UNIVERSIDADE DO ESTADO DO RIO DE JANEIRO
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA MECÂNICA

MORPHOLOFY AND TOPOGRAFY OF STAINLESS STEEL SURFACES UNS S32205 SUBMITTED TO EROSION BY IMPACT OF ALUMINA PARTICLES IN AIR FLOW

July 2017

AUTHOR: ANTÔNIO CARLOS SANTOS

ADVISER: PROF. ANTONIO MARINHO JUNIOR

AGENDA

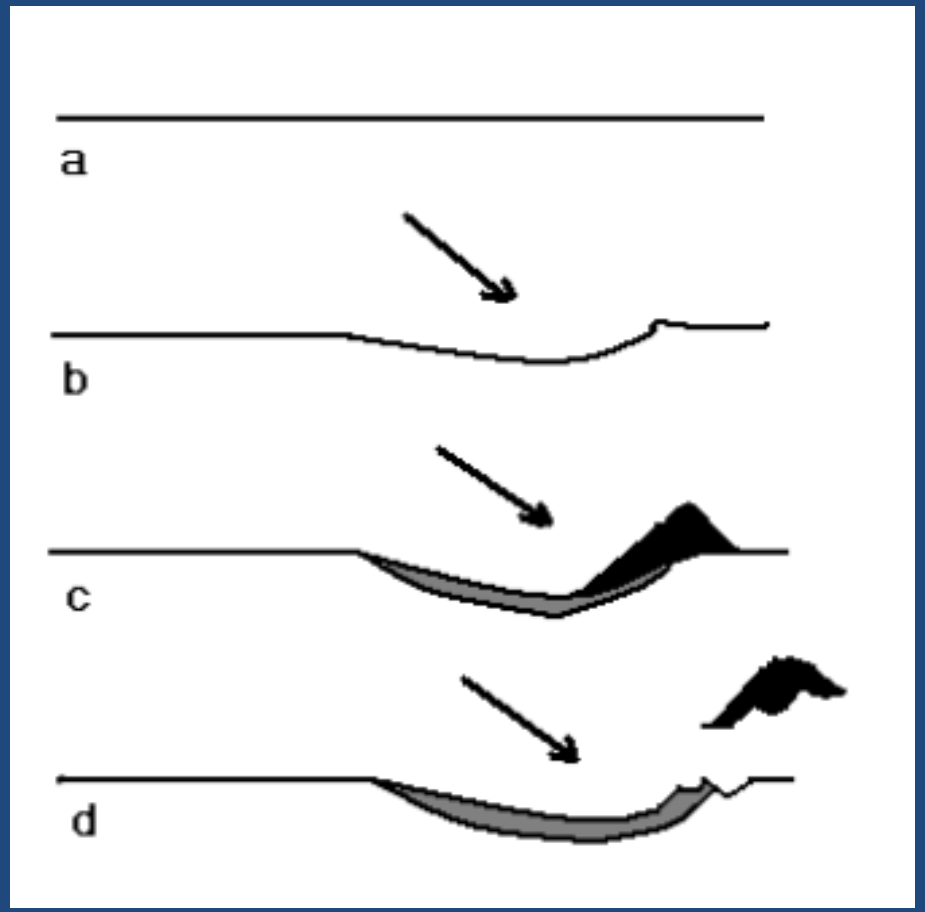
- Introduction
- Objective
- Methodology
- Materials and Methods
- Analysis
- Results
- Conclusions

INTRODUCTION

- METALIC EROSION

- Definition:A method surface wear caused by impacts of hard particles in suspension in movement fluids.
- In the experiments performed for this work used aluminum particles and target the stainless steel duplex UNS S 32205.

ILLUSTRATED FIGURE OF DISPOSAL OF MATERIAL AFTER THE THIRD IMPACT



OBJECTIVE

- Study morphology and topography of stainless steel surfaces duplex UNS S32205 erodides by impac to of aluminum particles in different exposure times.
- Study,by rugosimetry,the topography of the observed surfaces and verify the utility of the method in the evaluation of the erosive process.

METHODOLOGY

- Observation by SEM of samples with different times of erosive atack compliance of observations with other experimental works and simulations .
- Measurement of surface rugosities of eroded samples and analyses of derived statistical curves.

