

Shaftless Drive Technology Increases Profitability of Existing Presses

Today, “shaftless driven” presses are available in all printing subsegments including: Label printing, package printing, commercial printing, newspaper printing, and converting. This technology not only fixes the fundamental flaws (gear transmission error and windup) of our traditional mechanical drive train, it also provides unmatched flexibility. Today printers are benefiting from improved quality, reduced make-ready, infinitely variable repeats, and greater flexibility.

The benefits of shaftless driven technology in new printing presses are well known. The flexibility, reduced waste, improved quality and infinitely variable repeats are truly remarkable. This has been a real advancement for printing technology. Whereas most new technologies monitor and control the inconsistency of a process, shaftless drive technology re-invents the mechanical drive system, eliminating the inconsistency, while increasing flexibility and quality.

As shaftless drives continue to gain acceptance, more companies are finding creative uses for this technology. This is not new. Servo drive technology has had the same effect in other industries. In packaging, most machinery now utilizes servo drive technology. In automotive manufacturing, there are production facilities with over 3,000 servo drives controlling all aspects of production.

In the converting portion of our business servo drives are now appearing on platen and rotary die cutters, coaters/laminators, and paper converting machinery. Shaftless drive technology is also appearing in many retrofit and add-on applications. With the large installation base of existing equipment it is impossible to justify the replacement of all our manufacturing equipment. Retrofits become feasible because the basic printing process has not changed. Reviewing advances in flexographic printing technology we see that the plate, anilox and impression cylinders haven’t changed. Advances have been made in plates, anilox rolls, mechanical timing mechanisms, and PLCs (Programmable Logic Controller) utilized for automating the set-up.

Innovative printers have performed shaftless retrofits on Flexographic, Rotogravure, and Lithographic Offset printing presses.

Let’s look at the retrofit of a wide web flexographic press. This could be a Common Impression or Stack press. As we evaluate what machine is right for a shaftless upgrade we find that age is not necessarily the deciding factor. As a matter of fact, older machines were typically built with thicker sideframes and more iron. For sake of conversation, let’s consider a 20 or 30 years old press. These machines are mostly mechanical in design, so we have don’t have concern for trying to salvage any electrical components.

Before starting a retrofit we need to evaluate the machine. When determining our planned maximum speed we need to review the overall process. Are the dryers sized to handle additional

machine speed? Do we have any converting processes that may limit our speed? Another consideration is the machine's ability to readily accept the mounting of the servomotors. Some print deck designs are not rigid enough, or do not have a surface area that can accommodate the mounting of a bracket to support the servomotor. In these cases we need to determine if we can use the existing print deck, or if modifications are required.

Once we have decided that our printing press is worthy of a shaftless upgrade, we start by removing the existing mechanical drive train including the bull gear. Since, cylinder technology has not changed we can utilize our existing plate, anilox and impression cylinders. We can even remove any mechanical timing devices such as those used for retiming plate cylinders when changing repeat sizes. Fundamentally, all that remains are the side frames and cylinders.

Each plate, anilox and impression cylinder will receive its own servomotor. Also, all web transport rolls such as tension rollers and chill stands will receive independent servomotors. All servomotors are connected with fiber optic cable to a common motion controller. The motion controller provides synchronization and functionality for the entire system. The motion controller can command each drive independently or as a whole system.

When removing all mechanical drive elements and electrical control systems from the press we removed some setup functions. Below is a quick review of how the shaftless drive technology replaces that functionality.

<u>Functionality</u>	<u>Mechanical Solution</u>	<u>Shaftless Solution</u>
Synchronization	Gears: These gears had inherent errors from the machining process. Mechanics wear out with use.	Cylinders driven from servomotor. Provides better synchronization and eliminates mechanical wear items.
Timing	Mechanical device or sensor: This requires the press to move and create waste before timing is accomplished.	Servomotors can electronically be adjusted prior to machine movement.
Repeat size change	Limited to gear pitch of cylinders. This creates waste or design limitations.	Electronic gearing provides infinitely variable repeats.
Speed	Gears limit speed and cause vibration from resonant frequencies.	Gears and associated limitations are removed.

As a result of our shaftless retrofit the machine is less complex in design, has few wear items and requires less maintenance. We also have a machine that has the following manufacturing benefits.

Benefit of Shaftless Retrofit:

- Reduced setup time
- Reduced make-ready waste
- Increased throughput
- Increased registration accuracy

The return on investment for a shaftless press is quickly achieved. Reduced setup time by using electronic setup and timing provides more time for manufacturing and makes your machine more competitive for short run jobs. Precision presetting and elimination of machine windup reduce make-ready waste. Faster machine speeds provide more production without increases in labor, floor space, and overhead. Your machine will now print with higher accuracy keeping your customers satisfied and allowing you to pursue jobs with higher profit margins.

