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ICMSSM2013

Xiamen, China, November 16-17, 2013

# Mechanical Materials



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# Conference on Mechanical and Smart Materials (ICMSSM 2013)

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## Catalogue



- > Introduction of surface integrity
- > Factors affecting surface integrity
- > Prediction of surface integrity
- > Twin facing lather and vibration-assisted machining

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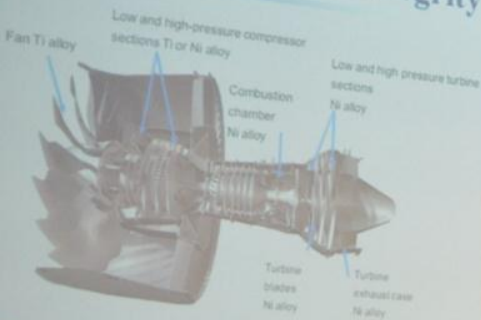
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# Introduction surface integrity



titanium and nickel alloys: difficult-to-machine materials



failures due to the poor machining quality of titanium and nickel alloys

## Harsh working conditions

- Working temperature: higher than 1000° C
- Working pressure: higher than 40 atmospheres
- Spindle rotate speed: nearly 15000 rpm

Aero-engines are the most important parts in aircrafts and have strict requirements on machining quality to avoid failures in use.



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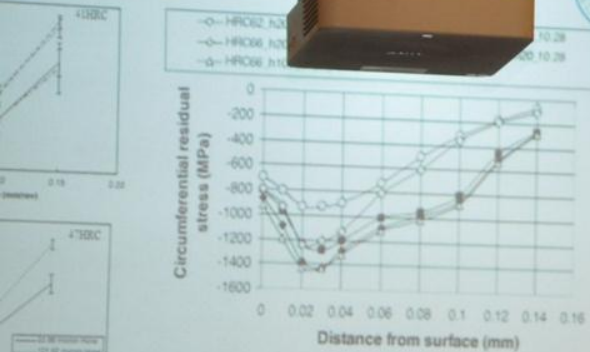
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## → Roughness and s



1. Workpiece hardness has little influence on surface roughness.
2. More compressive residual stresses are induced by increasing workpiece hardness.

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*Thank you !*

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Dynamic parameter identification of  
unknown object handled by  
space manipulator

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Beijing University of Posts and  
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Dynamic parameter identification of  
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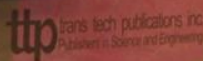
Dynamic parameter identification of  
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## Contents



- 1 Introduction
- 2 Structural Characteristic and Static Analysis
- 3 Measurement Principle
- 4 Performance Analysis
- 5 Conclusion

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中国科学技术大学  
University of Science and Technology of China

# Optimization of Granular Chute Flow with Two Bottlenecks

Mao-Bin Hu ([humaobin@ustc.edu.cn](mailto:humaobin@ustc.edu.cn))

With Q.Y. Liu, G.C. Yang, R. Jiang, Q.S. Wu, Y.H. Wu

School of Engineering Science, University of Science  
and Technology of China, Hefei 230026, P.R. China

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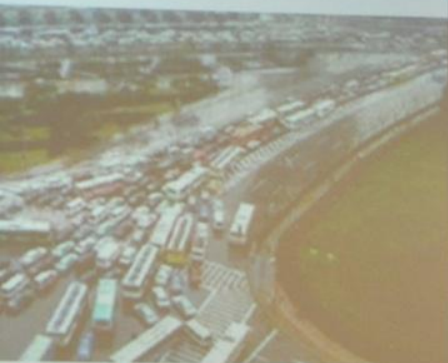
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nsible for the traffic jam.

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北京理工大学 School of Mechanical Engineering, Beijing Institute of Technology

## Experimental Results

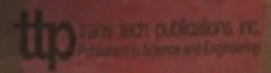
- Experiment

Choosing several kinds of light in the image capturing process including blue, green, orange, purple, white, yellow. Then calculating the residual sum of squares under each light source. We think that a lower value of the residual sum of square is better.

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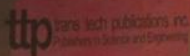
# Modeling and Development of Copper Wire Annealing Fuzzy Control System Based on Temperature Detecting

Author: Sun Hongyang  
FROM: Huazhong University  
of Science and Technology

International Conference on Mechanical Structures and Smart Materials

International Conference on Mechanical  
Structures and Smart Materials  
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October 2013, Xiamen, China



Heat Transfer Characteristics  
of  $\text{Fe}_3\text{O}_4\text{-H}_2\text{O}$  Nanofluids  
by External Magnetic Field

