



YASKAWA

## Drives for the Industrial Laundry

Variable frequency drives have not only become commonplace in today's laundry facility, but are developing into the standard control system on many of the most advanced washer-extractors, ironer, spreaders, feeders and dryers.

Variable frequency drives (VFD) have a well-founded reputation for versatility and dependability, with features and benefits that are just not available from other drive technologies. They are presently used in applications as simple as fan control and as complex as process loops, positioning and indexing and speed-regulated transport systems.

The benefits of AC drives are both cost and performance related. In laundry plants, the drives have delivered expanded machine capability, increased flexibility, simplified maintenance and manufacturing, and reduced operating energy costs.

They have the versatility to be programmed for optimum performance in demanding laundering applications, where they offer the advantages of reduced size, weight and costs, extremely simple installation and couple high efficiency operation with the simplicity and durability of standard, off-the-shelf AC motors.

### **Early Applications.**

Variable frequency drives, sometimes known as "inverters," were first applied to industrial washer-extractors in the mid-80s. Before that time, a system requiring 3 or 4 motors and a series of belts, pulleys, jack shafts and clutches were used to provide speed control for wash, distribute, and extract cycles.

The first really cost-effective VFD application came about when installation of a drive was able to eliminate the "distribute" motor along with its associated belt, pulley and control components, and use one motor for both wash and distribute speeds.

The drive also allowed infinite adjustment of wash and

distribute speeds, providing multiple wash formulas from any machine to efficiently process mixed loads of floor mats, shop towels.

Shortly thereafter, VFD technology was utilized to provide a simple, but highly desirable, "quick stop" function to pull "pinned" linen off the drum, reducing unloading time at the end of the extract cycle. The "quick stop" was accomplished simply by programming the dynamic braking feature available on most VFDs. The versatile drive provided effective braking while eliminating the need for brake-shoe maintenance and alignment problems commonly associated with mechanical systems.

Additionally, the drive's ability to provide speed control on both extract and wash/distribute motors meant that the special "multi-speed" extract motor was no longer necessary. The variable frequency drive is able to provide superior speed control through a much more economical standard AC motor.

### **Single-Motor Washer-Extractor**

For many years, the dream of many in the laundry industry was the single-motor washer-extractor.

Duty extremes in the laundry industry have traditionally required equipment that used multiple motors to perform complex mechanical operations. For example, commercial laundry machines demand high torque at low speeds for wash and distribute cycles, and decreasing torque and increasing speed to increase "G" force during the extract cycle. Prior to the introduction of dependable variable frequency drives, these cycles had to be carried out mechanically and required two or three separate motors.

Technology caught up in the early motor to cover all of the duty cycles, resulting in reduced cost, greatly reduced mechanical complexity and wear, and resulting in decreased maintenance and increased operating life.

Today, one motor provides wash, distribute and extract



speeds. One belt set and two pulleys are all that are needed, eliminating clutches, jack shafts, belts and pulleys. High current inrush is eliminated by the VFD to deliver a "soft start." Wash, distribute and extract speeds are easily changed by simple keypad commands.

## **Synchronized Finishing Lines**

Like washer-extractors, finishing equipment had traditionally been driven by mechanical speed changers. These mechanical drives, called "belt boxes," were a costly and high maintenance arrangement. Today, however, the comparable versatility and simplicity of the VFD is convincing many manufacturers of ironers, spreader-feeders, folders, and conveyors to follow the industry trend toward variable frequency drives.

A main/remote arrangement controlled through the VFD can easily coordinate and synchronize the speed of most equipment on a finishing line. In such an arrangement, a single speed knob mounted on the spreader or ironer allows automatic speed adjustment of all equipment incorporated in the finishing line.

## **Standard, Functional VFD Features**

Many new capabilities, which are in reality standard VFD features, become available to laundry operators when the drives are used on finishing equipment.

For example, ironers require periodic rewaxing. Since the wax serves as a lubricant, motor current increases slightly as the wax wears off. The "over torque detection" feature built into most VFD's can be utilized to detect this increase in motor current and provide a signal when rewaxing is required. This signal can be a light or buzzer or an electronic "maintenance" signal to a main computer.

As another example, most finishing lines run for many hours while the loads being processed change continually. A VFD is able to constantly audit current required for varying loads and automatically reduce the voltage for significant energy savings when equipment is less than fully loaded.

Recent technology developments in the drive industry

have made even more compact, cost-effective VFD units available to the commercial laundry equipment manufacturer. Several manufacturers have, or will shortly, introduce VFD-controlled on-premise washers that are rated up to 150 lbs.

Standard off-the-shelf motors will replace the hard-to-obtain, expensive multi-speed motors now common in these machines. Additionally, machine control components will be greatly reduced since the VFD eliminates contactors and capacitors and provides electronic overload protection.

## **Expanding Applications, Energy Savings**

Dryer manufacturers are now exploring methods for bringing the benefits of VFDs to large dryers where they can produce a virtually unlimited range of drum speeds to provide significant energy savings. Such speed control - optimizing dryer performance for varying loads, fabric materials and weaves - will not only deliver energy savings through reduced drying times, but will also provide increased fabric life.

The benefits of VFDs in commercial laundry applications are numerous, with high potential for electrical energy savings evident on virtually all types of equipment.

From an energy savings point of view, adjustable frequency drives can be used to eliminate high inrush currents, reducing peak demand charges, and improving system power factors.

Electrical utilities recognize the energy savings potentially available through drive installation as well, with many offering rebates on new installations using VFD technology.

VFD software can be modified to include unbalance detection, control wash cycles, and communicate directly to laundry main computers, reducing the size of the machine control microprocessor and eliminating components formerly associated with unbalance detection.

## **Reduced Maintenance/Inventory Costs**



## Drives for the Industrial Laundry

---

Reduced maintenance costs have also been a driving force behind utilization of VFDs on Laundry equipment. The drive's ability to control speed electronically eliminates most of the maintenance problems associated with the belts, pulleys, clutches, jackshafts and contactors formerly required for speed control. Specially designed motors, which were formerly required, have been replaced by standard AC designs at significant cost savings. VFDs have also allowed commercial laundry equipment manufacturers to reduce inventory costs since the same machine can be used on both single and 3-phase power supplies over a wide range of voltages and frequencies. Additionally, control components are reduced and capacitors are eliminated.

*In the future, more and more equipment will rely on VFDs. The entire laundry process will be controlled by one main computer via serial communication between equipment, microprocessors, and VFDs. Advances in drive technology are already providing reductions in size and costs, along with new features for increased versatility and easy operation.*