

## **Fault Indication Film Used In Magnetic Nondestructive Testing**

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### **Abstract:**

Up till now, magnetic powder and magnetic particle are commonly used in the magnetic detection. In American patents ( 3243876、 3786346 ) a technique was introduced that is adding up magnetic powder into the magnetic rubber. While taking sulphuration measure needs long time, with high cost, and just for once consumption. There is another way of magnetic dope indication method, due to complex handled, not extensively used. The innovative defect indication film is a new equipment of magnetic defect indication, in order to replace the current magnetic powder and magnetic-particle liquid. According to the research Defect indication film higher sensitivity than the powder, nearly same with magnetic-particle liquid, and the magnetic liquid “A” testing block can indicate clearly. The innovative defect indication film has the very higher sensitivity which can achieve the wonderful test on magnetic detection. The function of the film can replace the current magnetic powder and magnetic-particle liquid. So the defect detection test worker will have a very cleaning detective environment by this kind of indication film. We hope the perfect innovative defect indication film will take the defect detection test into the more wider testing area.

**Keywords:** defect indication film; magnetic detection

### **1. Summarization**

Up till now, magnetic powder and magnetic particle are commonly used in the magnetic detection. In American patents ( 3243876、 3786346 ) a technique was introduced that is adding up magnetic powder into the magnetic rubber. While taking sulphuration measure needs long time, with high cost, and just for once consumption. There is another way of magnetic dope indication method, due to complex handled, not extensively used. The innovative defect indication film is a new equipment of magnetic defect indication, in order to replace the current magnetic powder and magnetic-particle liquid, higher sensitivity than the powder, nearly same with magnetic-particle liquid, and the magnetic liquid “A” testing block can indicate clearly.

### **2. working theory**

The film is comprised of millions of particle units. The capsules are connected with each other by glutinosity and dual plastic film, so the indication film is as soft as cloth. Due to sealed in the capsule, the particle won't influence the others if get broken, and the indication film could be cut short, which will break the cut part.

The working theory of such film is: the magnetic particle will flow to the surface if attracted by the magnetic force. On the front side of the film, the trace will be indicated, which will form as same as the defect.

When there is no magnetic force, because iron has the same proportion with the white liquid, by the liquid surface tension theory, the black iron powder will stay at the same position. While using, the film could be glued on the work piece, then given magnetic force caused by direct, alternating or impulse current, etc.

The magnetic field given way could be the current passing caused, adding magnetic force onto the both ends of work piece, winding the work piece with cables, or magnetizing with small magnetic yoke.

If the work piece has defects, there must be magnetic field leakage. The magnetic force within will attract the magnetic powder to form a black trace which could directly view by the naked eyes to confirm the defect shape and size.

### 3. Advantages of the film compared with magnetic powder:

A. The film has stable form, which could stick onto any surface of the work piece, such as the bottom and head of the vessel, where is difficult to scatter the dry magnetic powder.

B. The trace shaped on the film will keep forever if no other magnetic field works.

C. Because the magnetic particle is inside the capsule, the detection environment is clean, no need of washing after detection.

D. The film could be used for thousands of times, which has very low cost.

E. High effectiveness in detection, some work pieces could be glued by the films, given magnetic field, all the defects could be indicated.

F. Easily operated, as soft as cloth, it could stick to any shaped work piece by any cut.

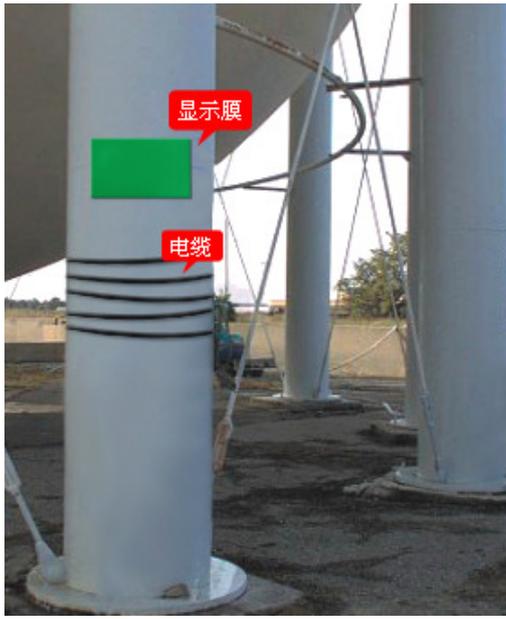
G. high sensitivity in the detection, magnetic liquid "A" testing block can indicate clearly.

H. All kinds of magnetic detectors could be used, such as the direct current, the alternating current, and the impulse current, etc. and the fixed or portable type could use it.

### 4. Application:

#### 4.1 Pipes and vessels:

For the fixed pipe elbow, the film could be stickled with dual glue. Then winding the detector with cables, given magnetic field with electricity passing through, some defects shall be tracing out. If given the low-frequency current and direct current magnetic fields, 6mm from the surface could be penetrated to find out the defects. If smoothing the pipe joint surface, it could easily discover the defects.



### Center hole of steam turbine main axle

Place the indication film into the center hole, with cables through it, giving low-frequency or direct current. Pull out the indication film and observe the results, the defects existed there would be traces.



### Equipments under water

The most special feature is with waterproof characteristic, which is the best choice for underwater magnetic detecting equipment.

