INFRARED SUCCESS STORIES

About FLIR Systems

With over 30 years experience and more than 30,000 of its IR cameras in use, FLIR is the undisputed global leader in infrared systems. From industrial to military applications, thermography professionals have made FLIR their number one choice. No other company offers such a wide range of infrared cameras, software, service, training and support.

FLIR's ThermaCAM series of thermal imaging cameras have long set the standard for thermographic testing and analysis. Today they are the most widely used non-contact temperature measurement infrared cameras in the world.

FLIR SYSTEMS™

The Global Leader in Infrared Cameras

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Americas Thermography Center
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North Billerica, MA 01862

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www.flirthermography.com

NIR ISO9001 REGISTERED COMPANY — ANSI-RAB QMS ACCREDITED

IR Averts Catastrophic Roll Cover Failure*

"The money meter starts ticking when you're not making paper," says the predictive maintenance specialist at a bleached pulp and liner board plant in the South. "Any failure will hurt immediately in the paper mill, where there's minimal equipment redundancy."

IR inspections of process equipment are performed immediately before and during the plant's monthly planned 8-hour "field day" shutdowns, and a complete electrical survey is performed every 60 days. More frequent inspections are performed on critical components such as dryer valves and roll covers.

Roll covers were added to the frequent inspection target list after the FLIR camera found a hot spot indicating delamination on a roll cover due to adhesive failure. "We could have had what the insurance people call a 'catastrophic failure' costing $40,000 for the cover, twice that if it had taken off its matching partner, not to mention the safety hazard," said the specialist.

Hundreds of Hours of Downtime Averted*

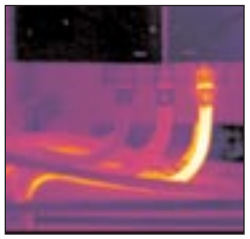
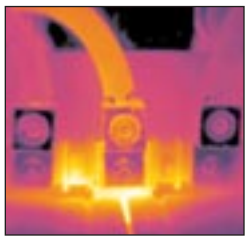
"Our infrared program has paid for itself many times over," says the PPM superintendent at a Southern newsprint plant. "We've had no electrical failures since we started our IR program at the plant." He says hundreds of hours of downtime — assessed at $60 per minute — have been averted by potential problems caught by his FLIR camera. Examples:

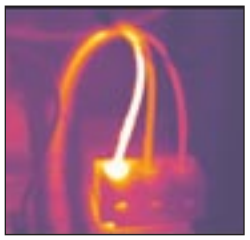
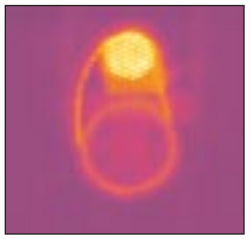
- Detecting a loose connection on 4160V switchgear avoided at least two hours downtime.
- Finding a cold solder joint on a field supply board causing eliminated repeated trips of a DC drive on one of the plant's paper machines.
- Identifying a loose disc in an automatic steam valve line feeding a white water silo cured the low silo tem perature problem and saved having to purchase and install a new valve.

Infrared Helps Increase Operating Efficiency*

"Productivity falls into the ditch when you have blowouts or sheet flutter," says the technical process supervisor at a West Coast tissue and specialty paper plant. "You can try and salvage as much product as you can in a repulper, but …the cost of reproducing it is higher because the weakened fibers have to be metered into the process at a slower rate."

He regularly monitors lime kilns with an IR camera for refractory damage and accumulation of lime. Refractory breakdown is repaired immediately, since it could cause distortion of the shell. "It may cost a few thousand dollars to repair the kiln," says the supervisor, "but you're talking millions of dollars to replace it!"

