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LONG-LIFE ITEMS FROM TiC-Me CERMET

PRODUCT DESCRIPTION

- EXTREME ABRASIVE, THERMAL, CORROSION RESISTANCE
- UNIFORM HARDNESS THROUGH THE WHOLE STRUCTURE
- MUCH LOWER COST TO MANUFACTURE
- ABILITY TO FORM SOLID COMPLEX SHAPES

BALL VALVES
RING SEALS
CENTRIFUGAL PUMP IMPELLERS
PIERCING PLUGS
DRILL BITS
EXTRUSION SCREWS

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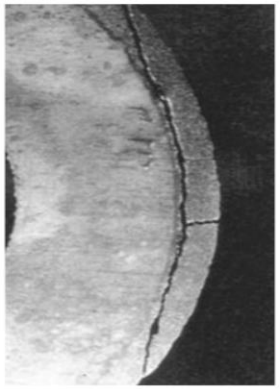
MAROMA - A FAMILY COMPANY WITH A BREAKTHROUGH INNOVATION

- ✓ 8 YEARS OF MARKET PRESENCE
- ✓ SOLID SCIENTIFIC BACKGROUND
- ✓ PERSISTENT AND COMPETENT CORE TEAM
- ✓ PROVEN RECORD OF VENTURE CAPITAL AND GRANTS
- ✓ STATE OF THE ART MANUFACTURING TECHNOLOGY WITH PROVEN INDUSTRIAL APPLICATIONS
- ✓ PATENTS IN THE USA AND RUSSIA
- ✓ COMPLETED PILOTS AND NUMEROUS EXPERIMENTS
- ✓ EXCELLENT QUALITY AT REASONABLE PRICES
- ✓ GROWING LIST OF INQUIRIES

PROBLEM

LOW RELIABILITY OF CRITICAL PARTS



COATING CRACK AND
PEELING OFF

COATING DAMAGE DUE
TO THERMAL SHOCK

HEAVY WEAR OF CENTRIFUGAL
PUMP IMPELLER

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SOLUTION

NEW MATERIAL FOR SEVERE CONDITIONS

TITANIUM CARBIDE (TiC) CERAMICS

HARDNESS AND WEAR RESISTANCE

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METALS

RESISTANCE TO THERMAL AND MECHANICAL IMPACTS

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MULTIPLE APPLICATIONS

GLOBAL TARGET MARKET IS ESTIMATED AT $15 BILLION+

OIL REFINERY, MINING, OIL PRODUCTION, TUBE ROLLING, CONSTRUCTION, MARINE, PETROCHEMICAL & EXTRUDERS, POWER & NUCLEAR



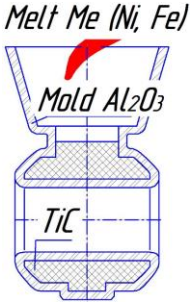





MANUFACTURING PROCESS

IN A PROPRIETORY VACUUM INDUCTION FURNACE

TITANIUM CARBIDE (TiC) POWDER FILLED AND COMPACTED INTO MOLD



TiC SINTERED AND SEMI-PRODUCT INFILTRATED WITH METAL MELT

TiC-ME BILLET REMOVED FROM MOLD

FINISHING

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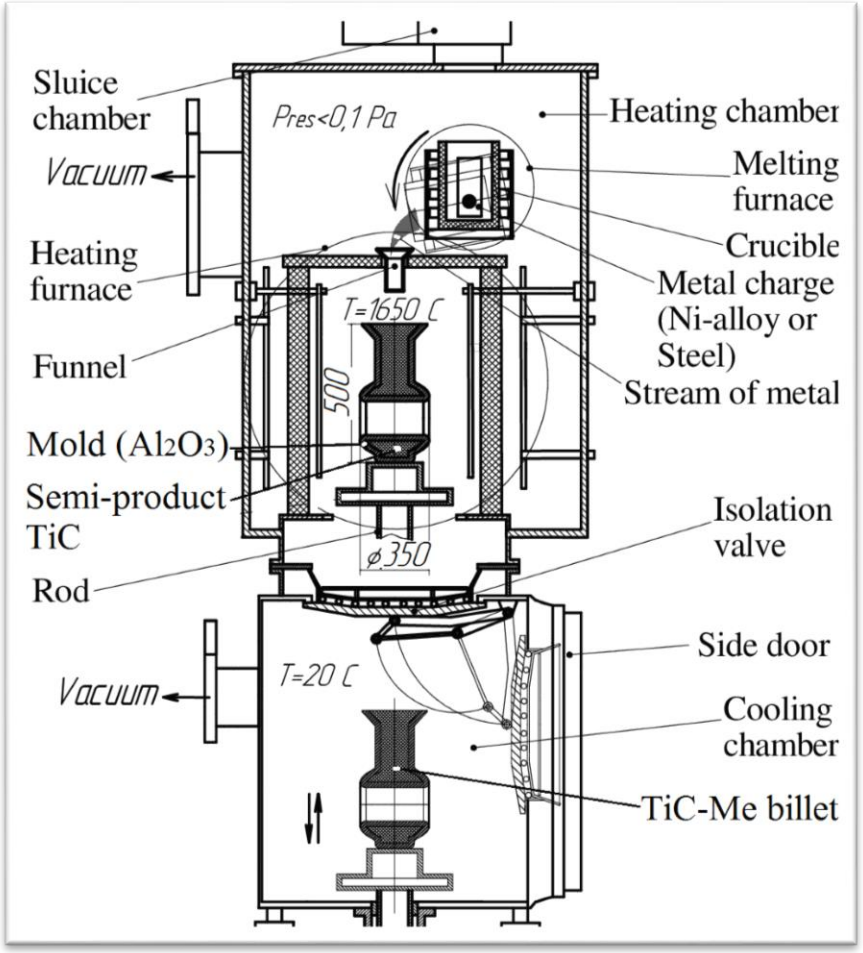
SPECIAL VACUUM INDUCTION FURNACE



