, densest portion of the garments. RF drying has a leveling effect that practically eliminates any problems of uneven shrinkage and over drying. The RF drying times depend on the type of fabric, the percentage of moisture in the fabric going in to the dryer, and the degree of dryness desired.

Advantages:

The major advantage is that it gives thorough, consistent drying in less time and also occupies less space. In addition to these following advantages are prominent:

1. Faster Drying
2. Faster Production
3. Increased Labor Production
4. Less work in progress
5. Energy Saving
6. Less Down Time
7. Lower Maintenance
8. Space savings

1.2. BATCH DRYER FOR NONWOVEN WEBS

The RF Web Dryer rapidly removes moisture from the web at low temperatures and prevents the migration of coating solids caused by conventional drying which increases web strength and product quality.



Fig. 2: 60 kW with single carrier for yarn packages capacity 100-120 kgs/batch

Benefits:

1. PREFERENTIAL HEATING:

Selectively dries products at the wettest sections of the web. The product output will be uniform in moisture content throughout, regardless of the non-uniformity going in.

2. INCREASES PRODUCTION THROUGHPUT:

Providing instant ON/OFF control, the RF Web Dryer eliminates the heat-up and cool-down times required by conventional dryers.

3. MINIMIZE DRYING TIMES:

Rapid volumetric heating eliminates the long dwell time required by conventional heating minimizing the quantity of product in the drying cycle and reduces changeover time.

4. NO ACCUMULATION ROLLERS:

This dryer eliminates the need for accumulation rollers required by festooned convection and infrared type dryers and saves floor space by generally requiring one-fifth of the floor space needed for hot-air and IR dryers as well as lowering maintenance costs.

Features:

- Energy applied by radio waves at a frequency of 40.68 MHz.
- Volumetric heating keeps the temperature low and uniform throughout the web to prevent overheating.

2. FOOD PROCESSING:

2.1. POST-BAKING DRYER

The combination of conventional oven heating with RF heating in the final stage of the drying process is an extremely efficient way to produce many types of baked products, and it's easy to do. Radio frequency post-baking dryers are generally supplied as stand-alone turnkey systems, which can be ordered for retrofit to an existing or new oven line.



Fig. 3: 100kW Post-Baking Dryer

RF post-baking dryers automatically adjust power to respond to varying moisture loads resulting from oven burner failures, minor dough moisture and sheet thickness variations. A pre-adjustment assures that the product is still produced within moisture specifications despite varying incoming moisture levels.

Benefits you can expect with the addition of a radio frequency dryer include:

1. **Increased Throughput:**

Up to 30% increase for crackers and often up to 40% for cookies.

2. **Elimination of Checking:**

By greatly reducing the moisture variation throughout the thickness of the product, checking caused by differential shrinkage is eliminated.

3. Excellent Control of Final Moisture Content:

Final moisture is controlled to approximately +/-0.25%.

4. Independent Color Control:

Since moisture is controlled in the RF dryer, color development in the oven can be done without concern for final moisture content.

3. ADVANCED BOOKBINDER DRYER:

In-Line Radio Frequency Drying System for Sewn and Perfect-Bound Books Using Water-based Adhesives

Benefits:

1. Use water-based glue at high production speeds.
2. Bind continuously in-line without handling and stacking before trimming.
3. Binder-to-trimmer time is reduced. Eliminates trimmer blade fouling.
4. Glued area of the book is selectively heated and dried, while dry areas receive little or no heating. Minimum cooling is required.
5. Glue charring, blistering and skinning-over is eliminated.
6. Requires a fraction of the floor space of conventional dryers.
7. Efficient use of energy. RF power is instant-on-off.
8. Improved book quality, flexibility and recyclability.



Fig. 5: Advanced Bookbinder Dryer

Features:

1. Compact one-piece design saves floor space.
2. Four-zone drying applicator for precise control of glue temperature.
3. High performance electrode arrays resist belt abrasion.
4. Fast and easy belt replacement.
5. Automatic mechanical belt tracking.

6. Adjustable for books .5" (13mm) to 3.15" (80mm) thick.
7. Opposite-hand dryer configuration is available for dual installations handled by one operator.
8. Does not radiate heat or affect the working environment.

Custom-design automated glue drying systems are also available for new and existing installations.

4. CHEMICAL INDUSTRY:

4.1. VERTICAL RADIO FREQUENCY WEB DRYERS FOR ON-PRESS DRYING OF WATER BASED COATINGS, ADHESIVES AND INKS

Benefits:

1. Wet areas on the web are selectively heated and dried, while dry areas absorb little or no energy.
2. Aqueous materials can be dried in the shortest line length to production speed of any drying method known.
3. Energy saving. The electrical power consumed by the dryer automatically adjusts to the amount of water present on the web.
4. Instant-on R.F. power eliminates start-up delays.
5. Requires a fraction of the floor space of conventional dryers.
6. Highest productivity is achieved with aqueous materials. Solvent emission and disposal problems are eliminated.



Vertical Dryer

Features:

1. Convenient access doors facilitate web threading.
2. Waste heat from the RF generator is channeled through the applicator to scavenge moisture released by dryer.
3. Solid State controller provides soft-start and maintains power at preselected level.
4. Optional auto-threading system is available to minimize make-ready time.

5. BULK SOLIDS

This drying system uniformly heats filter cake material throughout the thickness of the product depth and rapidly removes the water without overheating, at a fraction of the time and expense associated with conventional dryers.



Fig. 4: Rf Filter Press Cake Drying System

BENEFITS:

1. PRECISE MOISTURE CONTROL:

Selectively heats products where the moisture content is the highest. The product output will be uniform in moisture content throughout, regardless of the non-uniformity going in.

2. INCREASES PRODUCTION THROUGHPUT:

Product throughput on many applications can be increased 50% to 100%.

3. MINIMIZE DRYING TIMES:

Rapid volumetric heating eliminates the long dwell time required by conventional heating and is a suitable replacement for tumble-, spray-, tray-, spin flash-, and belt/tunnel dryers.

4. OTHER BENEFITS:

Energy savings and floor space savings. Typically requires one-fifth the floor space of conventional drying systems.