INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**WEAR PARTICLE ANALYSIS PROCEDURE FOR ESTABLISHING A SYSTEM**	**IPSS:3-02-012-18**
	Corresponding IS does not exist	Formally : IPSS:3-02-012-01

0 FOREWORD

0.1 Interplant standardization in steel industry was initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This IPSS was prepared by the standard committee on Operation and Maintenance, IPSS 3:2 and firstly published in 2001. Lastly, this has been revised by the standard committee in July 2018 with the active participation of the representatives from major Indian steel plants and leading consultants.

0.2 During the course of working of any equipment over a period of time, its components wear out generating wear particles in a normal wear mode. These wear particles are carried by the lubricating/hydraulic systems of the equipment and carry the signature of the wear process that is taking place in the equipment. Any abnormal conditions in the working of the equipment accelerate the wear process and the components wear out prematurely resulting in a breakdown.

Therefore, a systematic morphological, analytical study and the elemental analysis of the wear particles can reveal a lot of valuable information about the nature of wear that is taking place in the equipment and helps in taking remedial measures in advance to avoid any impending failure.

1. SCOPE AND FIELD APPLICATION

1.1 This Standard specifies procedure for establishing a system for Wear Particle Analysis using Ferrography techniques. Oil samples are collected from lubricating/hydraulic fluid systems of the equipment used in industrial, mobile and marine applications.

2. PROCEDURE FOR ESTABLISHING A SYSTEM

2.1 Preparation of a database with equipment details :

a) Equipment specifications.

b) Fluid system specifications and schemes.

c) Filter specifications.

d) Component details and material specifications.

e) Survey of prior maintenance and service reports to identify the problem areas.

2.2 Sampling and sample handling procedures :

a) Design and documentation of sampling and sample handling methods.

b) Locate sampling points.

c) Ensure cleanliness of sampling bottles.

d) Take samples from the system while it is in operation.

e) Do not take samples from the sump.

f) Take samples at the same location and equipment operating conditions each time.

g) Visually inspect and note the observations of the sample collected.

h) Document sampling

i) Samples collected are to be tested/ forwarded to laboratory for testing immediately so that the properties of the oil in sample oil in machine do not drift apart much.

j) Deposits on the filter shall be analyzed for portable wear detection.

2.3 Determine frequency of sampling :

i) Determine the initial sampling frequency taking into consideration the type, workload, running time, etc., of the equipment.

ii) Equipment wise schedule of maintenance shall be maintained based on the severity of application.

3. TERMINOLOGY

3.1 **DR Ferrography** - A quantitative analysis using Direct Reading instrument to identify the large and small wear particle concentrations in the oil sample.

3.2 **Ferrogram** - A glass slide on which wear particles in the oil sample are deposited using a particle depositing instrument.

3.3 **Analytical Ferrography** - The ferrograms are studied under a bichromatic microscope with high magnification to identify the size, shape, colour etc., of the wear particles. The analysis gives information about the type and severity of wear that is taking place in the equipment.

3.4 **Elemental Analysis** - The oil sample is subjected to Spectrometric Oil Analysis (SOAP) to know the elements present in the wear particles by which the wearing components can be identified.

4. TESTING OF THE OIL SAMPLES AND ANALYSIS OF THE RESULTS

a) Test the sample on DR Ferrography instrument to know the wear particle concentration and plot graphs for the results for each M/c and trend them.

b) Initially generate ferrograms and conduct analytical ferrography for all samples to establish machine signature.

c) Document Ferrograms with ferrograph analysis sheets.

d) Store oil samples and ferrograms for possible retrospective analysis.

e) Conduct elemental analysis and document data.

f) Based on data on wear particle concentration, analysis of Ferro grams and elemental analysis information recommendations are to be framed after trending the data.

g) Wherever possible on site oil analysis may be carried out to identify the presence of moisture and wear particles as an alternate to DR ferrography. The frequency of on site oil analysis may be between 200 hours - 1000 hours of operation depending on the duty, speed, etc. Analytical Ferro graphic analysis may be carried out wherever the wear particles are in increasing trend.

5. REPORTING AND FEEDBACK SYSTEM

a) Prepare the required formats for reporting the data.

b) **Communication** - Make sure that results and observation reach appropriate people in time through an existing feedback system.

c) Based on observations, correction activities shall be taken as per maintenance manual.

d) **Inspections** - Regular inspections are to be done based on the report of the results to assess the condition of the equipment.

e) Document all substantiative work in the SAP system / data management system.

6. TRAINING THE PERSONNEL

6.1 Identify the personnel for imparting training for effective implementation and working of the system.

7. REVIEW OF THE SYSTEM

7.1 Review the total system based on the feedback information in order to :

a) Adjust the frequency of sampling

b) Locate the areas prone to high rate of wear feedback.

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