

Infrared Moisture Detection

**What it can do for you...
what it can't...
and why**



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1. Infrared camera basics
2. Examples
3. Summary - The 4 most important facts about infrared moisture detection



Infrared Cameras



■ Operating principles

- Detect electromagnetic energy in the “thermal infrared” range - 7 to 14 micron wavelengths
- “Receive-only” operation - no energy emitted from the camera
- 19,000 to 76,000 sensors collect and measure infrared energy, forming an image
- Image shows the surface temperature differences in 256 levels of gray scale, or false color



Examples

- 1. Interior water damage - gypsum wall board**
- 2. Interior water damage - gym floor**
- 3. Exterior water intrusion - EIFS building**



Flood damage - Gypsum wall board

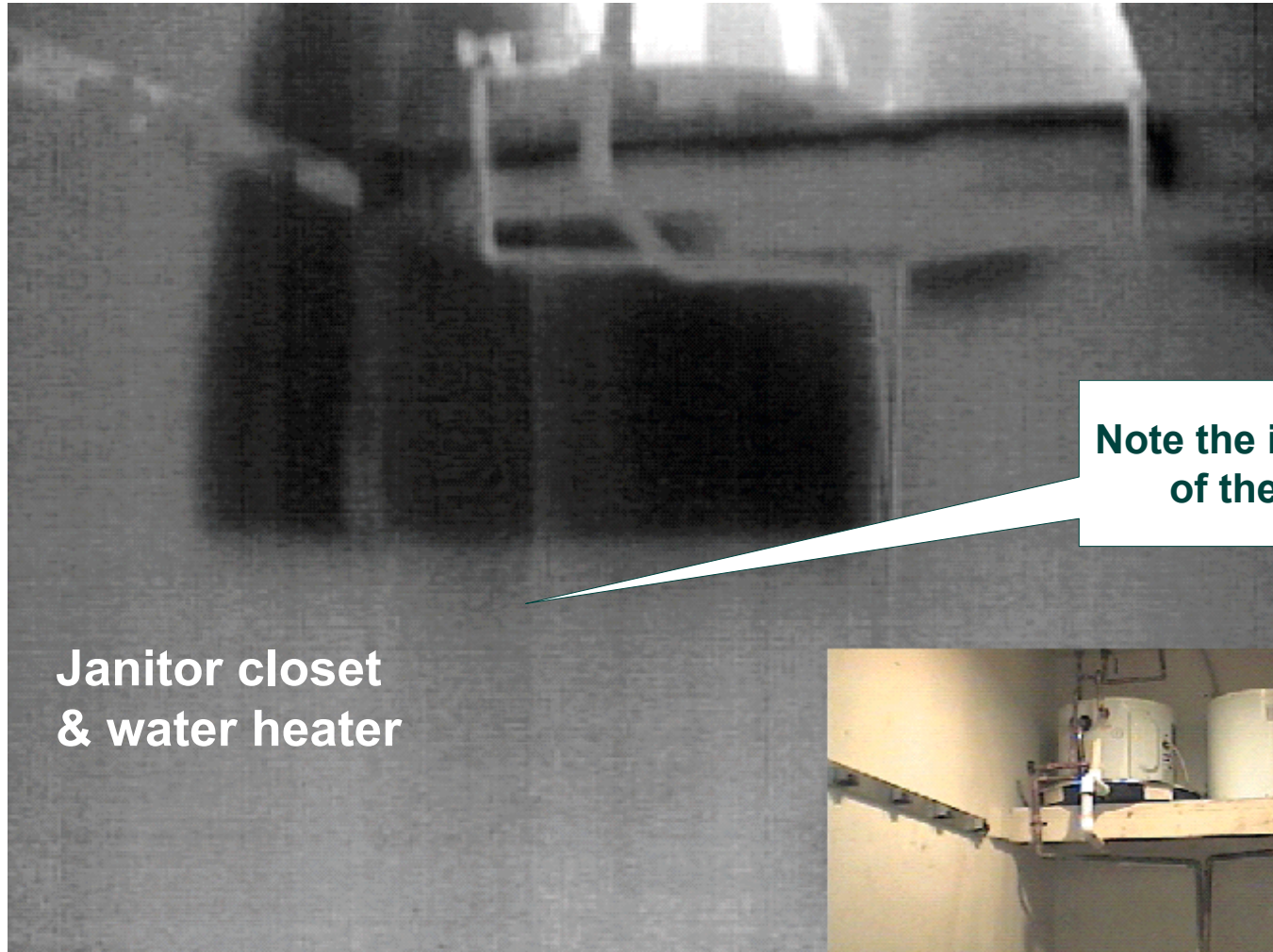


- Office condo in New Jersey
- Corroded connection to 5 gal hot water heater, flooded the floor over a weekend