MATERIALS AND METHODS

For the study,samples of UNS S32205 were take from ½" tick steel plate with chemical and mechanical properties shown below:

CHEMICAL COMPOSITION(%Weight)

C	Mn	P	S	Si	Ni	Cr	Mo	N
0,020	1,576	0,030	0,00110	0,559	4,596	22,037	3,108	0,144

Fonte: [NAS, 2012].

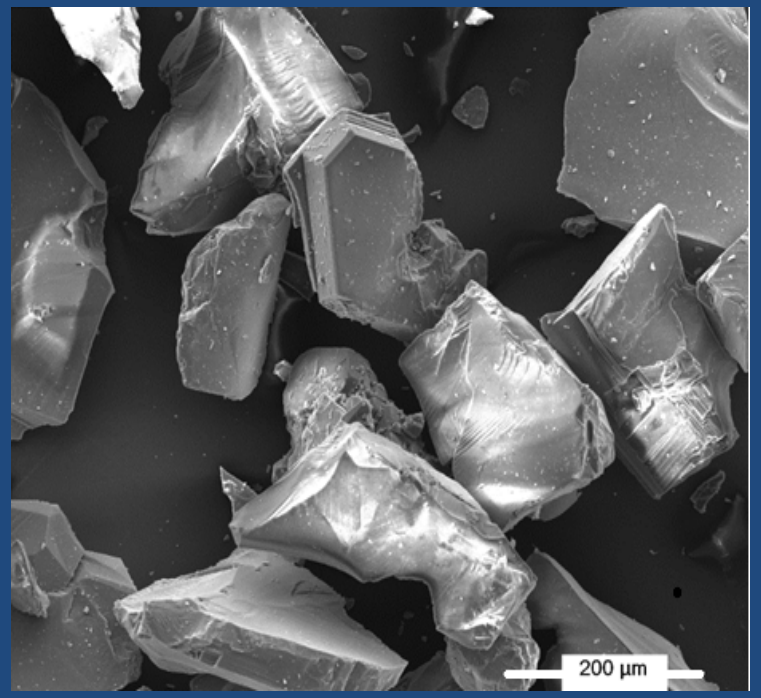
MECHANICAL PROPERTIES

Tensão de escoamento a 0,2%	Limite de resistência	Alongamento em 50 mm	Dureza
586 MPa	784 MPa	41 %	20 HRC

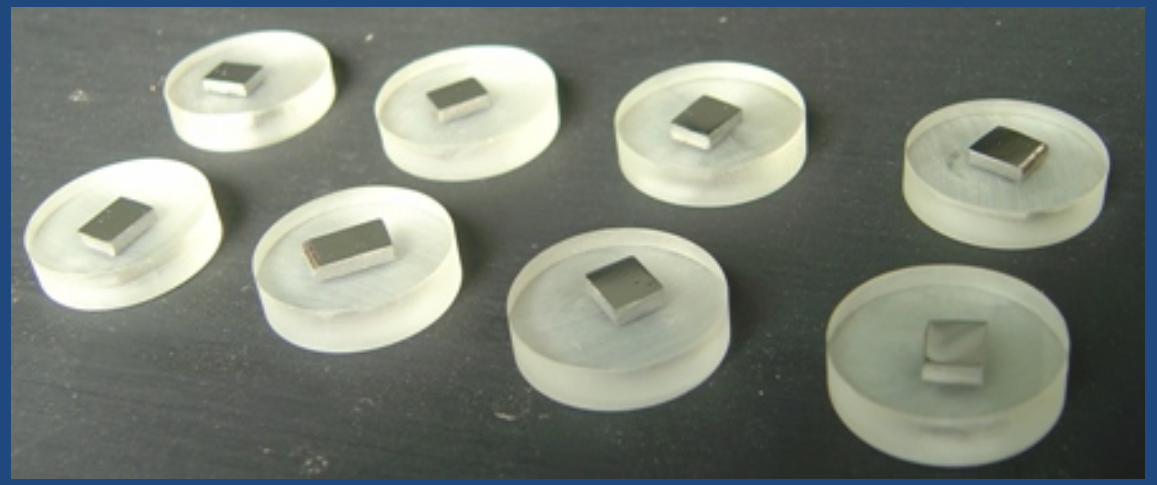
Fonte: [NAS, 2012].