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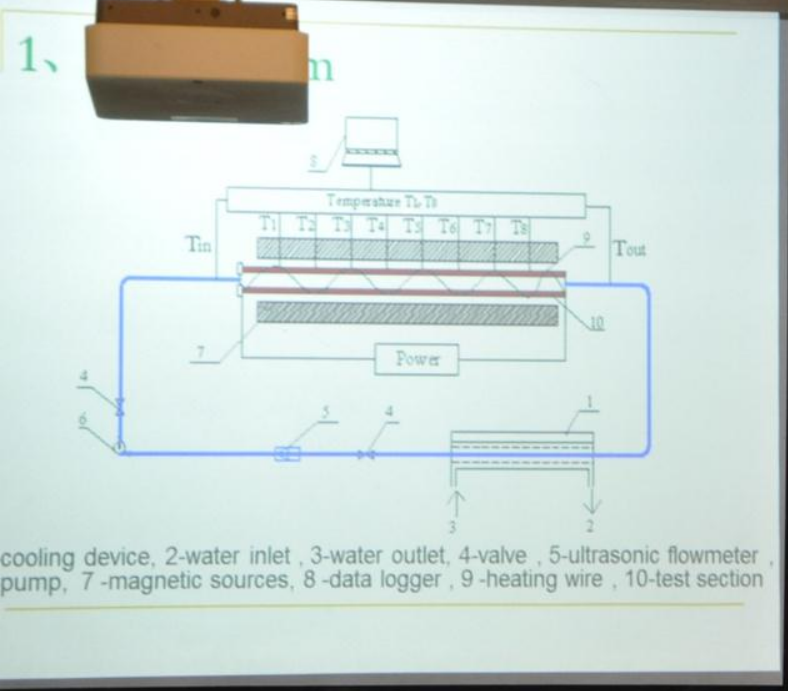
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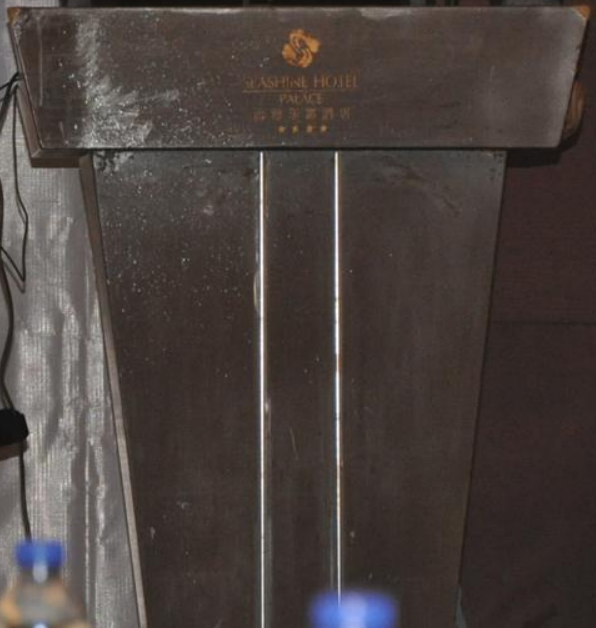
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## 1. Introduction

The presence of interstitial atoms (C, N, O and H) has great effects on the physical, chemical and mechanical properties of most metallic materials, which is true for elastic and anelastic properties [1]. Interstitial atoms in metals and alloys can produce anelastic relaxation under cycle stress-inducing, which was originally observed by Snoek in Fe containing carbon and nitrogen as interstitial solutes and called as Snoek relaxation [2-3]. The interstitial solute atoms in a bcc metal constitute elastic dipoles of tetragonal symmetry, and can thus produce anelastic relaxation via the process of stress-induced migration of interstitial atoms in octahedral positions of bcc lattices. From this idea, in addition to iron, several other bcc metals (e.g., Ta, Nb, Cr, V) are now known to exhibit the Snoek relaxation in one or more of these metals now includes H, O (and possibly B) in addition to C and N [3].

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by (bcc), O  
to occupy  
and N in the  
there are  
ctions and  
relaxation  
, Nb-O-O  
(7K), Ti-O-  
(23K) [4].

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## Back Ground

### Our previous work

The addition of carbon nanotubes (CNTs) to the MoSi<sub>2</sub> matrix results in the improvement in both **hardness** and **fracture toughness**. This is because that CNTs have the **good tensile strength** (200GPa) and **good modulus** (1TPa).

### The present work

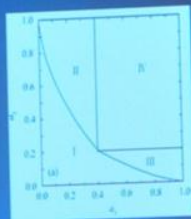
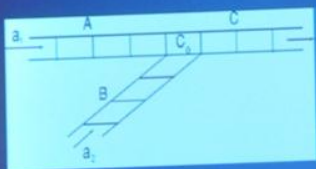
The **main purpose of this work** was to investigate the effect of CNTs content on the oxidation behavior and resistance of MoSi<sub>2</sub>-based composites at high temperature.

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### Typical onramp system of vehicular traffic flow



When changing the inflow rate of  $a_1$  and  $a_2$ , the system show four different phases.

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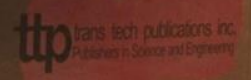


# Research Background



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# 1、The team of IPE

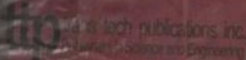


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