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Comparative Sliding Wear Studies Among Flame Hardening and Induction Hardening Processes on 316l Stainless Steel

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ABSTRACT

This task examines on acceptance induction and flame hardening processes so as to enhance the wear conduct of the material. The hardness of the material is expanded up to 200% by this procedure. Induction hardening process were done to 3 unique examples - a 1 minute, 2 minutes, and 3 minutes and named as IH1, IH2, and IH3 separately. Flame hardening process were completed to 3 distinct examples – 5 minutes, 10 minutes and 15 minutes and named as FH1, FH2, and FH3. The examples are to be amplified by metallographic test, for example, scanning electron microscope. The untreated example is utilized to contrast and the treated example. The best example is picked which decides the life of material and enhances the better wear protection. The hardness of untreated material and treated material were analyzed.

Keywords: Flame Hardening, Induction Hardening, Metallographic test, Wear Resistance.

I. INTRODUCTION

Stainless steels are available day materials. Stainless steel is the non particular name for different various steels used on a very basic level for their impenetrability to disintegration. Stainless steel isn't a single material yet rather the name for a gathering of disintegration protection steel in metallurgy, stainless steel is portrayed as a ferrous mix with no less than 10% chromium. The name starts from the way that stainless steel does not recolor, expend or rust as adequately as normal steel. This material is in like manner called disintegration safe steel when it isn't point by direct accurately toward its mix sort and grade, particularly in the flight business. As needs be, there are by and by interesting and viably open assessments and surface culminations of stainless steel, to suit nature to which the material will be subjected lifetime.

It includes chromium (16-26%), nickel (6-12%) and press. Other alloying segments (e.g. molybdenum) may be included or modified by the pined for properties to make auxiliary assessments that are described in the models (e.g. 1.4404). The austenitic social occasion contains more assessments, that are used as a piece of more conspicuous sums, than some different class of stainless steel.

AISI 316L austenitic stainless steel is remarkable for its best equality of carbon, chromium, nickel and molybdenum for utilization protection. Along these lines, this material is frequently used for high temperature conditions, commandingly ruinous condition and nuclear reactor applications. In any case, a reasonably low hardness (200 HV), happening in the poor wear protection, is a basic hindrance of this steel, is the clarification behind its confined use. Under conditions of measurable mechanical wear (paste or grinding), this material should be portrayed by sensible wear protection. An austenitic structure, which can't be set by the standard warmth treatment, makes that there is no basic approach upgrade the wear protection of this steel.

II. METHODS AND MATERIAL

Since it is a comparative report on the flame hardening and induction hardening processes, six sets of specimens were prepared alongside with one untreated specimen. These seven specimens have undergone pin on disc test and they were being tested by scanning electron microscope for the better wear behaviour of the material among induction hardening and flame hardening processes.

III. RESULTS AND DISCUSSION

Scanning Electrode Microscopic images of Flame hardened and Induction hardened specimens.

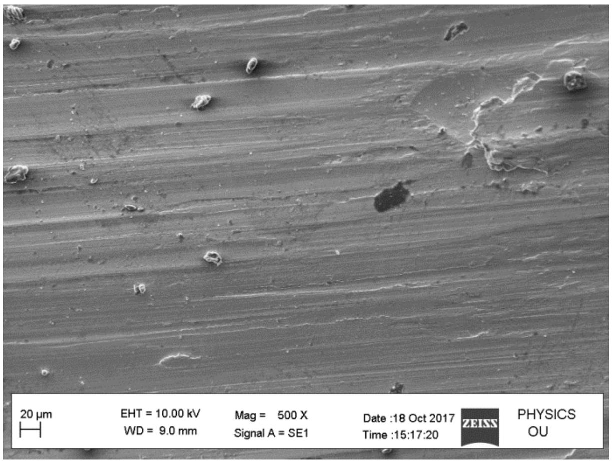

Fig 1 Untreated Specimen at 500rpm

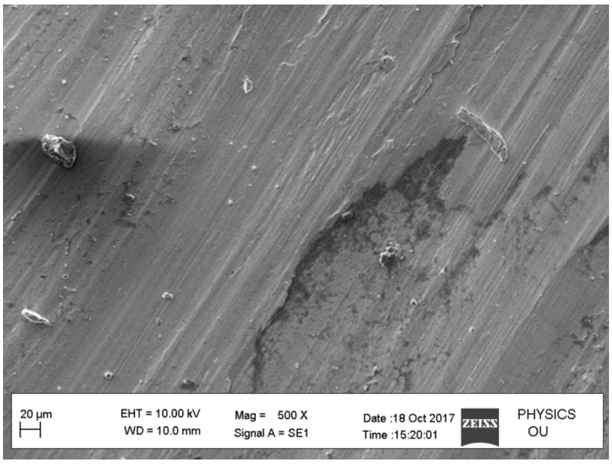

Fig 2 Untreated Specimen at 1000rpm

By above figures, we can clearly see that Untreated specimen at 500rpm shows less wear than untreated specimen at 1000rpm.

