

# Using infrared cameras to find pipe blockages

## Application Note

Whether they carry liquid product, water, steam, natural gas, or oil, keeping pipes flowing smoothly is critical to safe and efficient manufacturing and processing systems. Blockages, thinning, and corrosion can diminish the efficiency and safety and result in leaks that could cause serious damage to your facility and your people.

The challenge is to find problems such as carbon deposition, thinning, and cracking in hundreds or thousands of feet of pipe, as well as leaks and clogs in heat-exchanger and reactor tubes. A high resolution infrared camera (also called a thermal imager) can expedite inspection of this equipment and provide the thermal detail to detect small temperature changes that can aid early detection of potentially big problems.

### Gain better visibility into piping systems with Fluke TiX560 and TiX520 infrared cameras

When inspecting pipes, you're typically looking for hot spots, cold spots, or subtle temperature changes that could indicate a leak, blockage, or weakness in the pipe. If possible, it's a good idea to have a baseline image of the pipe in good condition that you can compare to subsequent images to detect problem areas more quickly. The articulating lens, 5.7 inch touchscreen, high resolution, thermal sensitivity, LaserSharp® Auto Focus, and on-camera storage on Fluke TiX560 and TiX520 infrared cameras make it easier to identify a wide range of pipe problems, such as:

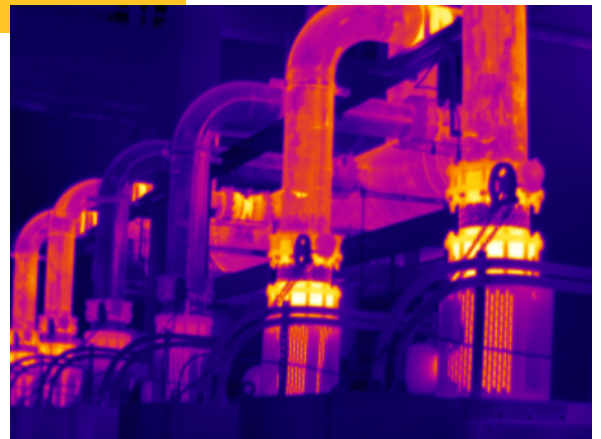
#### Blocked pipe

A blocked pipe can cause a delta in temperature around that area that can transfer to the external pipe casing. The area beyond the blockage will show a difference

in temperature due to little or no flow. Equipped with a Fluke TiX560 camera you can scan pipe from a distance, using LaserSharp® Auto Focus to get a clear image. You can add voice and text annotations, additional digital images (IR-PhotoNotes™), and put the camera into 640 x 480 SuperResolution mode to tell the whole story. You can also manually adjust the level and span to show small differences.

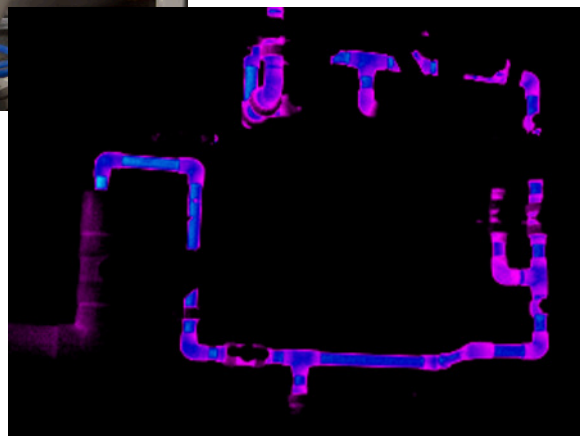
#### Corroded, abraded, or thinning pipe

If the inside wall of the pipe is abraded, corroded, and thinning the temperature of the casing will be different than uncompromised pipe. Using the image sharpening (TiX560 only) and filter mode features in the TiX5XX cameras you'll be able to get a clearer view to help you find a possible weakness in the pipe.



### Top 5 Pipe inspection applications

- 1 Blocked pipe
- 2 Corroded, abraded or thinning pipe
- 3 Pipe leaks
- 4 Internal heat exchanger blockage or leaks
- 5 Stove and reactor tube leaks



### Pipe leaks

Sudden changes of temperature and pressure can cause excess wear and cracks in the pipe, elbows, and flanges, which may not be visible to the unaided eye. Using a TiX5XX camera you can look for temperature variations along the run of pipe. Such temperature variations can help indicate a leak, so you can record radiometric video or set alarms to collect data over time or as temperatures change. Once you identify a problem area, you can use the 640 x 480 SuperResolution (on the TiX560 camera or in SmartView software for both models), image sharpening (TiX560 only), and filter mode features to see the leaks more clearly.

### Internal heat exchanger blockage or leaks

A blocked or leaking heat-exchanger tube will negatively affect heat-exchange efficiency resulting in loss of production and wasted energy. You should see a difference in temperature on either side of a blockage, or a non-standard temperature that could indicate a leak.