Having a press that is driven with independent motors also provides for simultaneous job setup procedures. Previously, mechanical drive systems prevented printers from performing make-ready if any part of the machine required maintenance. When a drive shaft connected the entire machine it was a safety hazard to setup and perform maintenance on the same machine. With independent drives press operators can rotate any part of the machine while maintenance is working on a different part of the machine. This same independent control allows for simultaneous setup of all machine modules. Because there is no mechanical link, each print deck and machine module can be set up simultaneously. Compare this to the sequential process of setting up one module at a time and you will clearly see the reduction in make-ready time and increase in productivity. After setup the machine automatically retimes itself.

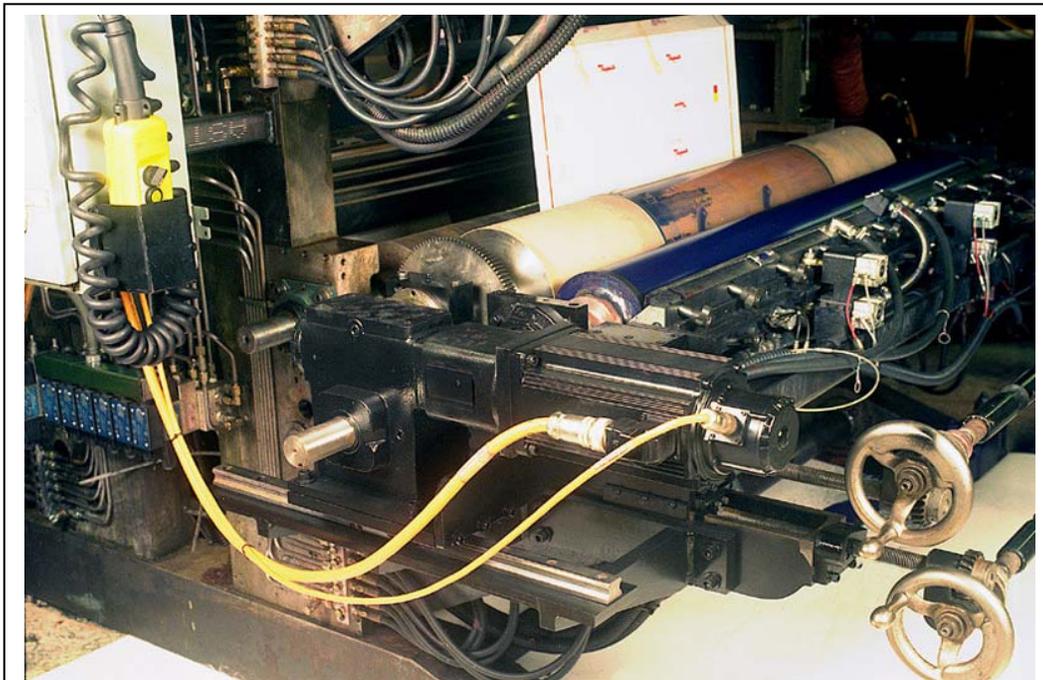
The benefit of shaftless driven technology does not stop at the printing press. Many converting processes can benefit from the same technology. Platten die cutters can double in speed making them competitive for longer run lengths. Even in-house development of value added processes benefit. The increase in flexibility minimizes the risk of these new development projects.

With the ability to achieve higher speeds in your converting processes it becomes more feasible to combine processes. This eliminates the costs associated with scheduling, staging and storage of jobs that require multiple processes. Since our converting processes are no longer connected by a mechanical drive shaft we can now relocate the module in various locations within a line, or move the module to another line. An example of this would be a hot foil stamping station. On an in-line press we can place the hot foil station on a rail above the print units. We now have a more flexible and still cost effective offering for our customers. Similar flexibility and accuracy can be achieved when using shaftless driven technology for tail printers.

Besides flexibility in locating new modules, shaftless driven modules minimize engineering associated with adding new modules. Since each module has an independent motor there is no need to change out the main press motor to accommodate for the increased load. We also eliminate custom mechanical drive systems required for connecting equipment.

Today our industry faces many challenges including shorter runs, more competition, and increased job complexity. Whether you are purchasing new or upgrading existing equipment shaftless driven technology can help you face these challenges while adding more profit to your business.

Mechanical mounting of Servomotors to the print deck is a primary



Retrofit of wide web stack press.