

**NATIONAL AEROSPACE UNIVERSITY “Khai”  
named by N. E. Zhukovsky**

**AIRCRAFT ENGINES MANUFACTURING TECHNOLOGIES  
DEPARTMENT**

**COST-EFFECTIVE TECHNOLOGY FOR  
GAS-TURBINE ENGINES COMPRESSOR  
OVERHAUL AND REPAIR**

**Presenter: Sergey Sergeyev, PhD**

# GAS-TURBINE ENGINES COMPRESSOR GUIDE VANE REPAIR



**TV3-117 TURBOSHAFT ENGINE**

**COMPRESSOR V-XI LEVEL  
GUIDE VANE D-RING**



# BLADES REPLACING PROCESS

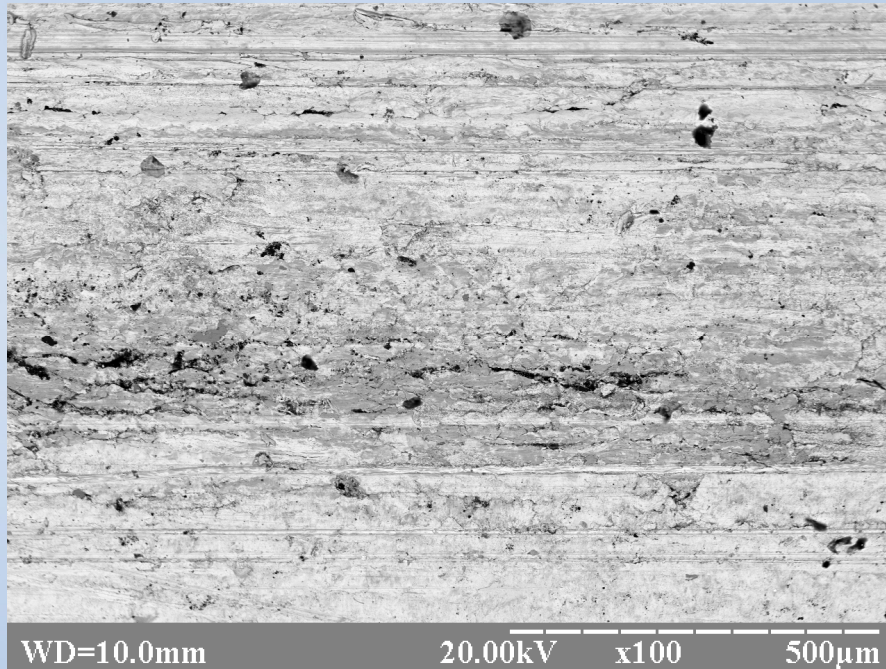


**A. Debrazed non-conditional blade place**

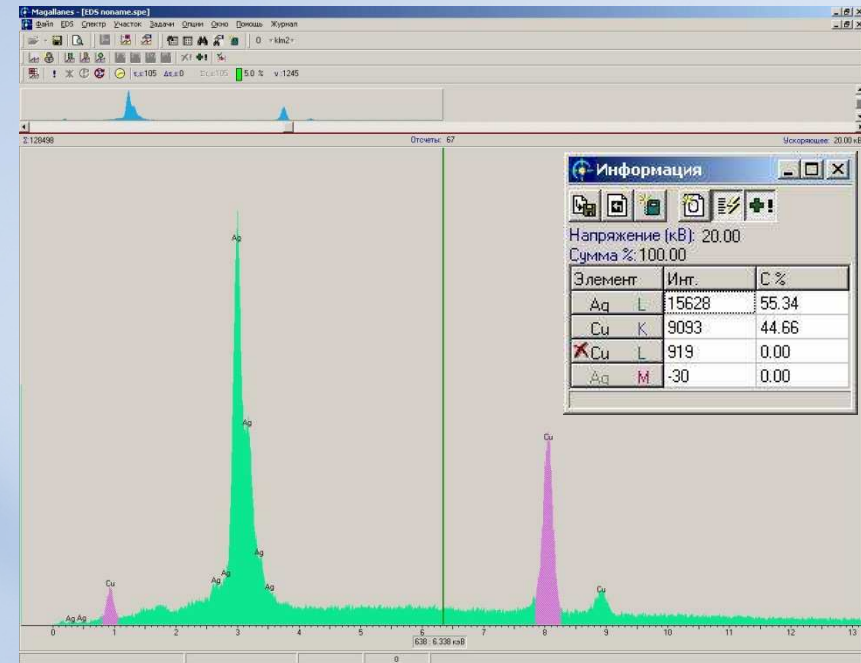