### Stove and reactor tube leaks

These tubes work under high-temperature, high-pressure, and strong-corrosive conditions which can cause hot spots, cracks, carburization, oxidation, and thinning. To stay on top of any damage, you can use the TiX560 to scan these tubes to find any anomalies that could indicate clogs or leaks.

### Additional tips for more effective infrared pipe inspections

To make infrared inspections most effective there are some basic practices to follow.

#### Insulated pipe

If the pipe has a thick heat-insulating layer it is difficult to detect temperature variations between sections of pipe and therefore hard to detect leaks. If the insulation can be removed safely that will ensure a more effective inspection.

#### High reflectivity casing

If parts of the pipe's external layer or insulation are shiny metal or stainless steel with low emissivity and inherently high reflectivity, it can interfere with getting accurate temperature measurements. If it is safe to do so in your environment, you can apply a high emissivity paint, tape, or stickers to help increase emissivity for more accurate temperature measurements.



## Fluke TiX560 and TiX520 infrared cameras provide the first line of defense

The new Fluke TiX560 and TiX520 Expert Series Infrared Cameras provide a unique set of capabilities to help you quickly identify potential issues and keep you up and running.

- 1 **Ergonomic 180° articulating lens** gives you maximum flexibility and makes it easy to navigate over, under, and around objects so you can see the image before you capture it. It allows you to verify that the image is in focus before you record it, unlike a pistol-grip camera that can be very difficult to focus when you're in an awkward position. This allows technicians to work in more ergonomically agreeable positions for all day use.
- 2 **The only 5.7 inch responsive touchscreen** in its class<sup>1</sup> delivers 150%<sup>2</sup> more viewing area to make it easy to see even subtle changes and details right on the camera. Quickly finger scroll through saved thumbnail images on the screen, zoom in and out, and access shortcuts to save time and increase productivity.
- 3 **Enhanced image quality** and temperature measurement accuracy allow you to increase 320 x 240 images to 640 x 480 in SuperResolution mode to find subtle anomalies faster.
- 4 **LaserSharp® Auto Focus** at the touch of a button takes the guesswork out of precision focus. The built-in laser distance meter calculates the distance to your designated target and then automatically focuses to produce the optimum image.
- 5 **Image Sharpening** reduces fixed pattern noise to create sharper images, particularly in high temperature environments. (On TiX560 only)
- 6 **Filter mode** achieves Noise Equivalent Temperature Difference (NETD) as low as 30 mK to detect very slight temperature differences.
- 7 **Hot and cold spot markers** highlight the hottest and coldest pixels on the image and displays their temperature values at the top of the screen for quick identification of anomalies.
- 8 **On-camera storage, editing, and analysis** allow you to store thousands of images in memory and bring them up in the field to edit, add digital images, text or voice annotations, and analyze right on the camera.
- 9 **Fluke Connect™** wireless compatibility enables you to see, save, and share live video, still images, and measurements with team members who have the Fluke Connect™ mobile app on their smart phones. Just push the shortcut button to connect.

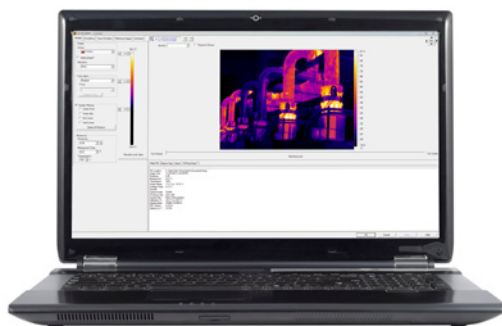
<sup>1</sup>Compared to industrial handheld infrared cameras with 320x240 detector resolution as of October 14, 2014.

<sup>2</sup>Compared to a 3.5 inch screen.



**See and share more results at one time with Fluke Connect™ wireless capabilities**

The Fluke TiX560 and TiX520 cameras are Fluke Connect-enabled so you can transmit images and measurements from the cameras to smart phones or tablets that have the Fluke Connect\* mobile app. In so doing you can share results with authorized team members and thus enhance collaboration and help resolve problems faster.



With SmartView® software, included with Fluke infrared cameras, you can run additional analyses and document findings in reports that include thermal and visible light images, and measurement data. You can adjust most parameters on the stored image, including emissivity, color palette, and level/span, just to name few.

Fluke Connect™ is not available in all countries.  
\*Within providers wireless service area.

**Work faster and easier**

Unexplained hot spots could mean trouble for your operation. A high resolution infrared camera is the fastest way to get a clear, accurate view of those problems. Fluke TiX560 and TiX520 Expert Series cameras deliver the image resolution, thermal sensitivity and accuracy and ergonomic design to help you find those hot spots before they cause major damage.

To find out more, consult your Fluke sales representative or visit [www.fluke.com/infraredcameras](http://www.fluke.com/infraredcameras) for more information.

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