**Going with the Flow**
*by Thomas Westerkamp*

**New technology to assess and address drain and pipe problems puts additional power in the hands of front-line technicians**

Today’s drain cleaning systems are a far cry from the rudimentary systems employed by maintenance departments in years past to keep plumbing systems operating and pipes flowing smoothly. These advanced systems feature improvements in materials, designs and technology that enable managers to put greater power in the hands of front-line plumbers and equipment technicians, which can enable them to diagnose plumbing system problems more quickly and accurately.

The options available to today’s technicians for assessing pipeline problems generally fall into two categories — mechanical and chemical.

**Equipment options**
Mechanical cleaning includes everything from the old standby manual plungers and augers to today’s faster and more powerful motor- or engine-driven power cleaners. Typical examples of mechanical cleaners found in a plumber’s arsenal include:

**Hand cleaners.** Two common types are closet augers and hand spinners. Closet augers with flexible, 1/2-inch inner core cable can snake through traps, even in newer, low-flow closets. Workers also can use portable electric or battery-operated hand spinners on small drain blockages in sinks. They have a range of 50 feet and a vinyl-wrapped, flexible inner core cable housed in a plastic drum. They will not rust or dent and clean easily.

**Sectional cable machines.** These units can be electric or gas driven and can clean lines up to 300 feet. They are available for application in 1-1/4 to 10-inch diameter pipe and in increments of 1-1/4 inches to 4 inches, 2 – 8 inches, 2 – 10 inches, etc. Speeds of 600-700 rpm enable them to remove buildup and cut roots that invade underground drains.

**Drum-type cable machines.** These units have quick-disconnect drums and quick- connect couplers for faster setup and easier transport through narrow passages. They also are designed for problems with sink and floor drains, and they offer line diameters ranging from 1-1/4 inches to 10 inches, cable lengths of up to 250 feet, and in- and out-feed rates of more than 20 feet per minute.

**Rodders.** For heavy-duty, large diameter pipe, rodders with an attached gas engine can handle up to 500 feet of line length with sectional rod and up to 24 inch-diameter pipe.

**Water-jet machines.** Water jet machines are driven by either electric or gas engines. Typical electric units handle more than 200 feet of 1-1/4 – 4 inch drain. Connected to a water source, they deliver high-velocity pulses of water forward and backward at 1,250 pounds of thrust to remove sludge buildup. Gas units remove soap, grease and sludge in 1-1/4 inch to 6 inch drain lines. A 5-1/2 hp drive delivers pressure at 2,100 psi, which is controlled by a foot valve. Both electric and gas units can be hand-carried or two-wheel-cart-mounted with hose.

**Imaging technology**
The gradual forms of pipe deterioration that maintenance and engineering technicians face include drainpipe wall buildup, erosion, corrosion, root invasion, cavities, sagging and cracks. Managers need to assess risks, understand equipment options, and sell a solution to management. These steps are best taken before a middle-of- the-night emergency occurs.

With up-to-date drain inspection equipment, smart managers can mitigate risks by viewing the condition of a drainage system at periodic intervals, documenting impending problems, and recording the findings using both audio and video of the actual interior condition of the lines to backup recommendations for corrective action.

The conventional method has been remotely controlled closed-circuit television (CCTV), a process by which a TV camera is inserted into the pipeline to make an analog recording. The camera is mounted on a track device that propels it through the pipeline and records distance, time and date. The device enables the operator to make audio comments of observations, as well as color videotapes, DVDs or still photos.

An alternative for smaller pipelines is a monitor on the surface connected to a Kevlar sleeved fiberglass cable that is inserted into the pipe for recording. Trenchless pipeline rehabilitation is a cost-effective alternative to open-trench repairs.

The disadvantage of CCTV is that it is subject to operator interpretation and varying quality of the TV pictures. Errors are most likely to occur in assessing early defects or deterioration that generally are not easily seen. As a result, inspectors might believe that complete relining is the best option, when in fact only spot repairs are needed, or that spot repairs are done when complete relining is needed.

**Digital decisions**
More recently, facilities have begun using digital imaging to assess pipeline condition. This technology is driven by the inconsistency of CCTV data. Benefits of digital imaging include more consistent and higher quality images, as well as the ability to do computer-assisted data analysis.

For example, a Java-based analysis now in use makes data less susceptible to operator error and enables users to scan and measure joint separation and accurately assess pipeline defects, including ovality of pipe and depth of cavities. Software allows user-defined coding of defects for automatic summary and analysis and user-defined reports. On-board sensors capture vertical and horizontal pipe deflection since installation, possible indicators of stresses from shifting soil that can cause failure.

In its third generation, digital optical scanning technology Digital data can be reviewed on line, stored on CD or DVD, or seamlessly transferred to an asset management system for further evaluation and easy archiving. When reviewing data, the user can go to any point in the pipeline image instantly. When combined with the analytical software that is available today, digital data can help technicians more accurately assess the condition of the pipeline — the key to cost-effective and high-quality rehabilitation.

**Chemical Considerations**
Chemicals used for drain and pipe cleaning include biological agents and a variety of inorganic chemicals. These cleaners are application specific. For example, if the problem involves a drain that is plugged with fats, grease or oils, bio-augmentation drain cleaners provide a solution. Naturally occurring microorganisms feed on waste buildup and remove it from drains. Bio-augmentation is environmentally safe and non- corrosive.

On the other hand, if the problem involves a floor drain used for photographic development or radiology waste, the buildup likely is a combination of calcium carbonate from the developer and iron deposits from steel wool silver recovery.

Solid buildup is very difficult to clean. The best solution is a cleaner specified for calcium carbonate and iron removal. This liquid material is easy to use, safe for use in iron and plastic pipe, and meets standards for non-corrosive cleaners.