

Non Destructive Testing

**The Ambersil
Flaw Detector
System**

Flaw Detectors

Many constructions have to be approved for:

- Fit
- Quality (strength) of weld seams
- Material fatigue
- Surface condition

*without damaging the construction

Flaw Detectors

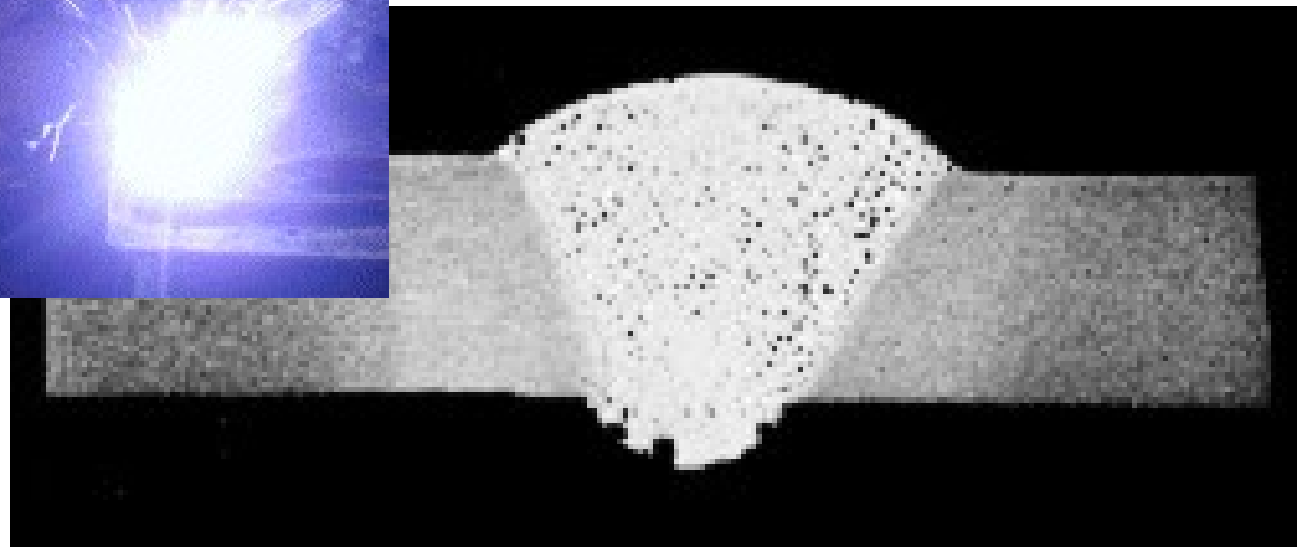
Potential problems

- Miniscule cracks in the material
- Cavities in weld seams
- Encapsulated slacks (inclusions)
- Porosity of the material