Extract from video report

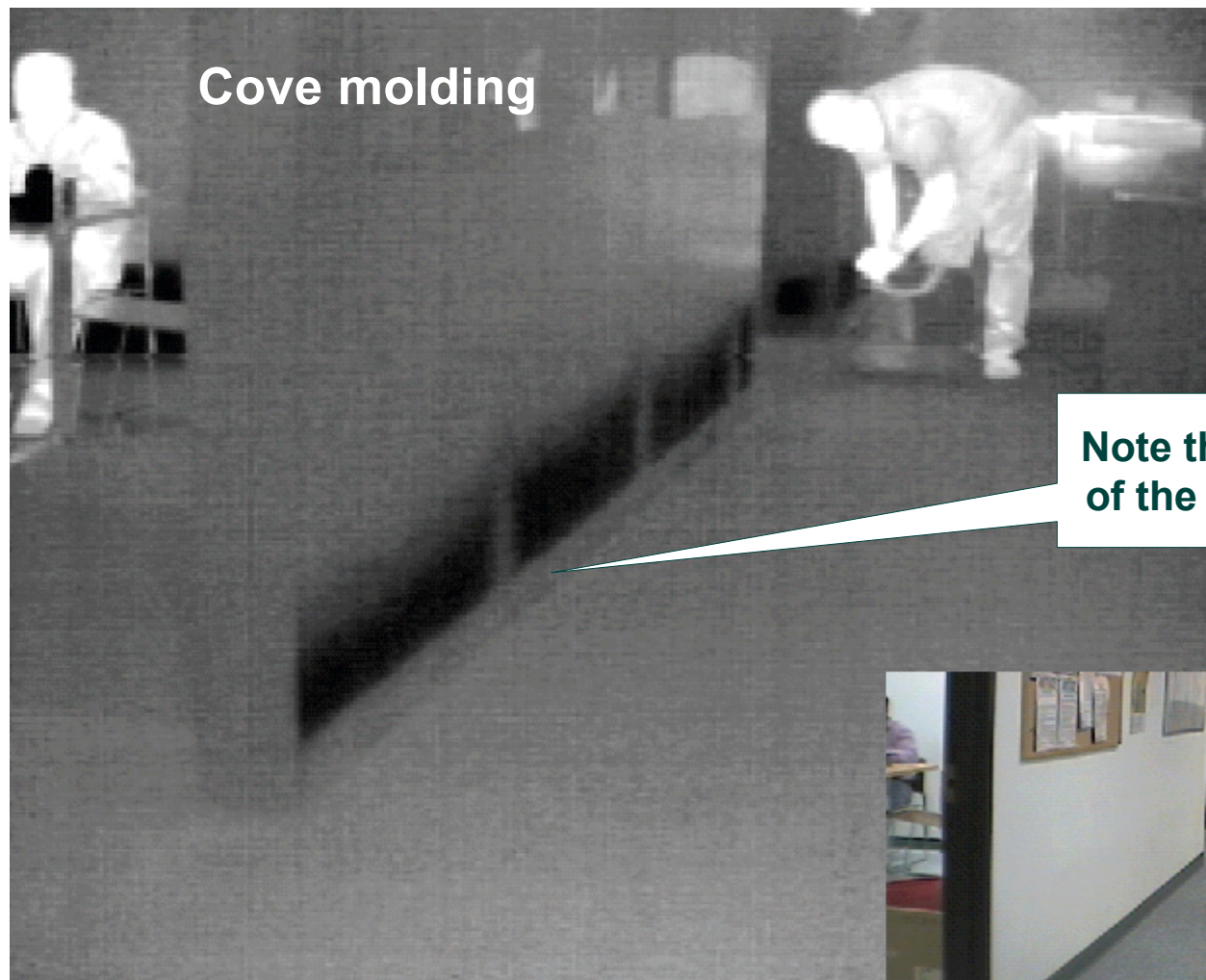




**Janitor closet
& water heater**

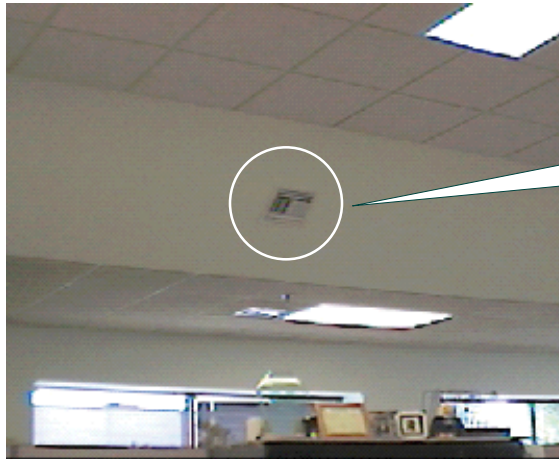
**Note the insulating effect
of the ceramic tile**





**Note the insulating effect
of the vinyl base molding**





The visual camera shows the diffuser that's cooling the ceiling.