ERODENT PARTICLES

- Alumina particles produced by ALCOA and provided by ESSENCE with a 150 mesh average granulometry and variable morphology have been used as shown below:



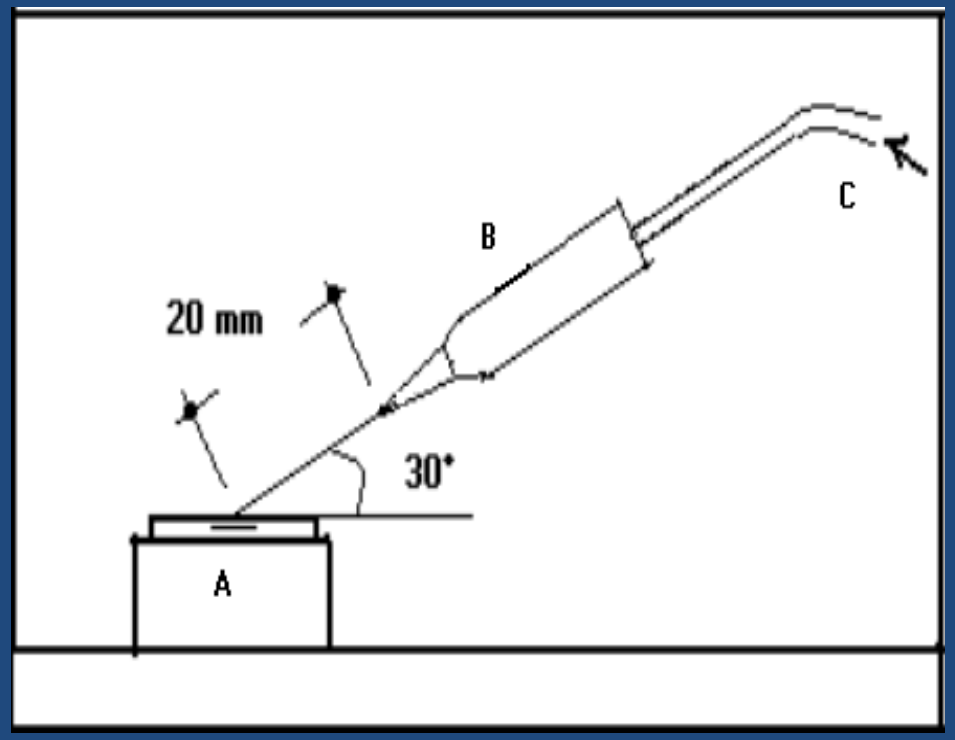
SAMPLES USED IN THE EXPERIMENTS



INSTALLATIONS AND INSTRUMENTS USED

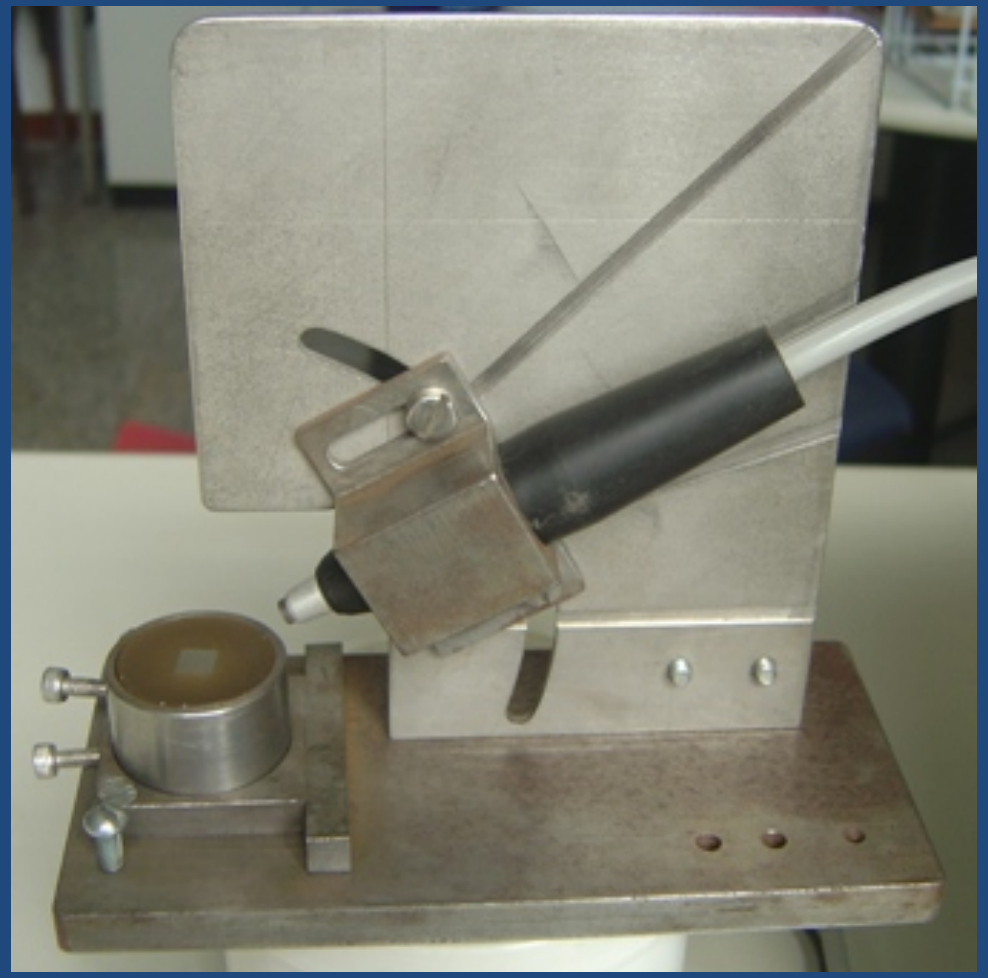
- Blast chamber and compressor

DEVICE DESIGN



- (A)Hold Samples (B)Jet Nozzle (C)Compressed air imput with alumina particles

DEVICE FOTO