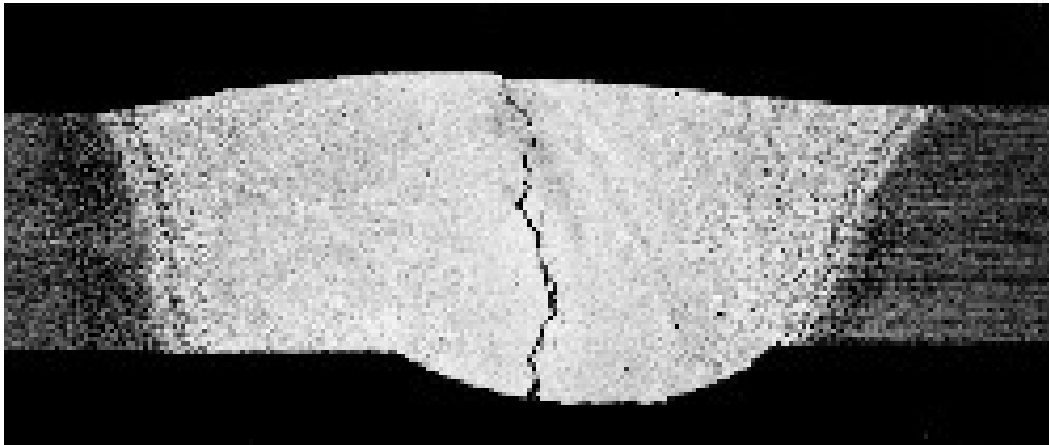
Examples of defects



Porosity of aluminum
weld seams (TIG) due
to hydrogen absorption

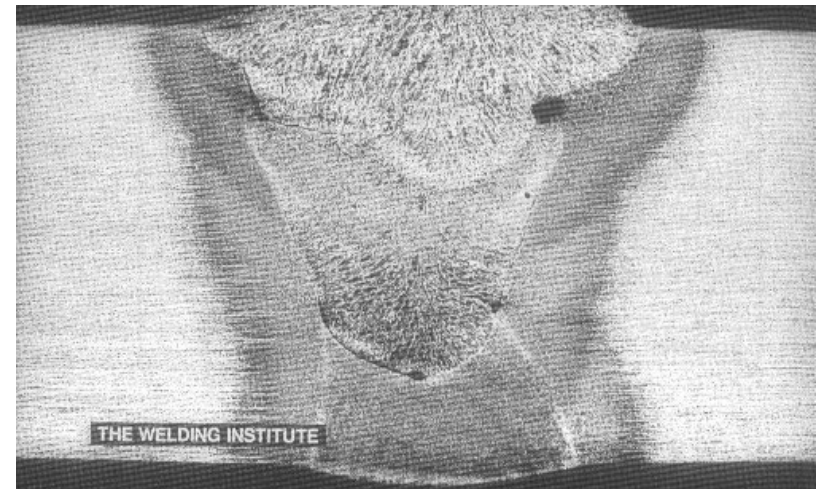


Examples of defects

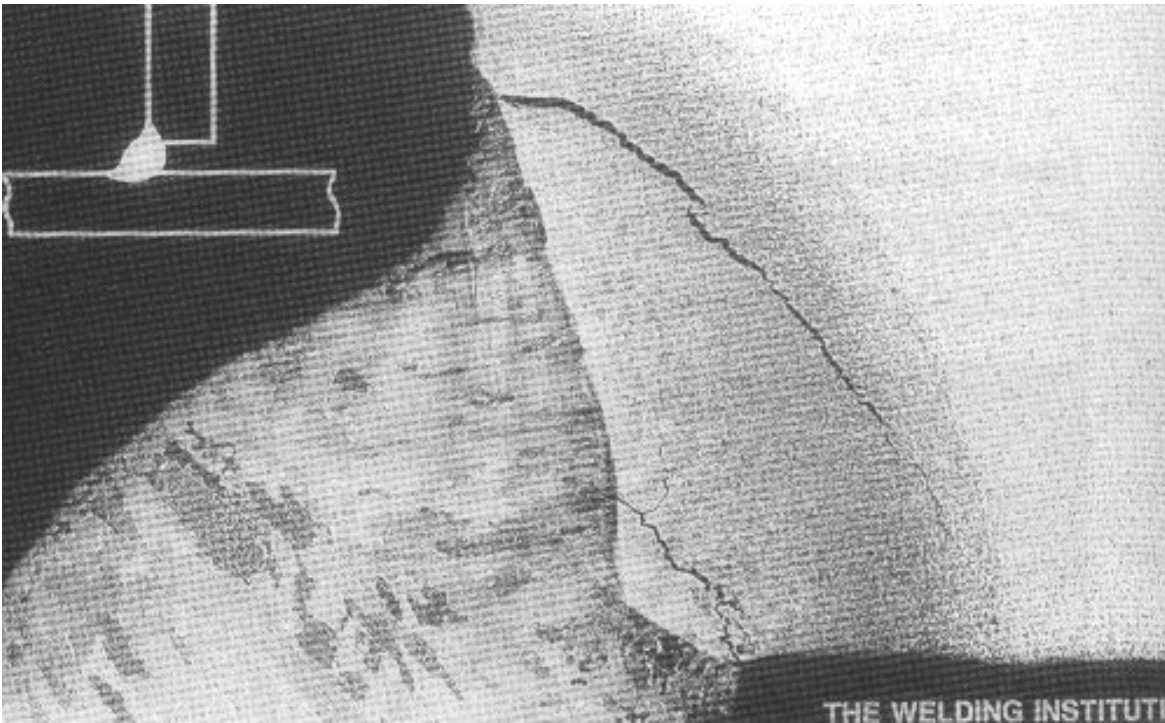


Solidification cracks generated by the high thermal expansion and substantial contraction during solidification