✓ GENERATION OF RESIDUAL PRESSURE IN THE FURNACE CHAMBER NOT HIGHER THAN 0.1 PA

✓ TIC POWDER SINTERING IN THE MOLD: T=1650 ^{0}C

✓ INFILTRATION OF A POROUS SEMI-ITEM FROM TIC:
T=1500 ^{0}C

EXAMPLE

8 SETS OF BALL-TYPE CLOSING ELEMENTS: 8 BALLS AND 16 SEATS
CYCLE LENGTH: 6 HOURS

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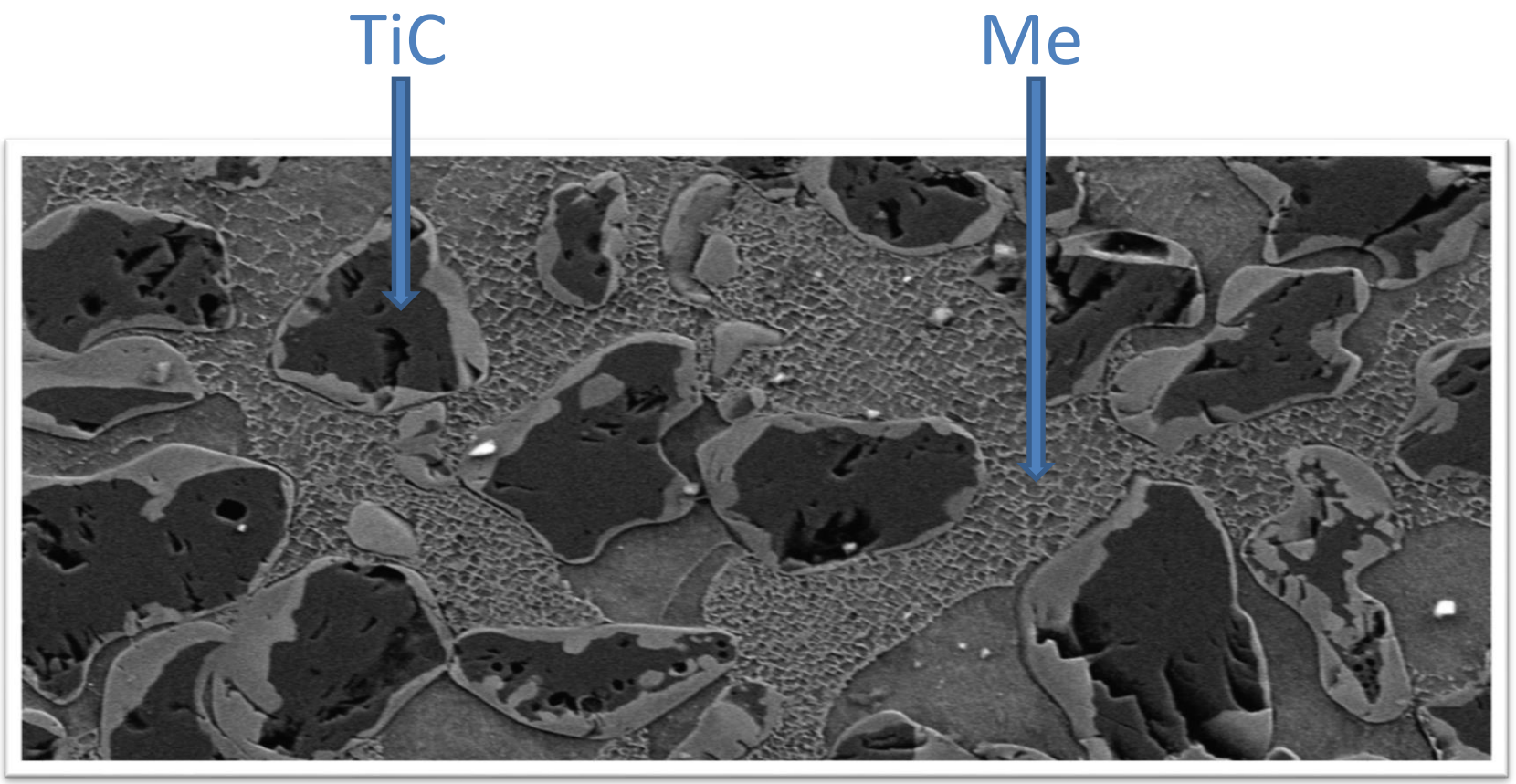
CERMET TiC-Me STRUCTURE