**B. New blade after brazing**

# BRAZING PROCESS RESEARCH RESULTS

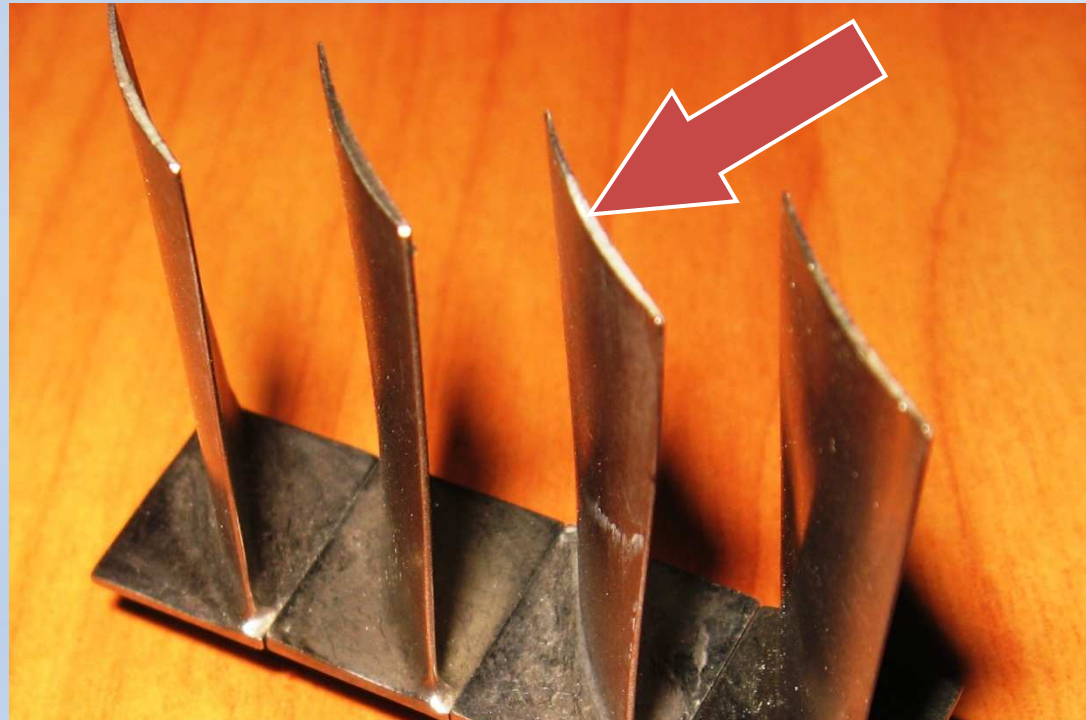


**A. Brazed joint  
microstructure (x100)**



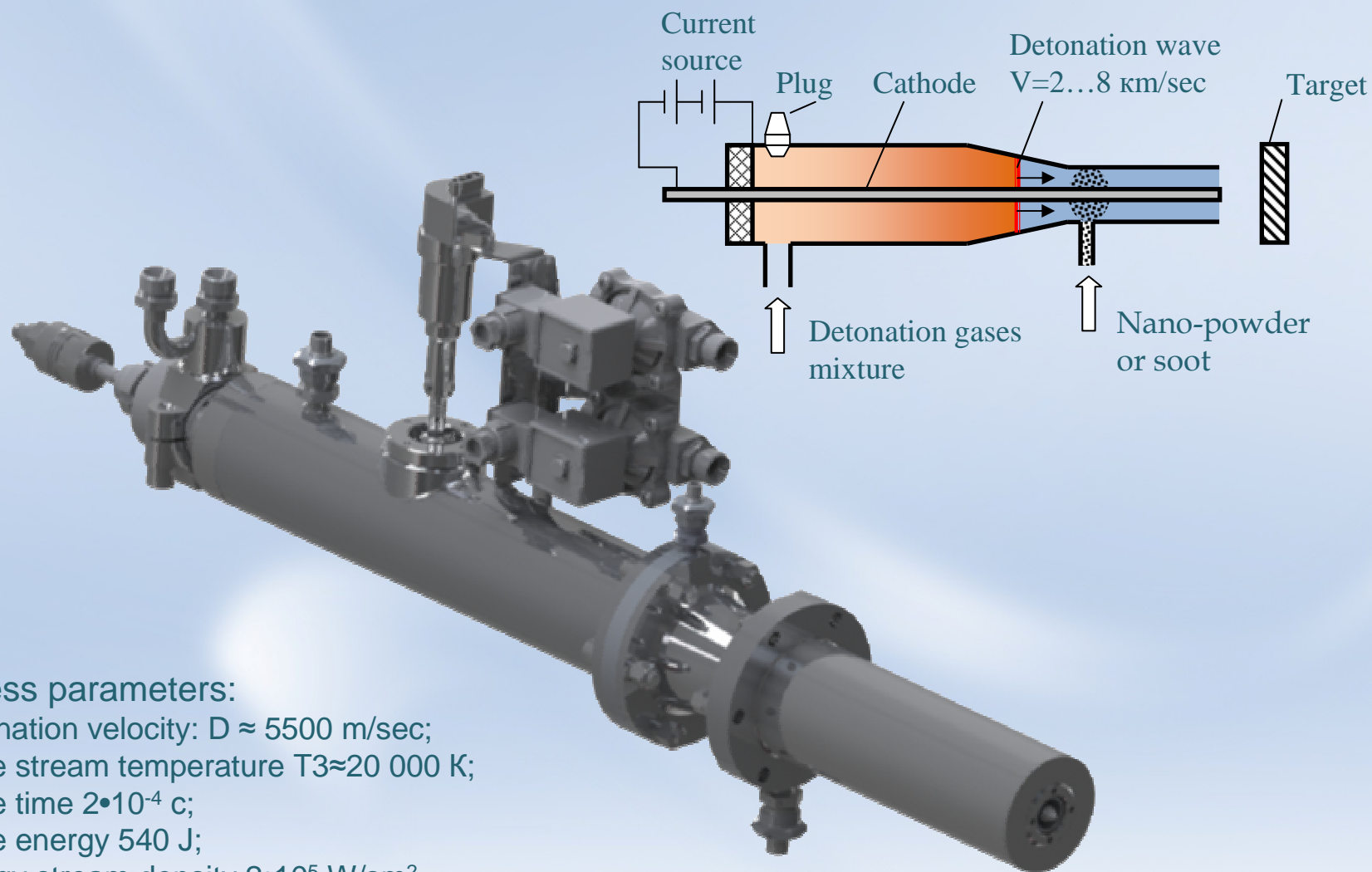
**B. Chemical composition  
analyze results for brazing  
material (PSR-50)**