Slack encapsulation with cavity during welding with electrode



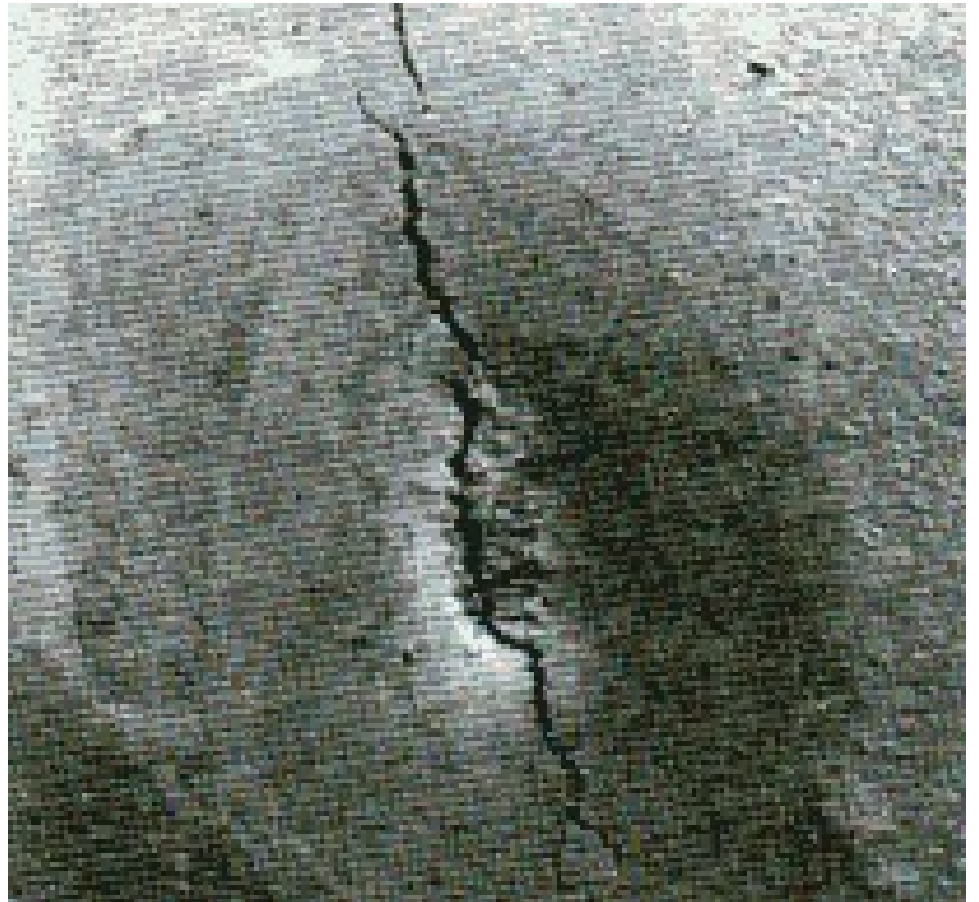
Examples of defects



Stress cracking at a corner, welded with protected electrode

Examples of defects

Cracks at the end of a weld
seam



Flaw Detectors

In all cases we have to deal with tiny **openings in the surface** of the material.

How to detect these tiny openings?

Flaw Detectors

Non-destructive testing methods:

- Visual Surface inspection method
- Penetrant Surface inspection method
- Eddy Current Surface inspection method
- Magnetic particle Surface & subsurface inspection method
- Radiography Volumetric inspection method
- Ultrasonic Volumetric inspection method

Flaw Detectors

Evaluation of testing methods

	Visual	Penetrant	Eddy Current	Magnetic	Radiography	Ultrasonic
Easy to use	yes	yes	no	no	no	No
Time consuming	No	No	Yes	Yes	Yes	Yes
Required education level	Low	Low	High	High	High	High
Adequate performance	No	Yes	Yes	Yes	Yes	Yes
Cost	Low	Low	High	High	High	high

Flaw Detectors

Dye Penetrant: an effective & efficient solution !

Compared to other surface inspection methods,

Red Dye Pen-NDT system scores best on:

- Performance / cost – ratio
- Simplicity of the system
- Time consumption
- Required education level

Flaw Detectors

Standards for NDT with Dye Penetrants:

Local standards in use:

NFA 09-521, NFA 09-120, NFA 09-520, ASTM E 1417,...