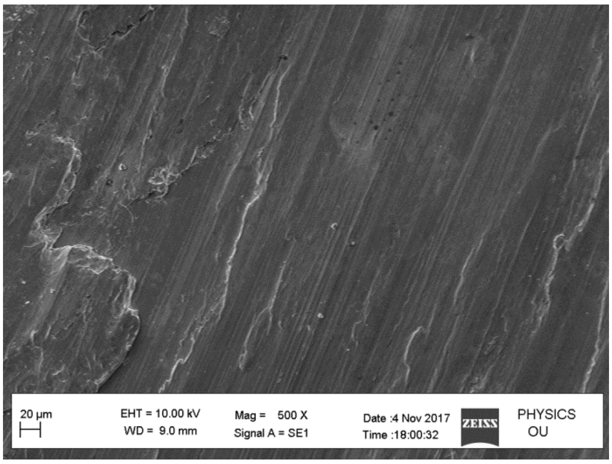

Fig 3 FH1 specimen at 500rpm

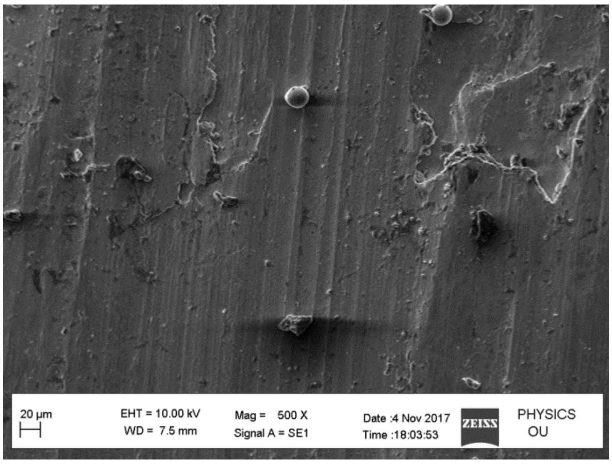

Fig 4 FH1 specimen at 1000rpm

By above figures, we can clearly see that FH1 specimen at 500rpm shows less wear than FH1 specimen at 1000rpm.

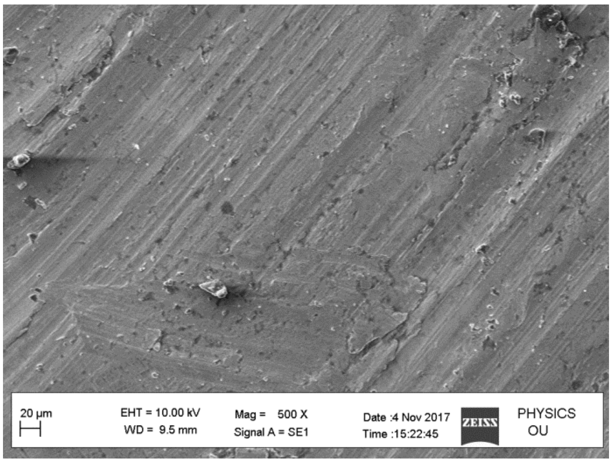

Fig 5 FH2 specimen at 500rpm

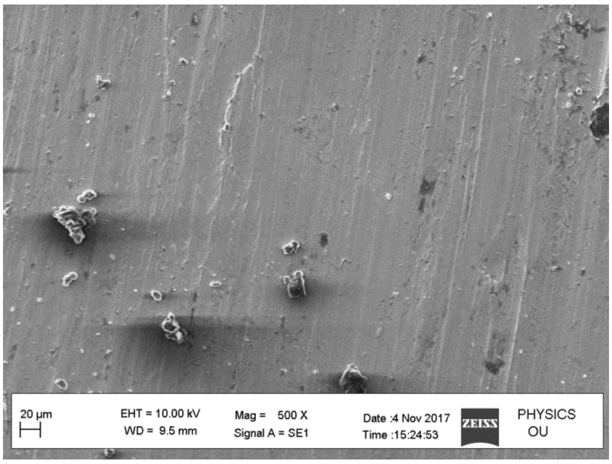

Fig 6 FH2 specimen at 1000rpm

By above figures, we can clearly see that FH2 specimen at 500rpm shows less wear than FH2 specimen at 1000rpm