Observations on the gypsum wallboard project

- **Very simple situation. Using IR, moisture is obvious**
 - Known, interior water source and location
 - Single-story is affected, interior issues only
 - Simple wall construction - Single layer is wet, and it's exposed to view
 - No vinyl wall covering to inhibit evaporation & thermal pattern

- **Note the effect of vinyl cove molding and tile in janitor closet**
 - Insulates the surface from evaporative cooling of drying wall board



Gymnasium floor moisture mapping



Observations on gym floor moisture mapping

- **For the floor, the camera is useless**
 - Reflections generate strong (and false) patterns
 - Thick wood flooring insulates surface from evap cooling underneath

- **For the wall, camera is quite helpful**
 - Non-insulated block responds **VERY** differently in wet areas



Exterior EIFS

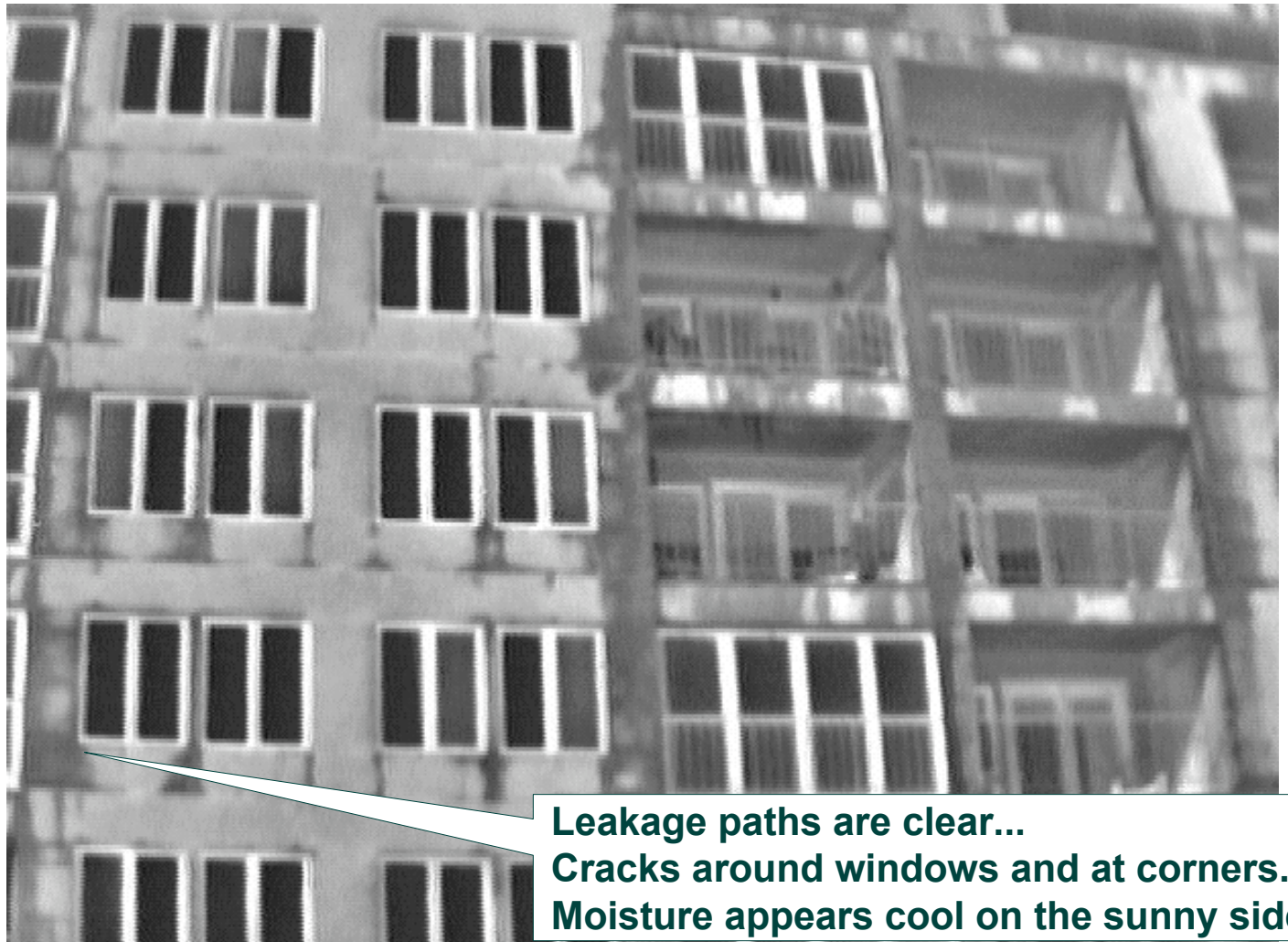
- 5-story condominium building - On the beach, in Maine
- Identify moist insulation and locate moisture intrusion path