For the Flaw Detector System, we have chosen:

ONE EUROPEAN STANDARD

EN ISO 3452-2:2000

Flaw Detectors

This system allows detection of openings from 30 μm , by using:

- A cleaner
- A penetrating, tracing liquid
- A developer to contrast the traces

Flaw Detectors

Flaw Detector Cleaner

Quick drying, solvent based Cleaner/Degreaser

- Cleans & degreases
- Fast evaporation
- Leaves no residue
- Non-staining, non-corrosive

Flaw Detectors

Flaw Detector Penetrant

Non drying, highly visible, tracing liquid

- Extreme penetrating capability
- Industry standard red dye
- Washable with either solvent or water

Flaw Detectors

Flaw Detector Developer

Dry White Powder, contrasting the smallest trace of Penetrant

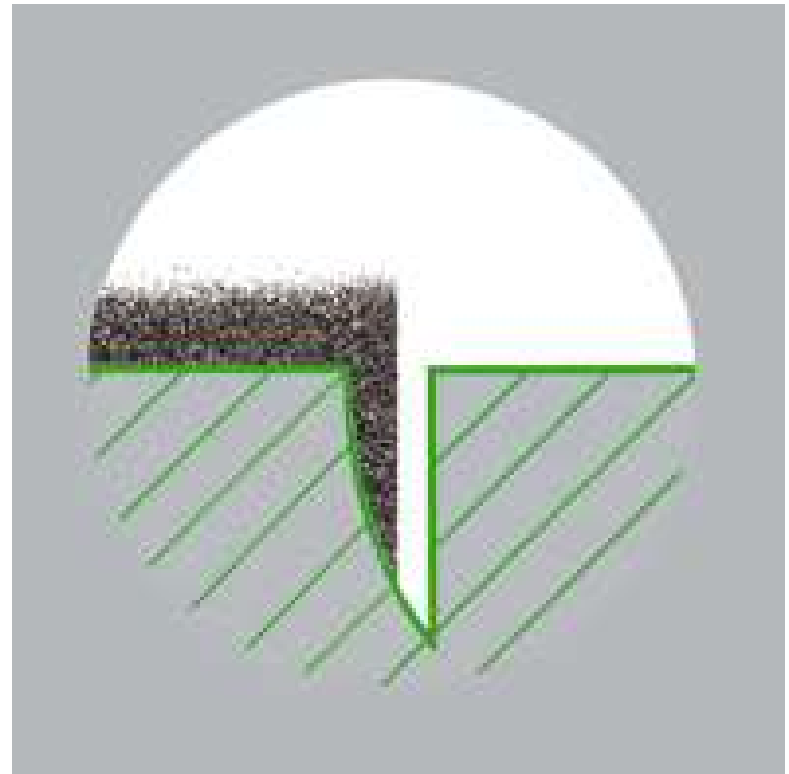
- Extremely fast drying
- High opacity
- Non-staining, non-corrosive

Using Ambersil Flaw Detectors

Step 1: Cleaning

Defects can often be masked by contamination.

- Apply cleaner generously
- Allow run off
- Leave to dry

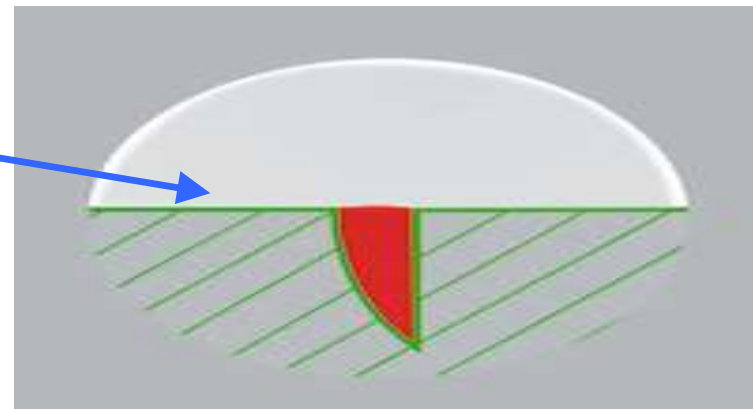
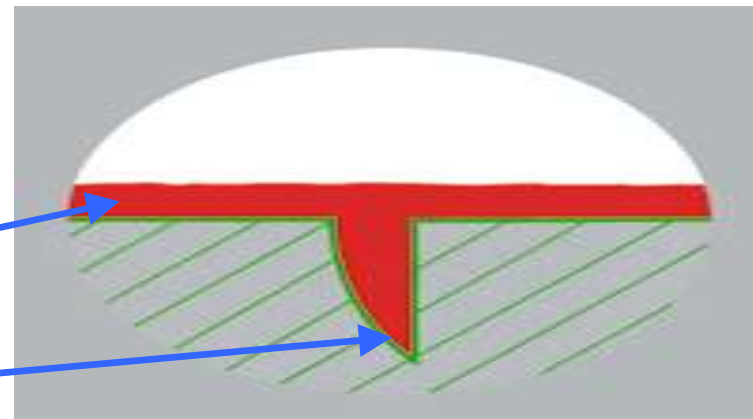


Using Ambersil Flaw Detectors

Step 2: marking the defects

Apply Penetrant.