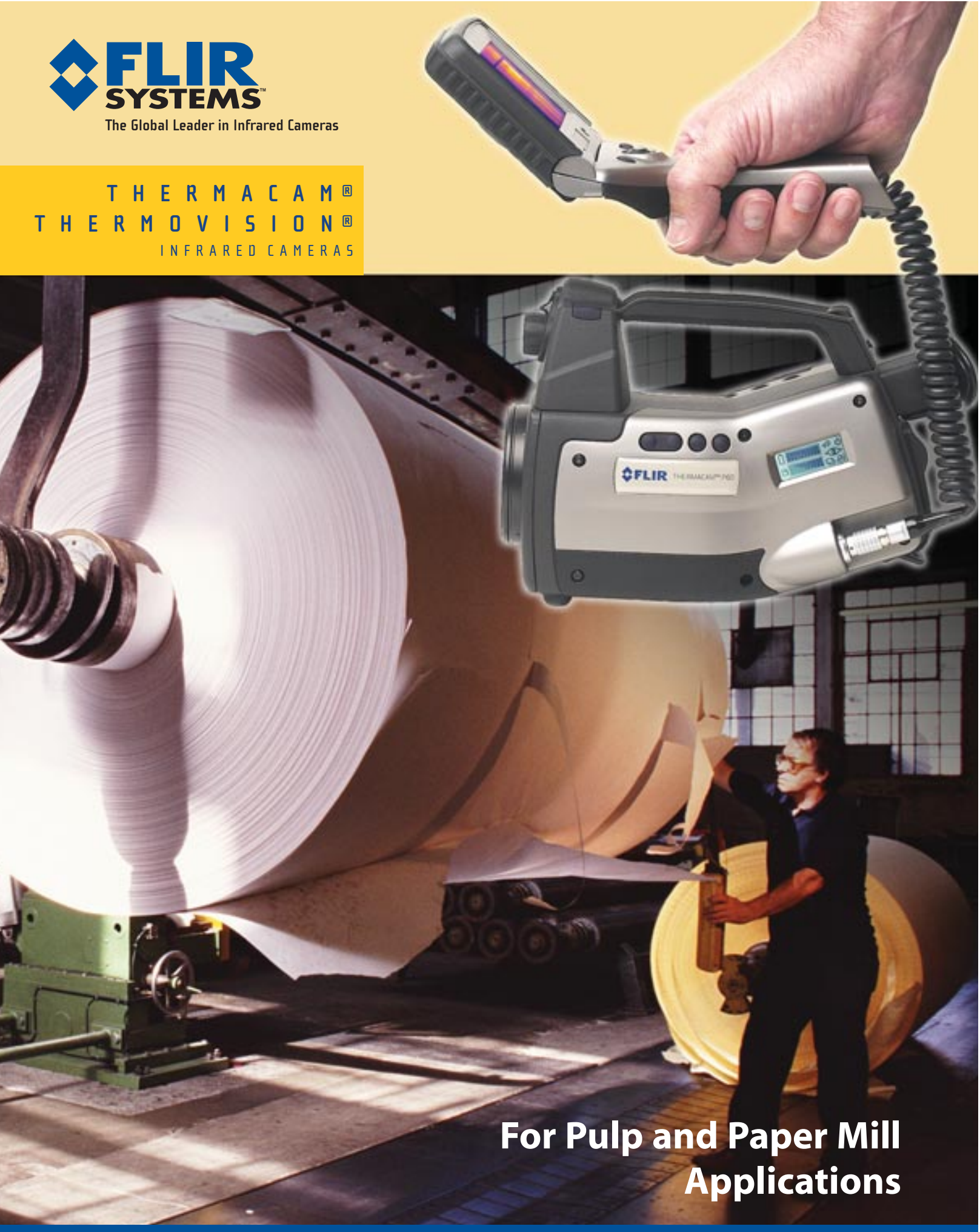




* Infrared thermography has so significantly improved worker safety and competitive advantages for companies in the pulp and paper industry that to preclude our compromising their competitive advantages we cannot identify specific sources by name.

FLIR SYSTEMS™

The Global Leader in Infrared Cameras

THERMACAM®
THERMOVISION®
INFRARED CAMERAS



For Pulp and Paper Mill Applications

SEE IT | MEASURE IT | IMPROVE IT

See what you've been missing.

The paper market is becoming increasingly competitive, with customers demanding higher and higher quality specifications. The unique effectiveness of infrared inspection for predictive maintenance and process monitoring tasks in paper mills has become a central factor in assuring uptime, maintaining productivity and product quality — and preserving profits.

