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METHOD OF TESTING MATERIALS FOR SURFACE DEFECTS

Gustav A. Jebens, Ralph H. Snell, Robert L. Heath, George A. Fisher, Jr., Donald R. Scott, and Garrett H. Mouw, Jr., Indianapolis, Ind., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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It has become common practice to inspect parts, particularly metal parts, for cracks and other surface defects by immersing them in liquid capable of fluorescing when exposed to light of particular wave lengths—usually ultra-violet light—removing the excess liquid, and examining the part under such light whereupon the liquid in the cracks fluoresces and reveals the defect. To secure the best results the liquid in which the part is immersed is heated to facilitate penetration into the cracks. The part is also usually heated at the time of examination to cause liquid to tend to exude from the cracks and give a better indication. To further improve the indication it has been common to dust the part with powder prior to inspection, some of the powder adhering to the liquid exuding from the cracks and so increasing the size of the indication.

It is common to employ as the fluorescent liquid, water soluble oils and to use water to remove the excess oil. This may prove undesirable particularly in the case of magnesium parts which are adversely affected by water.

While the use of powder improves the definition of the defects it is essential that all of it be removed after the test so that it will not cause abrasion. Cleaning the parts to remove the powder has proven to be difficult.

We have found it is possible to secure better definition without employing deleterious materials in the testing.

According to our preferred method the part is submerged for approximately twenty minutes in engine lubricating oil possessing the property of fluorescence, maintained at a temperature of approximately 325° F. The parts are then removed and allowed to cool and drain for a few minutes. Thereafter they are washed or rinsed in a suitable petroleum solvent consisting preferably of a refined distillation product of crude petroleum. The parts should not remain in the solvent for more than approximately thirty seconds to insure retaining oil in the cracks.

While the excess solvent may then be removed by wiping, we found that the best results are obtained by degreasing the part in a vapor degreaser at approximately 180° F. using a suitable vapor such as trichlorethylene. There is a two fold purpose in using a vapor type degreaser (1) the removal of oil remaining on the surface and (2) as a source of heat for the casting which will eliminate a separate operation and facilitate subsequent location of defect. Degreasing should continue for no more than three minutes, otherwise too much of the oil is removed from the casting defects.

The degreasing provides a very clean surface free from any trace of fluorescent material and affords a good background contrasting with the fluorescence of the oil in the cracks.

By employing this method no subsequent cleaning is required as none of the materials used adversely affects the part being tested.

The improved method is subject to considerable modification with respect to temperatures employed and other details. Thus, the liquids, particularly the solvent, may be applied by spraying instead of dipping, if desired. Other known degreasers may be used in place of the one specifically mentioned.

We claim:

1. The method of checking a part for surface defects which comprises immersing the part in a hot fluorescent oil so that the defects are filled therewith, removing the excess oil including the step of exposing the part to degreasing agent in hot vapor form which serves the purpose (1) of removing excessive fluorescent material from the surface to better define the defects and (2) heating the part which increases the definition of the defects on subsequent examination under radiation capable of causing the oil in the defects to fluoresce.

2. The method of checking a part for surface defects which comprises treating the part with a fluorescent oil so that the cracks and other surface defects are filled therewith, removing the excess oil by means of a suitable solvent, degreasing the part in degreasing vapor to remove the solvent and any remaining excess oil, and thereafter examining the part while exposed to radiation capable of causing the oil in the defects to fluoresce.

3. The method of checking a part for surface defects which comprises treating the part with hot fluorescent lubricating oil to fill the defects therewith, treating the part with an oil solvent to remove the excess oil, degreasing the part by the use of a hot vapor degreaser such as trichlorethylene vapor, to remove the solvent and any excess oil remaining, and, while still warm from the degreasing operation, examining the part as it is exposed to radiation capable of causing oil in the defects to fluoresce.

GUSTAV A. JEBENS.
RALPH H. SNELL.
ROBERT L. HEATH.
GEORGE A. FISHER, JR.
DONALD R. SCOTT.
GARRETT H. MOUW, JR.