East side, facing the ocean and the rising sun on a very cold winter day



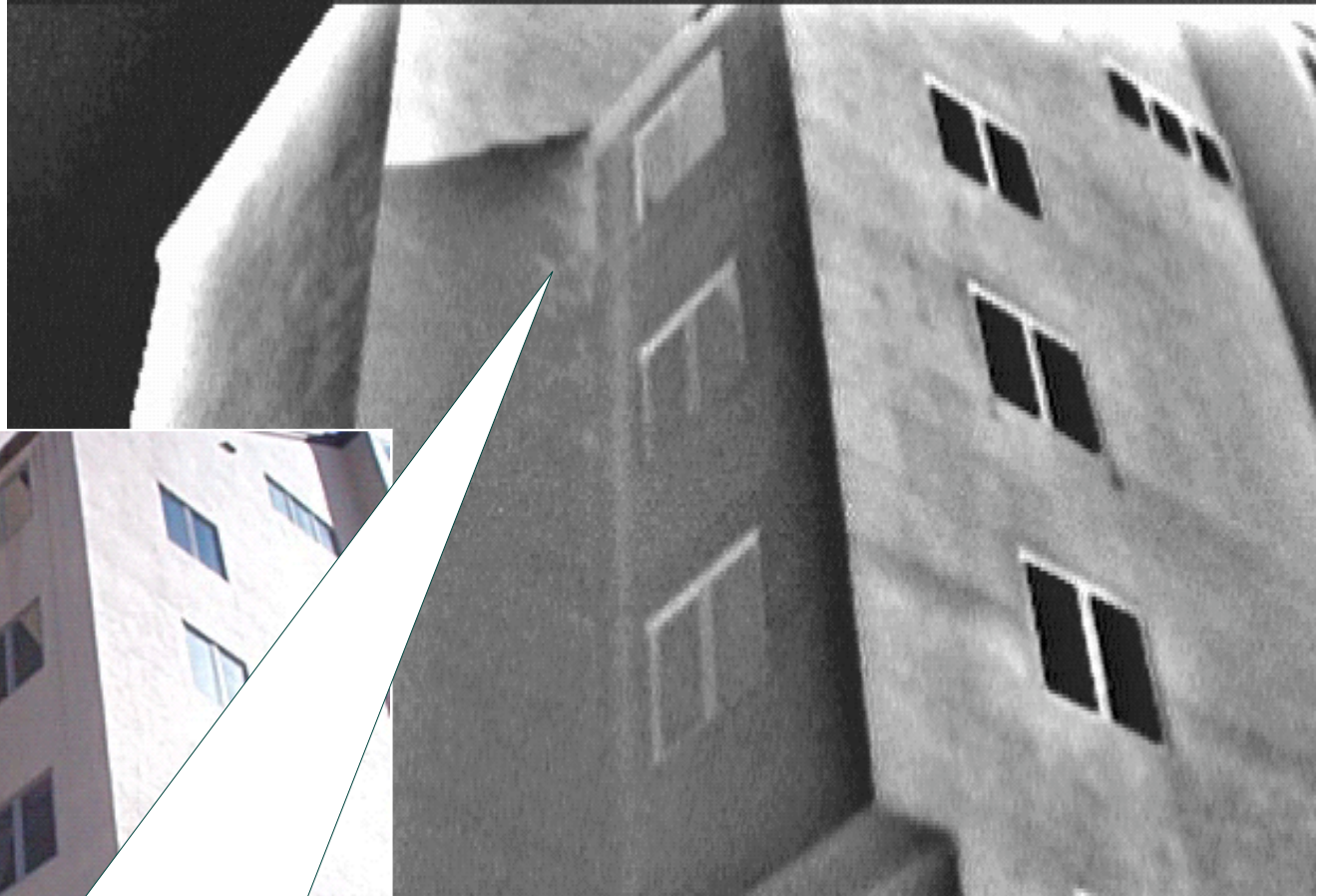
Exterior EIFS - Fast-changing temperatures with large ΔT make surface patterns obvious