Predictive and Preventive Maintenance (PPM)

Infrared (IR) inspection is a well-accepted method for checking electrical systems for short circuits, failing and defective components, and poor connections. Infrared cameras such as the ThermaCAM P-Series and E-Series are used by maintenance engineers to check boilers and other vessels for liquid levels, heat loss and leakage, kiln walls for refractory breakdown, and steam traps and process lines for blockage. Infrared inspection is also effective for quickly checking product levels in lime silos and in suppliers' railroad cars, detecting material buildup in lime kilns, determining the sludge level in storage tanks, and detecting problems in wet end vacuum pumps used for dewatering pulp. In addition, operations professionals use infrared cameras to scan building roofs and walls for moisture or structural problems and energy loss.

Process Monitoring

Infrared monitoring plays a vital role in maintaining paper quality and uniformity throughout the preproduction, forming, pressing, and drying stages of the papermaking process.

IR cameras such as the ThermoVision A-Series can provide real-time infrared video imaging of temperature variations in the wet paper roll, which indicate variations in moisture distribution, which in turn affect paper strength, printability, and convertibility. Infrared imaging can also detect barring in the sheet due to size press or press roll wear, wet streaks in the sheet caused by plugged areas in vacuum rolls or vacuum boxes, problems with steam box actuators, condensate flooding, scale and corrosion on dryer cans and dryer can imbalance, plugged, wrinkled, perforated or burned areas in press felts, roll cover delaminations, and dryer spoiler bar location.

IR cameras also enhance safety by detecting fire hazards such as hot spots in chip piles and in electrical equipment and wiring, detecting potential kiln ruptures, and imaging debarking baths for logjams.

Software

ThermaCAM Reporter™ software generates professional reports from your field information quickly and easily. When you can't fit an expansive subject into one image, FLIR Image Builder software automatically "stitches" individual thermographs of adjacent views into one fully thermal collage.

REGULAR INFRARED INSPECTIONS CAN:

- Minimize unscheduled shutdowns
- Shorten planned shutdowns
- Enhance plant safety
- Maximize equipment performance
- Maximize equipment life
- Optimize product quality
- Increase production efficiency
- Reveal problems in plant buildings

TYPICAL PPM TARGETS IN THE PAPER MILL

ELECTRICAL

- bus bars
- cabinets
- cable trays
- circuit breakers
- disconnects
- distribution panels
- fuses
- insulators
- lighting
- line splices
- motor control centers
- motor windings
- panels
- PLCs
- starters
- substations
- switchgear
- transformers
- wiring

MECHANICAL

- bearings
- boilers
- conveyors
- debarking baths
- drive couplings
- fans
- gearboxes
- heaters
- insulation
- jackshafts
- kilns
- motor bearings
- nozzles
- pumps
- roofing
- rollers
- steam traps
- tanks
- transmissions

AN INFRARED CAMERA TO FIT EVERY JOB

All FLIR cameras are rugged and field-proven, shock resistant and environmentally sealed for survival in the paper mill. All models accept interchangeable lenses to accommodate targets at varying distances. FLIR's exclusive Ambient Temperature Compensation (ATC) system assures accurate temperature measurement regardless of environmental conditions. Ergonomic design and user friendly controls make operation intuitive, and a wide range of accessories is available to enhance productivity and convenience.

The **ThermaCAM P60** is a powerful inspection system that provides high-resolution imaging, accurate temperature measurement, on-board storage of written and spoken commentary, a built-in digital visual camera, and a convenient, removable LCD and control handle.

The **ThermaCAM E4** weighs only 1.5 pounds with recharge-able Li-ion battery, yet boasts advanced features including radiometric jpeg image format, a convenient audible temperature alarm, and real-time video output.

The affordable **ThermoVision A20** and **A40** are the world's smartest infrared cameras. They feature revolutionary control capabilities that include autonomous reaction to programmable thermal parameters and remote access via Ethernet or FireWire.

