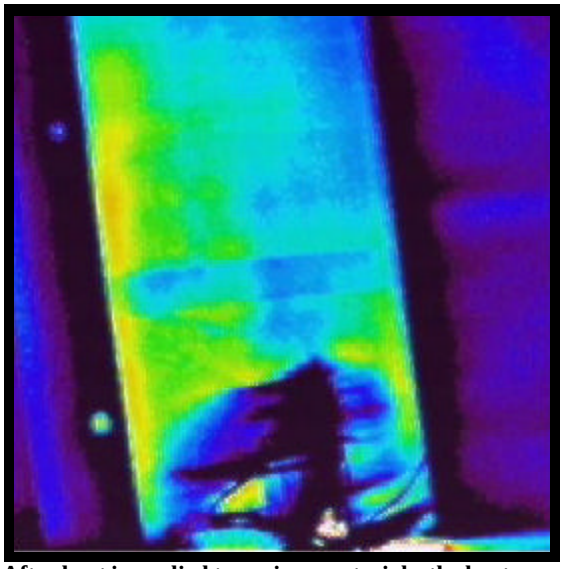
Structural damages are difficult to discover with traditional inspection and survey procedures. Different objects give off varying amounts of infrared radiation, depending on the temperature of the object. Infrared images discover the “hidden” defects.

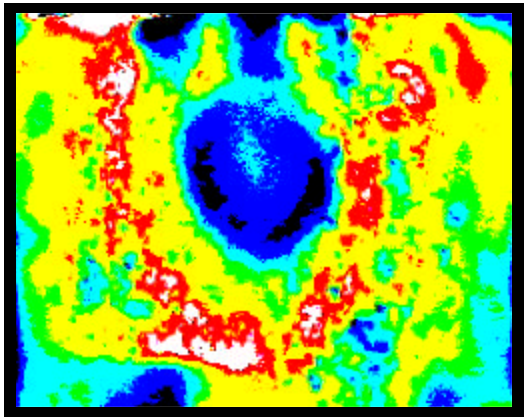
Carbon fiber mast break

While there are traditional means for discovering hidden or undiscovered damages, Infrared Thermographic Imaging is by far the most comprehensive, State-of-the-Art nondestructive application of technology available. Infrared Imaging assures all parties involved that every effort has been made to identify hidden damage so that informed knowledgable decisions may be made to return the vessel to its pre-loss condition.



After heat is applied to various materials, the heat differential is read by the FLIR P20 Infrared Radiometric camera, which is then displayed or captured in memory for later viewing. (Carbon fiber mast break)

Thermographic Infrared Imaging



FRP/balsa core impact damage & water entrapment

Nondestructive Inspection
for the Marine Industry

Todd & Associates, Inc.
2390 Shelter Island Drive #220
San Diego, California 92106
(619) 226-1895 or (800) 325-8061
Fax: (619) 223-8942

***How** Does Infrared Imaging Work?*

A FLIR P20 Thermocam Imaging Camera reads heat differentials at a .02°F sensitivity and the camera displays the transfer of infrared radiation. As materials differentiate in their thermal mass and heat sinking effects, thermal imaging is a non-contact, line-of-sight measurement technology and can measure surface temperatures of virtually any surface, that is then displayed as a video image.

***What** Equipment Is Used?*

Thermal imagers are instruments that create pictures of heat rather than light. Images may be digitized, stored, manipulated, processed and printed out. Our FLIR P20 Thermocam Infrared Thermographic Camera is a State-of-the-Art color imaging, radiometri thermal camera.

***When** Is Infrared Imaging Useful?*

Structural laminates, electrical, or mechanical inspections where hidden damages may exist and may be viewed due to their heat generation and in some inspections an outside heat source is applied.

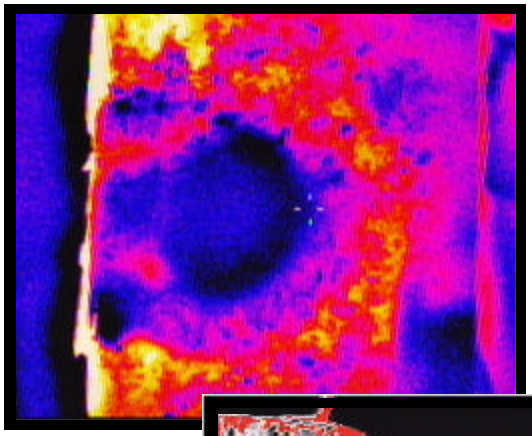
***Where** Can Infrared Imaging Be Conducted?*

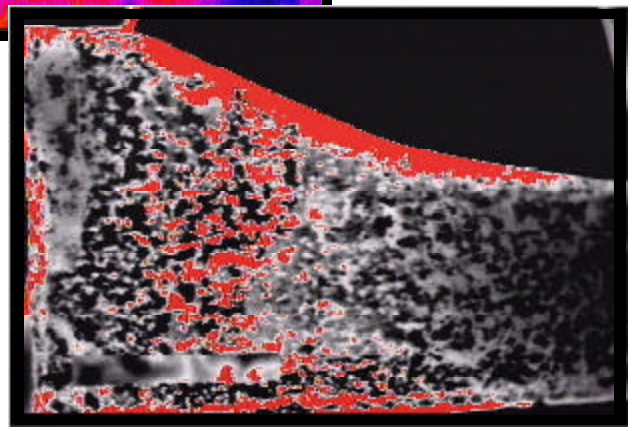
Infrared Imaging may be conducted outdoors or in virtually any space when heat source is present. Images show the variation of temperatures as infrared radiation travels through the surface, revealing anomalies and features, which are displayed as a video image.

***Why** Infrared Imaging is preferrable to other discovery methods?*

There are no destructive removals or testing required and a minimal amount of time is invested for the imaging.

Our goal is to assist in the discovery of hidden damages without resorting to destructive testing, and Infrared Thermographic Imaging helps make that possible.





Corrosion inside an aluminum fuel tank

***Infrared** Imaging in Damage Surveys!*

Infrared Imaging may be used as a tool following traditional procedures to inspect and discover hidden or concealed damages caused by:

- **Grounding a vessel may cause damages that are difficult to discover with standard boat yard discovery and survey techniques.**
- **Vessel collision damage may leave doubts in the owner's mind as to the reliability and thoroughness of vessel repairs or inspections.**
- **Mast or lightening damage.**

***Infrared** Imaging In Condition/ Valuation Surveys!*

Condition/Valuation Surveys are used for pre-purchase, pre-insurance inspections, and for general condition. Infrared Imaging may also be used for exhaust, machinery, and electrical system surveys and inspections.

Marine related damages such as the following have been observed:

- FRP/cored hull delamination/fractures/disbonding, water entrapment
- Kevlar, Airex, balsa core damage, carbon fiber and other laminate materials
- Electrical wiring, circuit breaker, and electrical system inspection
- Mechanical engine inspections

If there is heat generated, the camera sees it.