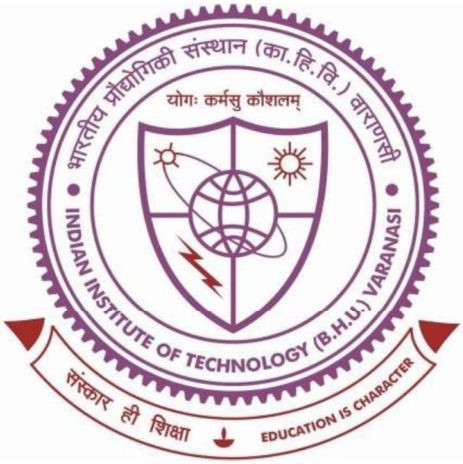
STUDIES ON EROSIVE WEAR CHARACTERISTICS OF DUAL PHASE STEEL



Thesis submitted in partial fulfillment for the Award of Degree

Doctor of Philosophy

By

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This is to certify that the work contained in the thesis titled ***" STUDIES ON EROSIVE WEAR CHARACTERISTICS OF DUAL PHASE STEEL"*** by ***"POOJA VERMA"*** has been carried out under my/our supervision and that this work has not been submitted elsewhere for a degree.

It is further certified that the student has fulfilled all the requirements of Comprehensive Examination, Candidacy and SOTA for the award of Ph.D. Degree.

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DECLARATION BY THE CANDIDATE

I ***"Pooja Verma"***, certify that the work embodied in this thesis is my own bona fide work and carried out by me under the supervision of ***"Prof. Rajnesh Tyagi"*** from ***"July 2017*** to ***July 2023"***, at the ***"DEPARTMENT OF MECHANICAL ENGINEERING"***, Indian Institute of Technology (BHU), Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma.

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge

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(POOJA VERMA)

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LIST OF ABBREAVIATIONS/SYMBOLS

DP	Dual phase
N	Normalized steel
FMS	Fully martensitic steel
UTZ	Uniform temperature zone
MVF	Martensite volume fraction
SSER	Steady state erosion rate
PDP	Potentiodynamic polarization
EIS	Electrochemical impedance spectroscopy
OCP	Open circuit potential
CR	Corrosion rate
ICA	Intercritical Annealing
CPE_1	constant phase element
UTS	Ultimate tensile strength
AFM	Atomic force microscopy
EDX	Energy dispersive X-ray spectroscopy
HV	Vickers hardness
SEM	Scanning electron microscopy
TEM	Transmission electron microscopy
XPS	X Ray photoelectron spectroscopy
XRD	X-Ray diffraction spectroscopy
CNTD	Controlled nucleation thermochemical deposition
SCC	Stress corrosion cracking
% EL	Percent elongation
KE	Kinetic energy
E_{corr}	Corrosion potential

I_{corr}	Corrosion current
k	Erosion rate constant
V	Impact velocity
n	Velocity exponent
W	Wear rate
W_D	Volume loss
M	Total mass
V_p	Velocity of impinging particles
δ	Energy needed to remove a unit volume of material
ε_m	Mean strain increment
ρ_p	Particle density
C_p	Target specific heat
T_m	Melting point of target material
H_t	Static hardness of the metal or alloy
ε_{vp}	Erosion rate
$\Delta\Omega_m$	Mean strain increment induced by each impact
Ω_c	Critical strain for the onset of lip formation
R_s	Solution resistance
R_{pr}	Polarization resistance
P_{tot}	Total probability of first-order collision between the incident and a rebound particle
Q_o	Incident particle number flux
t_r	Average flight time of the rebounding particle
$\dot{\varepsilon}$	Mean strain rate
γ	Austenite phase
m	Martensite phase

σ_y	Yield strength
σ_T	Tensile strength
V	Volume fraction
σ_u	Ultimate tensile strength
D	Average particle size
ε	True strain
K	Constant of order unity
r	Radius of martensite islands
l	half-length of martensite islands
G	Shear modulus
σ	True stress
b	Burgers vector
V	Impact velocity
k	Constant,
n	Velocity exponent
μ	Friction coefficient