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NEWS VIEWS

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Determination to Establish Excellence Through Efficiency and Expertise

NON-DESTRUCTIVE TESTING OF COLD ROLLING MILL ROLLS

Technological advancement has improved methods to evaluate the quality of roll. These methods are used both by roll manufacturer and roll user. Once a roll is completed, whatever defect is inside the roll cannot be seen with naked eyes. From outside, roll appears to be good.

The objective of roll inspection is to detect defects at the inspection stage before the roll is shipped or taken into service on the mill. There is possibility that minute surface and sub-surface defects are present in the material. These defects should be determined by Nondestructive Testing. Five methods are :

1. **Eddy Current Test.**
2. **Ultrasonic Test**
3. **Acid Etching Test.**
4. **Magnetic Particle Test.**
5. **Die Penetraint Test.**

ULTRASONIC TEST: IS THE QUICKEST, ACCURATE AND MOST RELIABLE AFTER EDDY CURRENT TESTING.

Ultrasonic test is used to detect cracks , inclusions and other discontinuities by pulse echo contact method/back reflection technique. Piezo Electric waves are generated by a probe. While contacting object by probe, these waves propagate in the object and get reflected if any phase change takes place. If there is no phase change, then waves get reflected from other end of object which return from full depth of material. In case of discontinuity, waves are reflected from crack. The reflected sound waves are returned to the transducer and displayed on the test screen as a spike.

TOP TOOLS DEWAS TOOLS

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This test is conducted as per **ASTM A388**

Rejection criteria is :-

a) Loss in back wall echo exceeding 20% of initial echo.

b) Travelling discontinuity more than 5% of initial echo.

c) Any discontinuity flaw equal to or greater than 10% of the B.W.E.

With the use of suitable probe internal defects can be detected. Sometimes there is a signal indicating a flaw at surface, but it is not visible with naked eyes. In such cases magnetic particle testing is used to ascertain surface defect.

Ultrasonic test can throw light on following defects:

1. **INTERNAL CRACKS / FLAWS** – These generally occur where crack propagates along the axial or longitudinal direction.
2. **PIPING DEFECTS**- These are forging defects and can be along with the axis in the core zone.
3. **SLAG INCLUSION** – These occur during casting the ingots for forging.
4. **SHRINKAGES**- These are generally due to less material while casting the ingots.
5. **INTERNAL FORGING LAPS/ FOLDS**- These are forging defects are caused due to overlapping of ingots.
6. **POROSITY**- These are due to trapped gases / fumes during casting the ingots.
7. **Surface Defects** - These are exogenous inclusions are checked with surface angular probe by scanning the whole surface. Any spike of 20 % height or more is treated rejected. This test is supplemented by magnetic particle test to see nature of defect present.

MAGNETIC PARTICLE TEST-

The test is conducted to detect cracks on surface and sub-surface layer in ferrous material only.

Normally, Iron particles are suspended in sprit / petrol and the solution in spread over the surface of rolls after magnetizing the surface. Any crack between two poles acts to distort the magnetic field which attract fine magnetic particles highlighting the cracks. Magnetic particle test is conducted as per ASTM SA 275 & SE709.

Any Magnetic particle build up having width more than 1.0mm and ratio of length to width more than three times will mean defect / crack.

Following defects can be traced by magnetic particle test:

1. **FORGING BURSTS -** These defects are due to temperature of the metal, lesser than required.
2. **FLAKES -** These cracks may occur at the surface or sub-layer of material and are due to rapid cooling of the rolls during heat treatment.
3. **GRINDING CRACKS**- These surface cracks are developed due to improper grinding.
4. **LOCAL HEATING CRACKS-** These cracks are developed when the rolls are in service where high pressing forces are in application resulting high work hardening.
5. **Stress Cracks -** These are developed while material is in use or in service where material is subjected to heavy alternating or fluctuating stresses.

Acid Etching Test -

Acid Etching test is performed on ground roll at any time to highlight change of hardness, cracks, bruise marks, grinding burns, overheated areas due to local

pressure. When applied on roll surface the softer areas will darken faster than the surroundings leaving a differential etch appearance. Cracks are also highlighted during an etching test. The reagent that enters the crack interface through capillary action. when the acid is cleaned the residual acid seeps out within the cracks and burns the area surrounding it. this test is also supplemented by UT testing on the located surface.

Surface to be examined is cleaned and dried by Methanol. The reagent used is Nital which is 20 % Nitric acid and 80 % Methanol. Apart from cracks the softer areas appear dark and harder areas appear lighter.

Ultrasonic test in conjunction with acid etching is very reliable.

DIE PENETRAINT TEST (I.S. 12889 : 1989)

This test is conducted for detecting surface cracks in ferrous and non-ferrous material by application of developer and penetraint. Any dark hair line will be treated as defect. This test is performed after grinding.

Following fine surface defects can be traced by die penetraint test:

1. **SURFACE HARDENING CRACKS–**

   This type of crack generally occurs when the hardness of the surface layer is more than the sub-layer hardness.

2. **PITTING –**

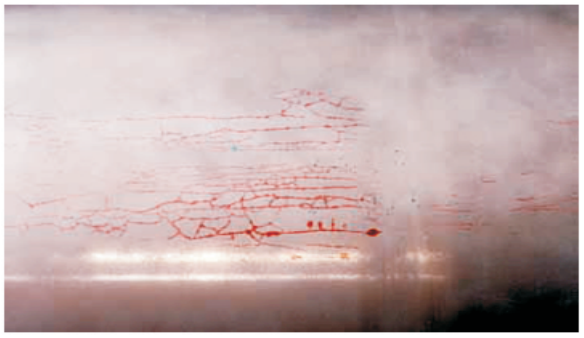
   These are pin/pinch type marks and occur at the surface.

3. **GRINDING CRACKS –**

   These are due to grinding heat and are called heat checks.

4. **LOCAL HEATING CRACKS-**

   These cracks are developed at the surface when the rolls are in service and high pressing forces are in application resulting in high work hardening.



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1. Slitting Line Tooling.
2. 20 Hi Mill Rolls
3. Metal Processing Rolls.
4. Cold Rolling Mill Rolls
5. Shear Blades.
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QUALITY POLICY

We, at **DeeTee Industries Pvt. Ltd.** are committed to provide best quality product at competitive price while maintaining high quality standards for customer delight. We will achieve it by - ☐ Active involvement and empowerment of our employees ☐ Continual improvement in our quality systems ☐ Technological up-gradation.