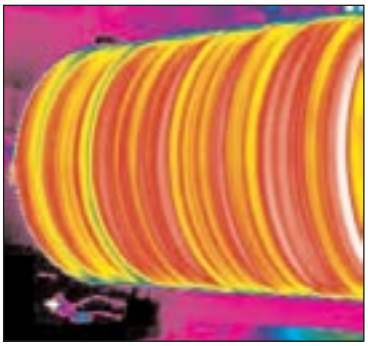
Paper Mill Applications

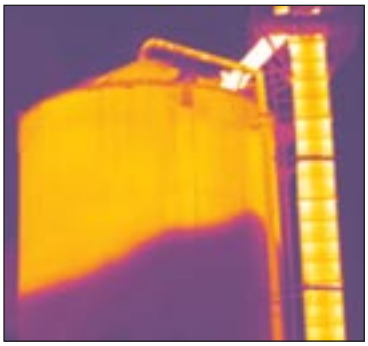
"The use of infrared in a paper mill is only limited by how much you can envision where it can be used."
—Technical Process Supervisor, tissue and specialty paper plant

ThermaCAM and ThermoVision infrared cameras are used in all parts of pulp and paper mills across the U.S. to increase productivity and product quality. Here are a few examples:

Paper rolls

The thermal image shows lines of moisture, a critical paper quality factor, on a paper spooling roll. The two green bands indicate too much moisture in that area.



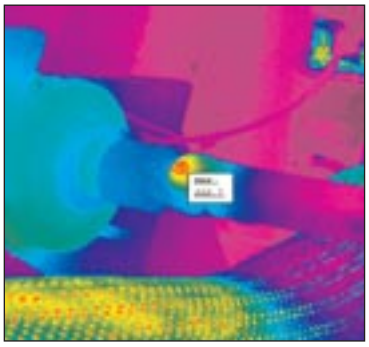


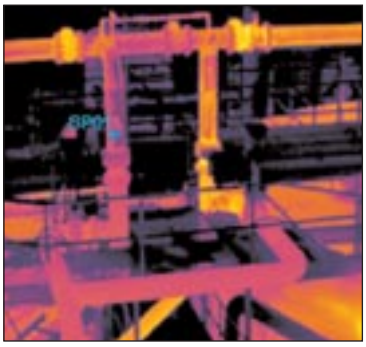
Lime kiln

This thermal image clearly shows the material level in a lime kiln. IR can also check material level in suppliers' railcars.

Motor couplings

Infrared inspection of this jackshaft coupling finds a hot spot, missed by vibration analysis.



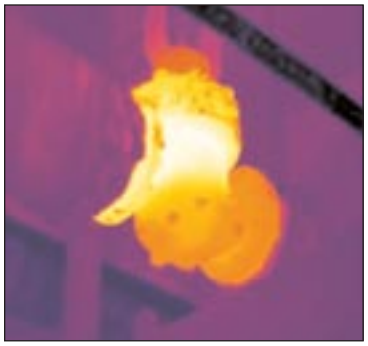


Process lines

The cool (measured at SP01), plugged line in a green liquor system is clearly imaged.

Steam lines

The thermal image of an automatic valve in a steam line shows that steam was not flowing through it. The valve disc had come loose from the shaft.

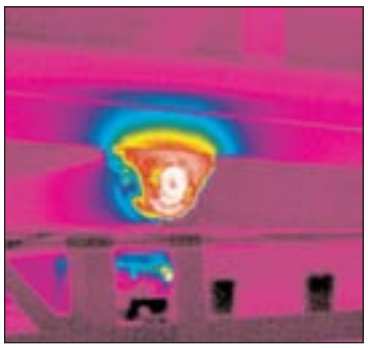


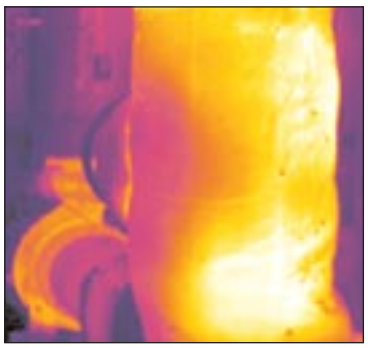
Dryers

This water-logged dryer was operating at only 169°F.

Belt conveyors

IR image clearly shows overheating belt convey or bearing.





Roller blankets

This thermal image shows blanket saturation due to steam tracing.