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TECHNOLOGY NOVELTY EFFECT

PRODUCING AN INTEGRAL COMPLEX-SHAPED LARGE ITEM FROM CERMET TiC-ME	OVERALL DIMENSIONS UP TO 400 MM (16 IN.)
ALLOWANCES & LABOR INTENSITY OF MECHANICAL TREATMENT REDUCED TO MINIMUM DUE TO SMALL SHRINK (<3%) DURING PRODUCTION	GRINDING: 0.5-1.5% OF THE ITEM SIZE BY DIAMOND TOOLS & ELECTROCHEMICAL TECHNIQUE
ENERGY CONSUMPTION REDUCED – NO NEED FOR MOLD HEATING BEFORE INFILTRATION	2 OPERATIONS COMBINED IN 1

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MAROMA CERMET ADVANTAGES

- ✓ UNIFORM HIGH HARDNESS THROUGH THE ENTIRE STRUCTURE (HRC 55…70)
- ✓ HIGH THERMO-MECHANICAL RESISTANCE TO IMPACTS
- ✓ WORKING TEMPERATURES UP TO 1200 ^{0}C
- ✓ EASY TO MANUFACTURE COMPLEX SHAPES WITH PRECISE GEOMETRY
- ✓ LOW PRODUCTION COST
- ✓ NOT DAMAGED FROM COARSE PARTICLES – HIGH ABRASION RESISTANCE
- ✓ UNIFORM THERMAL EXPANSION CHARACTERISTICS
- ✓ NO SURFACE COATING, NO PEELING

CUSTOMER'S BENEFITS

AIM
IMPROVEMENT OF EFFICIENCY

- ✓ LESS PRODUCTION DOWNTIME FOR REPAIR AND CHANGE OF CRITICAL PARTS
- ✓ EXPLOSION AND FIRE SAFETY
- ✓ ECOLOGY-FRIENDLY

RESULT
SUSTAINABLE TECHNOLOGICAL PROCESS

- ✓ REDUCTION OF DOWNTIME EXPENSES MIN BY 2 TIMES
- ✓ LIFE TIME OF ITEMS INCREASES MIN BY 6 TIMES
- ✓ LOWER EXPENSES FOR QUALIFIED REPAIR STAFF

MAROMA CERMET

PROVEN PERFORMANCE IN INDUSTRIAL APPLICATIONS

CONDITIONS	BALL VALVE DN50	RING SEAL DN500	METAL STAMPING TOOL D50	PIERCING PLUG D76
OPERATING TEMPERATURE, ºC	350	670	1000	1230
PRESSURE, MPa	4	0,5	≤ 150	≤ 250
ABRASIVES	3-5%	5%	-	-
RELIABILITY	> 9000 CYCLE „OPEN-CLOSE”	> 750 CYCLE „OPEN-CLOSE”	975 STAMPINGS	> 10 PIERCINGS
RESULT	>6 YEARS CONTINUOUS OPERATION	>5 TIMES LONGER LIFE	>3 TIMES LONGER LIFE	>10 TIMES LONGER LIFE

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COMPARISON WITH COMPETITORS

EXAMPLE IS BASED ON BALL VALVES

PRODUCT	COST	SERVICE LIFE	RESISTANCE TO ABRASIVE ENVIRONMENT	THERMAL RESISTANCE "HEATING AT 600 ^{0}C - WATER COOLING AT 20 ^{0}C"
BALL VALVE MAROMA (BALL AND SEATS FROM CERMET)	√√	√√√	√√√	√√√
GATE, VALVE (NUMEROUS MANUFACTURERS)	√	√	√	√√√
BALL VALVE (MULTIPLE COATINGS - MOGAS, ARGUS, VELAN)	√√√	√√	√√√	√√
BALL VALVE (BALL AND SEATS FROM PURE CERAMICS - CERASYSTEM, FRIATEC)	√√√	√√	√√√	-

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SEEKING

- INDUSTRIAL COMPANY FOR IMPLEMENTING CERMET TiC-Me PRODUCTION TECHNOLOGY (INVESTMENTS ~1 MILLION €)

OR

- STRATEGIC PARTNERSHIP WITH INDUSTRY PLAYER TO BUILD FULL PRODUCTION FACILITY (INVESTMENTS ~2 MILLION €)

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CORE TEAM

CEO
INVENTOR

RUSTAM
MAMLEEV

ITEMS FROM CERMETS
BASED ON
TiC, WC

30+ YEARS OF EXPERIENCE
50+ PUBLICATIONS
20+ INNOVATIONS

BUSINESS DEVELOPMENT DIRECTOR

GRADUATE OF THE PRESIDENTIAL
MANAGEMENT TRAINING
PROGRAM

ROZA
MAMLEEVA

CTO/GLOBAL MARKETS CONSULTANT

CEO OF NOBLE PRODUCTS GMBH

ZEMFIRA
STOIYE