- Spray a thin, even film
- Leave to penetrate for 10-20 minutes
- Wipe off excess Penetrant

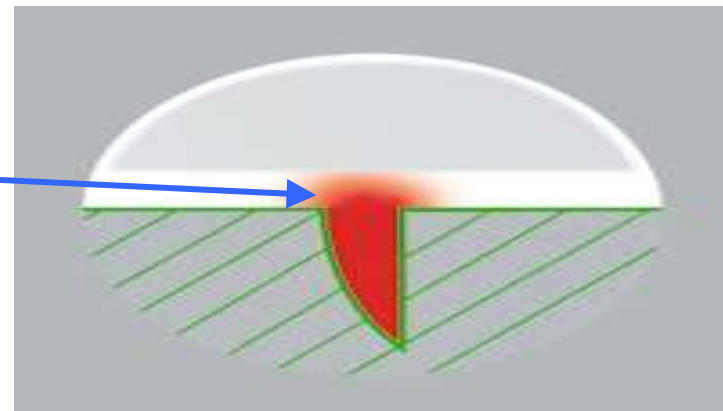
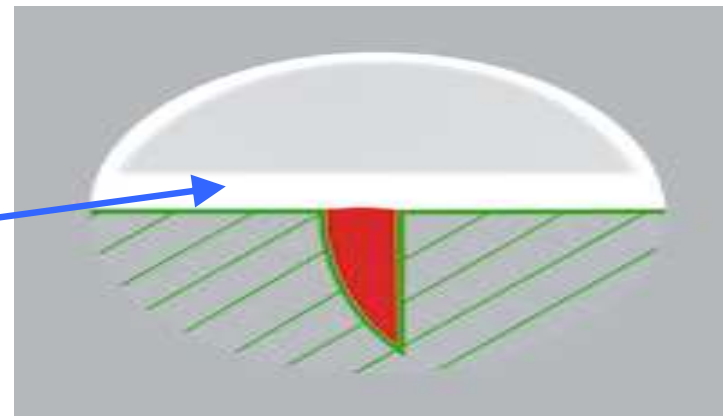


Using Ambersil Flaw Detectors

Step 3: Developer

If cracks are as fine as $30\mu\text{m}$, the penetrant in them will not be visible to the naked eye

- Apply an even coat of developer
- Allow to develop for at least 7 minutes
- Evaluate the defects
- Clean and protect



Applications



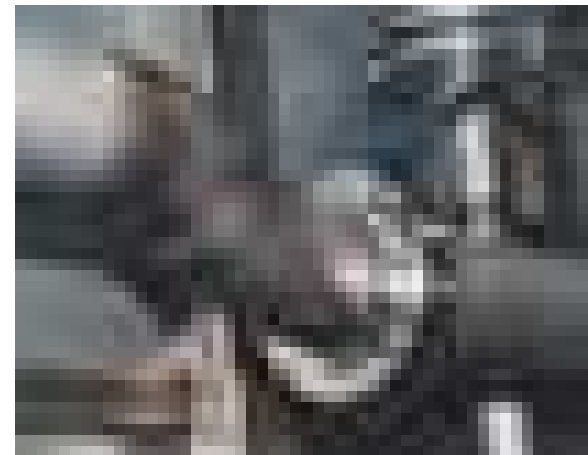
Possible construction faults on new or existing installations



Applications



Control the quality of weld seams on pipelines and pressure vessels



Ambersil Flaw Detectors

The non-destructive testing method to find:

- Cracks, lack of fusion and open to surface cavities in **welded parts**
- Open to surface cracks and cavities caused by metal fatigue and cutting operations
- Porosity or potential leaks in **pipes, tanks, boilers, heat exchangers**
- Discontinuities, laps, folds and open to surface defects in **castings, forgings and ceramics**

Flaw Detectors

Benefits

- Easy to use system
- Fast application & examination
- Detects cracks as small as 30 μ m