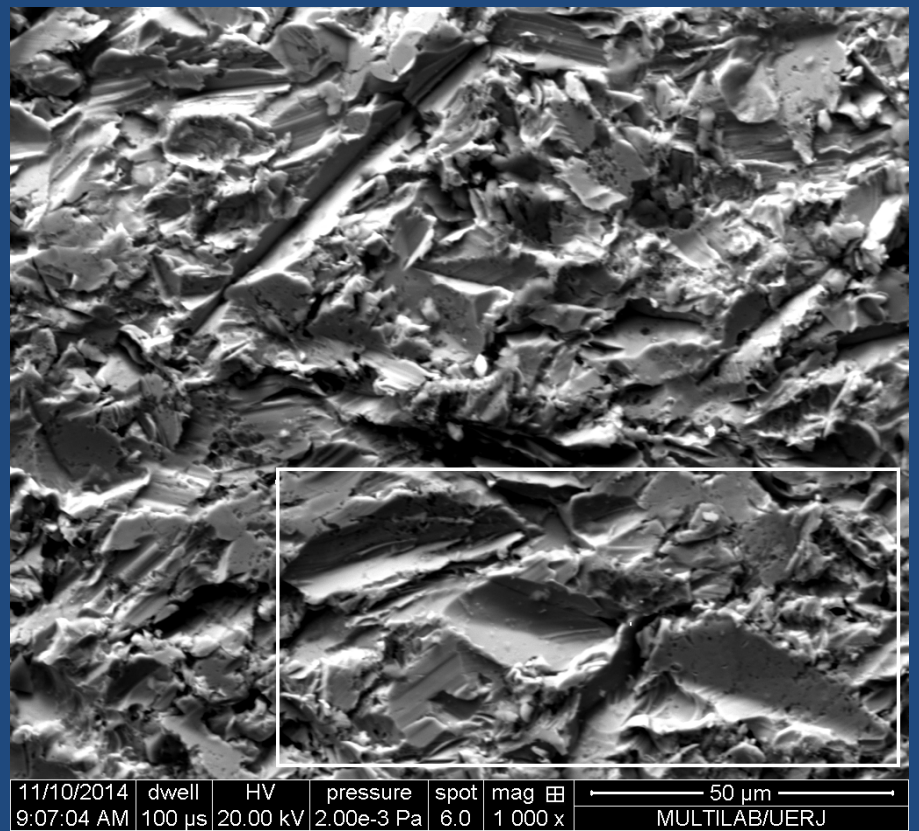
THE RUGOSIMETER

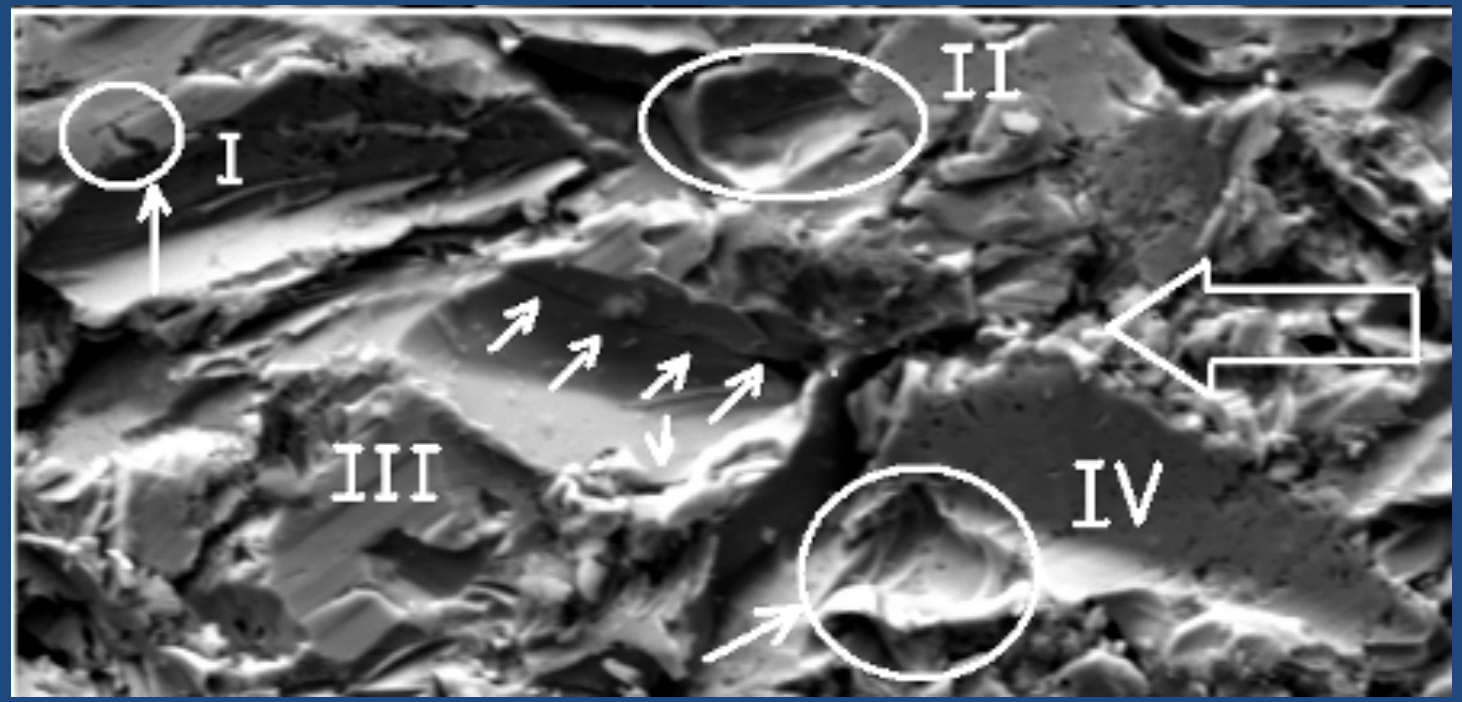
ANALYSIS

- Craters deepen than peaks are observed.Formation of crack in the botton trough up down for any sample.Rsk sign in ADC curve provides us a condition great craters.
- Rsk<o :abrasion resistence large.
- Rsk>o :Abrasion resistence small.
- ADC : Amplitude Distribution Curve
- BAC : Bearing area curve (or Abott Fire curve)

RESULTS

- Sample eroded by alumina particles for 120s time: micrograpphy and statistical graphycs.




I
II
III
IV

CONCLUSIONS

- The variations in the guidelines presented by cratersth rough na oriented flow could be attributed to the dispersion of air flow from the jet nozzle to the surface and the charater and not laminate from this flow.

- The use of Abbott Firestone curves (BAC) allowed to accompany the evolution of erosion craters as main plastic deformation machanism and material losses.

MUITO OBRIGADO.