Leakage paths are clear...
Cracks around windows and at corners.
Moisture appears cool on the sunny side



Exterior EIFS - Moisture appearance may change with sun and shade

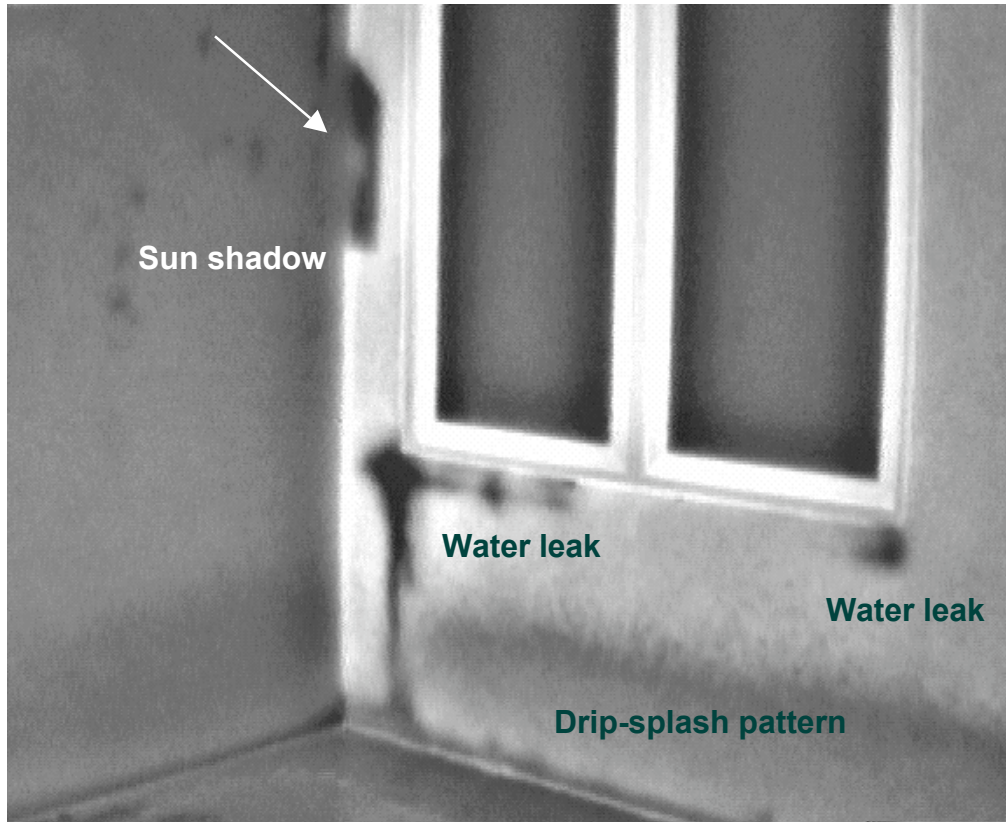


**On the shady side of the building
on this cold day, moisture appears warmer.**





Exterior EIFS - The visual image helps interpret the infrared image





Exterior EIFS - Thermal patterns do not always penetrate all layers of the exterior wall



Moisture apparent from the outside does not always create a thermal pattern indoors, and vice-versa



Observations about exterior moisture

- On the exterior of buildings, the direction of heat flow becomes especially important information.
- Need to keep track of air temperatures on both sides of the wall or roof, where the sun is, and if there are any clouds.
- Outdoor investigations tend to be **MUCH** more complex
 - More sources of heating and cooling effects
 - Many layers in the wall or roof
 - Time of day becomes very important to success



The 4 most important facts about IR moisture detection

1. Infrared cameras only show surface temperature patterns
 1. They CANNOT see inside walls
 2. Not all temperature patterns are moisture patterns – **meters remain mandatory**
2. Helps you see “The Big Picture” of the situation
 - Faster, more accurate initial damage assessment
 - Faster remediation through accurate daily re-assessment
3. Interior water damage is much simpler than exterior or forensic investigation
 - Water source is known
 - Moisture nearly always appears cooler
 - Very little weather or solar influence
4. Meaningful written reports take longer than the inspection
 - Locations and thermal circumstances must be explained for each photo



Additional Information



1. Water damage assessment

Cleaning & Restoration Magazine, Nov 2003

2. Forensic investigation

HPAC Engineering Magazine, Dec 2004

3. Download above articles, plus FAQ for IR cameras:

www.moistureDM.com



Infrared Moisture Detection
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