# RESTORATION OF THE COMPRESSOR OPERATING BLADES PERIPHERY TECHNOLOGY



**Threadbare peripheral surface of operating blades**

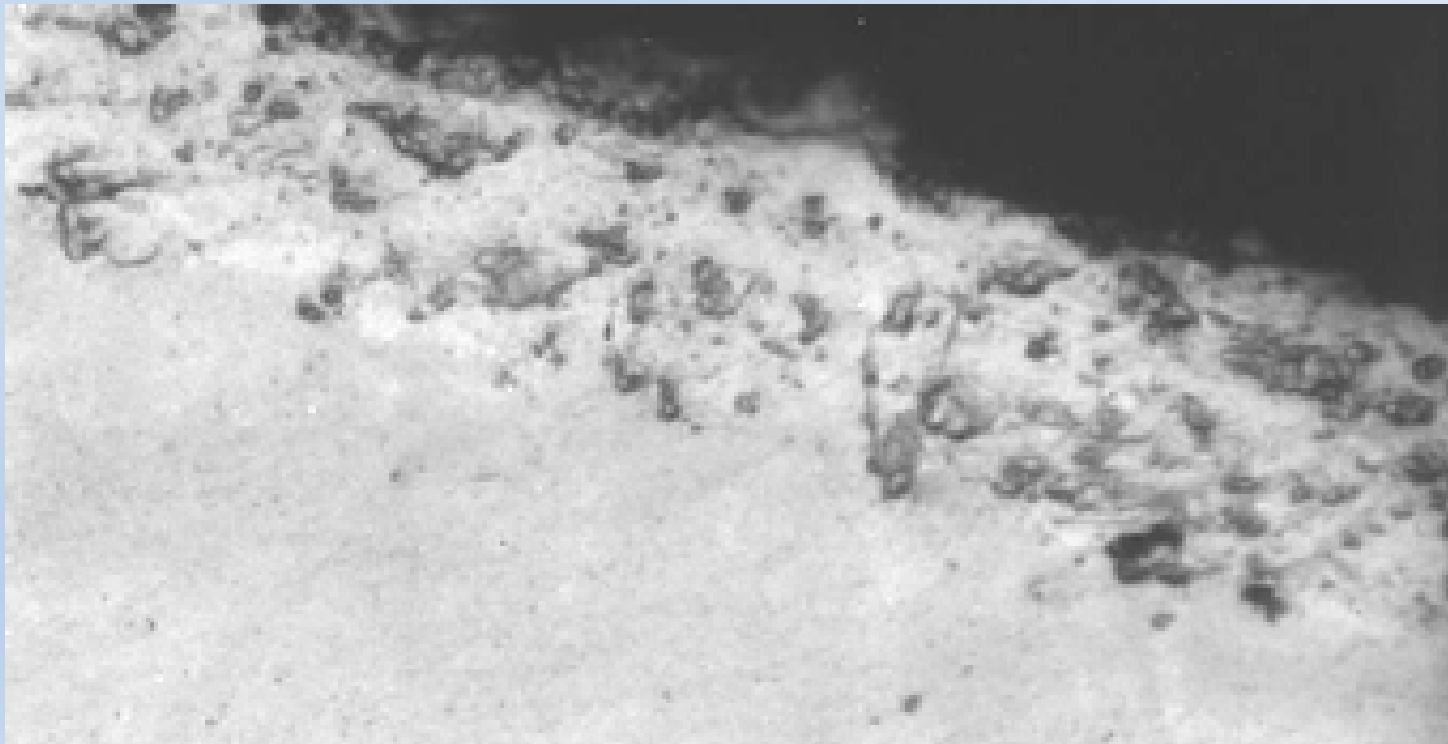
# EXPERIMENTAL DETONATION-PLASMA GUN DPU



