Open-close. Stop-start. A little more, a little less. FLOW.

All of these common words are associated with an essential piece of equipment used extensively throughout our daily, industrialized life.

Valves come in all sizes. They regulate the flow of water, gas, air, liquids, fluids, and in some cases even solids are controlled via valves. Taking a shower, washing your hands, making coffee, a valve or two is used to control the flow of water. Turning it on, regulating the flow— all essential for our way of life. Knowing about valves is essential to an education in Process Technology.

In the Western Texas College “Project Based Learning” – focused programs of Petroleum Technology and Process Technology each program has a series of lab activities to educate the students about the elements of the regulation of flow. These are part of a multipart teaching program also known as the “Pipe, Pump, Tank, and Valve” concept.

To truly know how a valve does its job of controlling flow, one must look inside. In medicine, a physician will use an x-ray or MRI machine to look at the inside of the human body. However, neither of these are a practical way to look at a metal valve used in the industry. Visually, it is hard to look inside a valve, even when it is not set into a pipe line or pipe structure. So to see the inside operations, we cut the valve open. Then, with visual information and working with the concept of the fluid that is being controlled along with the data on what the valve is intended to do, a full understanding of valve operation will be achieved.

“Project Based Learning” exercises were devised to teach skill sets which led to the making of cut away valves. These exercises used valves made of either brass (a relatively stable softer than iron alloy made of copper and zinc), or bronze (a harder alloy, still softer than iron made of copper and 12% tin, some other metals and a few non-metals such as arsenic, phosphorous, or silicon).
ILLUSTRATIONS OF OPERATIONS

During the operations of the “Project Based Learning” 3 special valves were chosen and turned into cut away demonstration units. These 3 valves are special, since they are going to students who stopped by to visit with the Process Technology program this past April during the Texas Workforce-hosted event at the Scurry County Coliseum. The event, the Jump Start Your Future Expo (JSYFE), enabled students to visit with employers, colleges, and universities. 45 students stopped by to see the Process Technology program at the JSYFE and filled out a contact form for a drawing which we held this month to coincide with another very exciting “Valve Event”. The Process Technology Exhibit table at the JSYFE included the cut away valves, the drawing for the valve exhibit, and a large aluminum base upon which a heat exchanger, small black tanks, plumbing, and a colorful glass bead coated heater element rested (showing that glass beads can also be used as insulators).
(Left) Cut Away view of a ½” ball valve with handle (yellow), and the plastic washers (either side of the silver ball in the center). To turn flow on or off only requires a 90 degree turn of the handle. U.S. 1 cent and 25 cent pieces are present for size comparisons.

(Right) Cut Away view of a ½” water faucet valve with handle (green). To turn this on fully requires multiple turns of the handle. U.S. 1 cent and 25 cent pieces are present for size comparisons.

(Left) Cut Away view of a ½” water valve for a brazed or solder connection to copper pipe with handle (black). To turn this on fully requires multiple turns of the handle. U.S. 1 cent and 25 cent pieces are present for size comparisons.
Not all valves are this small; many are much larger, made of much harder materials than brass or bronze, and sometime much more complex.

The students who won the cutaway valves drawn from the 45 students who visited with us were Issac DeLaPaz who won valve #1, and two other students from the area who won valve #2 and valve #3.

The other exciting event took place on June 24, 2015. Chris Mencor, of Kimray, Inc., Oklahoma City, OK., presented Western Texas College with six commercially produced cutaway valves which are commonly used in the Petroleum and Process industries.

The addition of these large steel cut away teaching units will greatly enhance the teaching programs of Petroleum Technology and Process Technology. The materials used and degree of production are beyond the capabilities of what our students can produce with the tools we have available.

When these Kimray, Inc produced cutaway units are not being used in the classroom as teaching aids, they will reside in the Scurry County Museum along with the permanent elements of the museum’s Petroleum exhibit.

These items are used in Process Technology locations for temperature controls, pressure, regulation, specialized fluid pumping, and level monitoring, among other uses. See the following six illustrations.

(Left) Gas Back Pressure Valve (AAA). This valve is typically used to regulate flow using the gas in the line – it regulates the “upstream pressure” in a system.
(Right) Treater Valve (DAA). This unit works on emulsion treaters, water knockouts (separators for water), and gunbarrels (tall tanks used for separation purposes). Ideal for discharging salt water to disposal systems.

(Left) GLYCOL Pump (GAB). This item works as a pump, and is our first pump cut away unit. It pumps Glycol as the name states, which is a viscous fluid used to dehydrate (remove water) from oil, ethanol, methanol, or other petroleum products.

(Right) Base Low Temperature Thermostat (HAA). Used to set the temperature in Emulsion Treaters, reboilers, steam generators, and heat exchangers.

(Left) Low pressure valance Control Valve Motor Valve (EJA). Designed for liquid systems up to 500 psig.

(Right) Diaphragm balanced. A mechanically operated, via a float connection, tank level control valve.