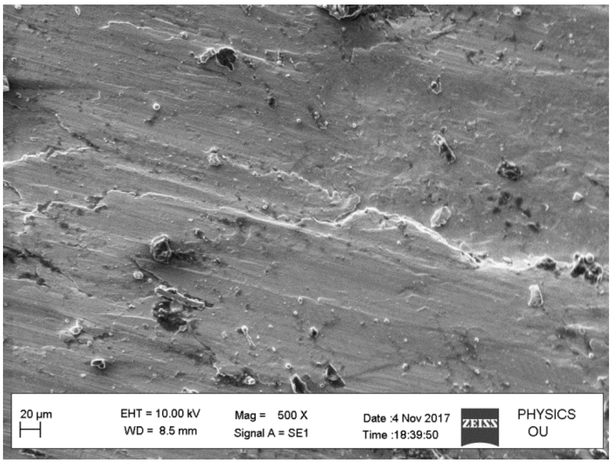

Fig 7 FH3 specimen at 500rpm

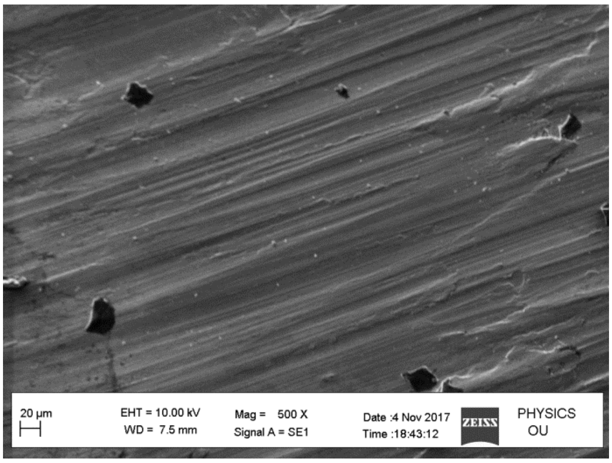

Fig 8 FH3 specimen at 1000rpm

By above figures, we can clearly see that FH3 specimen at 500rpm shows less wear than FH3 specimen at 1000rpm

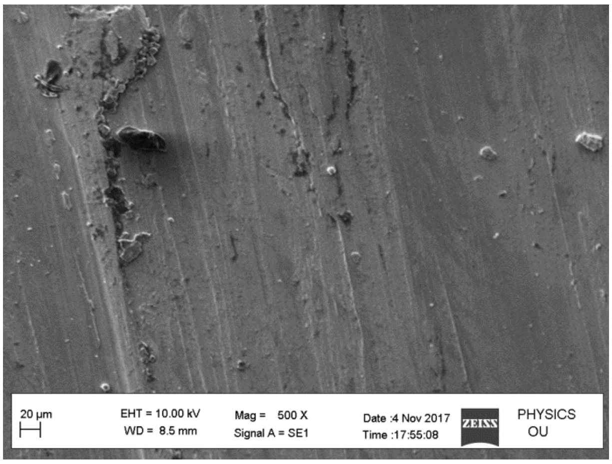

Fig 9 IH1 specimen at 500rpm

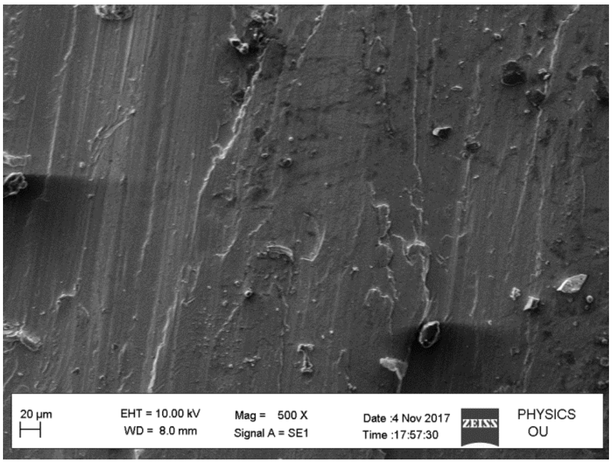

Fig 10 IH1 specimen at 1000rpm

By above figures, we can clearly see that IH1 specimen at 500rpm shows less wear than IH1 specimen at 1000rpm