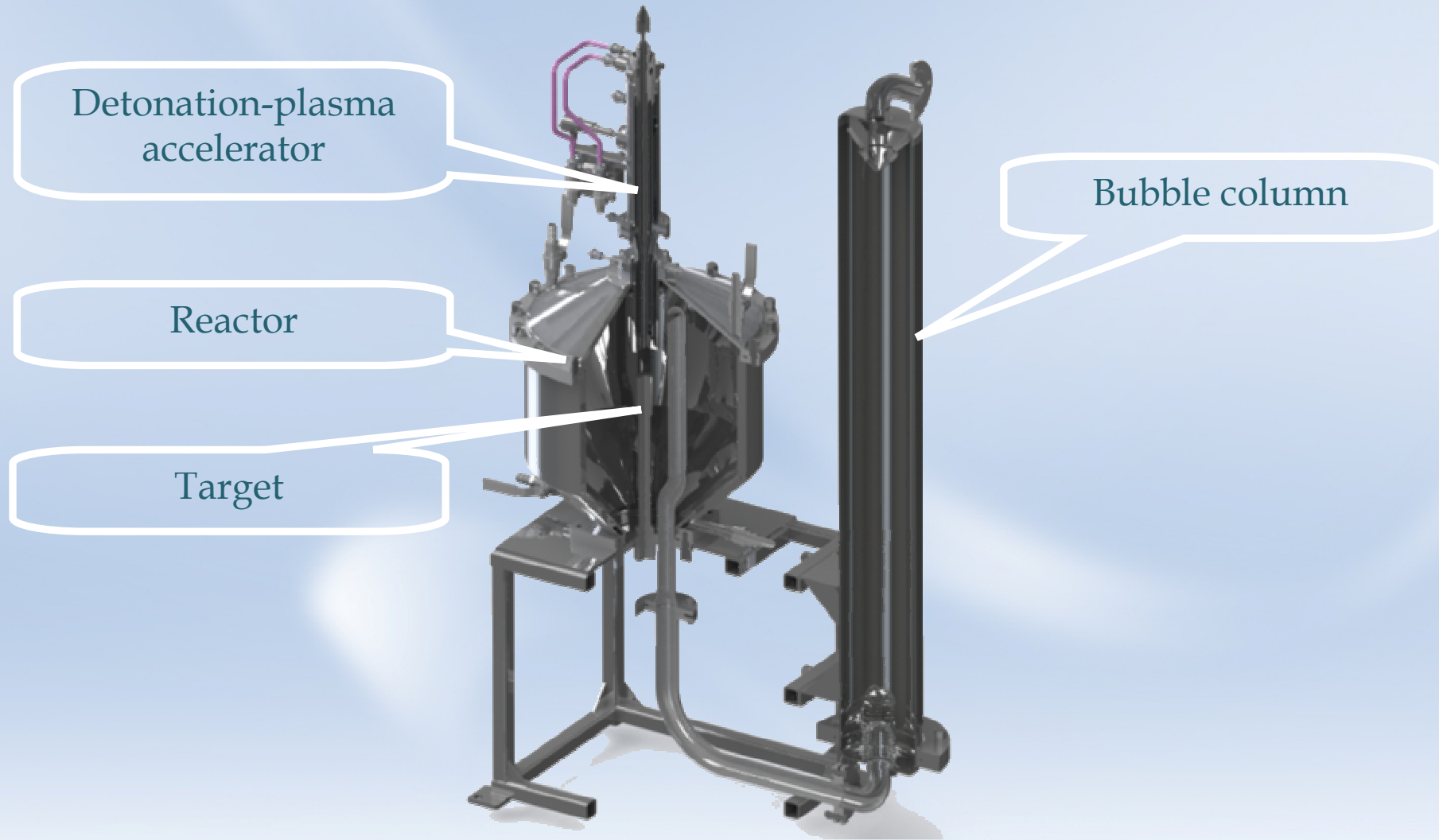
## Process parameters:

- Detonation velocity:  $D \approx 5500$  m/sec;
- Pulse stream temperature  $T_3 \approx 20\,000$  K;
- Pulse time  $2 \cdot 10^{-4}$  c;
- Pulse energy 540 J;
- Energy stream density  $2 \cdot 10^5$  W/sm<sup>2</sup>.

# WC detonation-plasma gradient coating on Ti alloy BT-3



# NANOPOWDER PRODUCTION PLANT BY KINETIC EXPLOSION METHOD





# COMPARISON OF THERMAL SPRAYING COATING METHODS

Method	Particle velocity, m/s	Adhesion (strength), MPa	Porosity, %
Powder Supersonic coating	600-800	20 - 80	1.0 - 6.0
Gas-Detonation coating	800-1500	100 - 260	0.5 - 5.0
Detonation-plasma coating	3000-4500	300-600	0.05 - 1.0