In order to operate an offset press efficiently, it is important that all members of the crew know the cylinder configuration of their press in order to follow directions while operating or maintaining the press.

There are many offset press cylinder configurations available today. For sheetfed printing, there are three basic configurations. First is single-color sheetfed, in which there is one set of cylinders arranged to print only one color on one side of each sheet as it passes through the press.

The second configuration is the multicolor sheeted press. In this arrangement, more than one color is printed on one side of a sheet during one pass through the press.
The third configuration is called **perfecting.** In a sheeted perfecting configuration, sheets are printed on both sides during one pass through the press.

The design of the printing unit of the single-color sheetfed press is sometimes described as an "open unit;" it has a cylinder configuration that includes a plate cylinder, blanket cylinder, and an impression cylinder. The arrangement is usually in a near right-angle relationship.

The cylinders are arranged in this way for three reasons: first, to reduce the overall height of the press;
...second, to make it easier to feed the paper into the impression cylinder grippers;

...and third, to make it possible, by movement of only the blanket cylinder, to throw all three cylinders out of contact with each other.

One exception to the right-angle arrangement is the metal decorating press. In this press, the cylinders are stacked directly above each other, so that the rigid metal sheets can pass through the printing nip without being bent around the impression cylinder.
Another exception is the press that has a single oversized cylinder used as both the plate and impression cylinder (Davidson design).

When placed in tandem, the open-unit type of single-color sheetfed press becomes a multicolor press, capable of printing a different color on each unit. To accomplish this, sheet transfer cylinders are installed between units to carry the sheets from one unit to another. In this configuration there are three transfer cylinders.

The transfer cylinder of a modern two-color press is illustrated here. A second view is available here.

Instead of using three transfer cylinders between each unit, some presses use a single, double-size transfer cylinder. The double-size cylinder carries two gripper bars which alternately transfer each succeeding sheet from one unit to the next. Note that only an odd number of transfer cylinders will move the sheet printed-side out to the next
impression cylinder. In this configuration, one transfer cylinder is between units. In the preceding configuration, three transfer cylinders are between units.

Another multicolor sheetfed press design, sometimes referred to as a "semi-open design," is one that has a common impression cylinder for two plate and blanket units. In this system, the printed sheet is held by a common impression cylinder and successively brought into contact with each blanket cylinder.

The "semi-open units" can also be put in tandem to increase the number of colors that can be printed on a sheet of paper in one pass through the press. Two such units make up a four-color press, and three make up a six-color press. The sheet is carried from one unit to the next by transfer gripper bars carried on chains. The same tandem arrangement is used with smaller two-color presses of the open-unit design.

For multicolor sheetfed printing, still another design is used. This configuration has only three cylinders, similar to the single-color sheetfed press, but each cylinder has four segments, one for each set of plates and blankets. The impression cylinder holds the sheet of paper until it makes four revolutions—one for each color to be printed—before
releasing it for delivery. Each segment also has a separate inking and dampening system.

The third major press design is the "sheetfed perfecting press" that prints on both sides of the sheet in one pass through the press. This is done by one of two different methods. The first design has no impression cylinder. Instead, the paper passes between two blanket cylinders that print on both sides of the sheet. Each blanket cylinder acts as the impression cylinder for the opposite blanket cylinder.

The second perfecting press design utilizes two transfer cylinders and a perfecting cylinder to turn the sheet over as it passes from one unit to another. To do this, the perfecting cylinder has a set of grippers that grasps the tail edge--rather than the lead edge--of the sheet as it passes from the large or second transfer cylinder. The sheet is then transferred to the second impression cylinder with the unprinted side up, ready to be printed on the second unit.

Web presses are designed to print from rolls of paper. The most common printing unit design in web presses is the blanket-to-blanket perfecting press.
These units, assembled in tandem, make possible multicolor and multiple web running.

Another type of webfed press is designed around the "common impression cylinder" principle. This is sometimes referred to as a CIC or drum-type press.

With this design, there are two methods of perfecting. One is to print one side of the web on one unit, turn the web over, and then perfect on the second unit.
A second way of perfecting on presses of this design may be accomplished by "double-ending." In double-ending, a web that is half the width of the press is printed on one side, using half the width of the web press printing unit. After printing and drying the first side, the web is led back, turned over, and fed through the other half of the press, to be perfected.

The third common design of webfed presses is the open forms, or in-line, press. The cylinders are stacked vertically to permit the web to pass straight through to each unit when in tandem. This type of webfed press is used for business forms and labelwork in which printing on one side only is required.

The many different cylinder configurations that have been shown are designed by press manufacturers to satisfy the demands of various types of work quality and quantity. An understanding of these systems is necessary, not only for the press operator and assistants, but also by those who purchase press equipment.