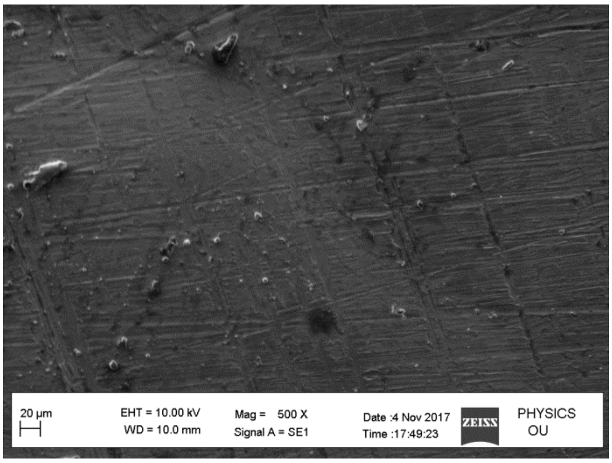

Fig 11 IH2 specimen at 500rpm

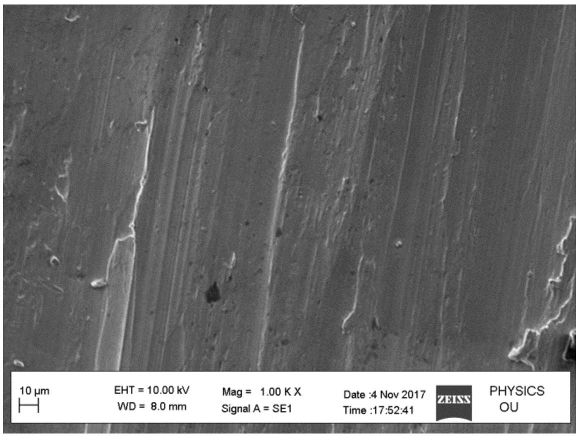

Fig 12 IH2 specimen at 1000rpm

By above figures, we can clearly see that IH2 specimen at 500rpm shows less wear than IH2 specimen at 1000rpm

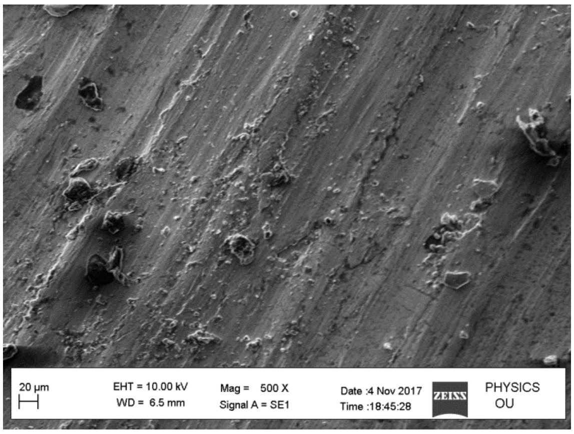

Fig 13 IH3 specimen at 500rpm

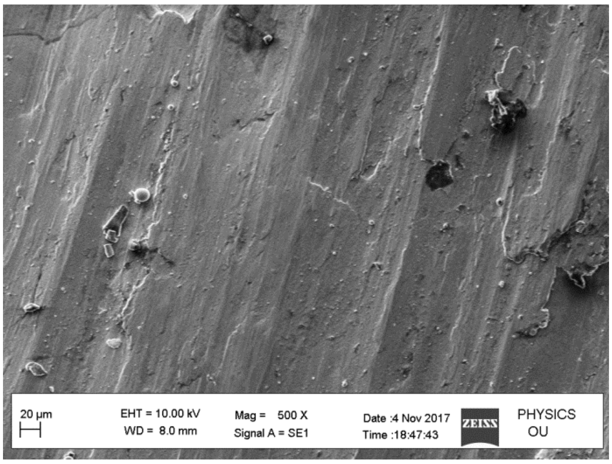

Fig 14 IH3 specimen at 1000rpm

By above figures, we can clearly see that IH3 specimen at 500rpm shows less wear than IH3 specimen at 1000rpm

IV. CONCLUSION

In this work, induction hardening and flame hardening on 316L grade stainless steels were performed and the wear conduct was examined. Here a correlation examine was made between treated examples with untreated test. Both induction hardening and flame hardening are viable technique to enhance the wear resistance of the stainless steel material. A few specialists examined the impact of case hardening on mechanical and surface behaviour of carbon steels. Just little data is accessible on the wear conduct of AISI 316L review austenitic stainless steel material. The exhibit contemplates centred toward examining the impact of 316L on the microstructure, hardness and wear protection of stainless steel material. The real conclusions are as per the following says that induction hardening is better than flame hardening process.

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