

# Russian Market of Bimetals for Mechanical Engineering



SC Metal Market LLC

2012

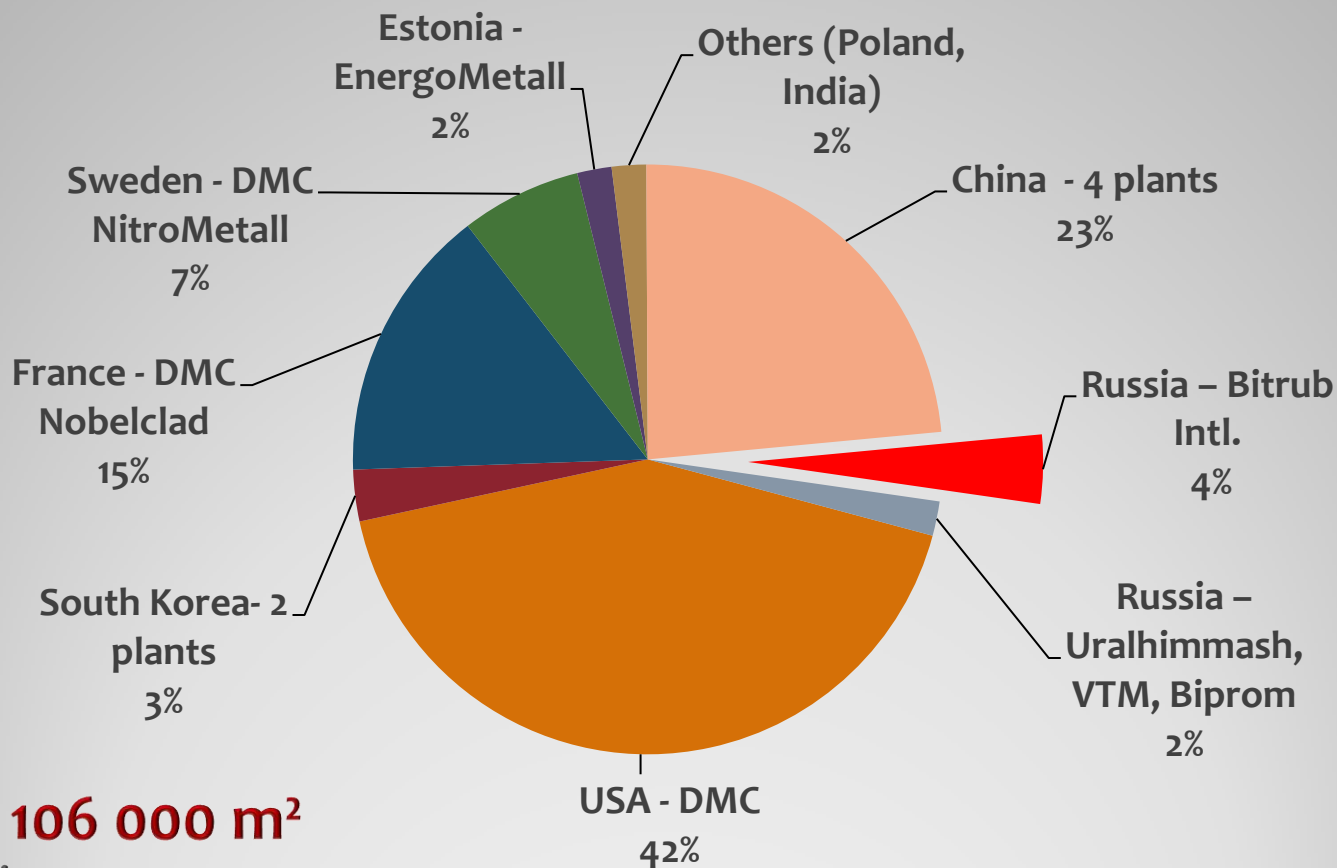
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# 1. Volume of Production of Bimetal

Yearly production of bimetal by explosive welding in world\*

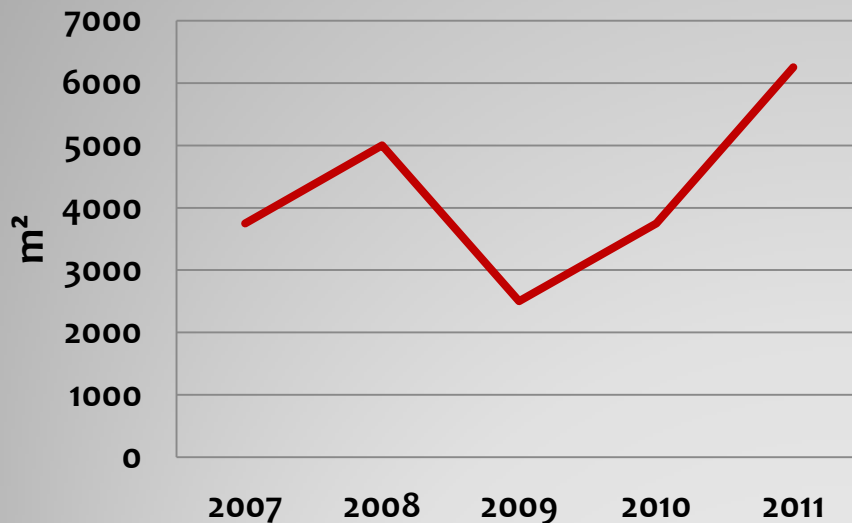


**Total: 106 000 m<sup>2</sup>**

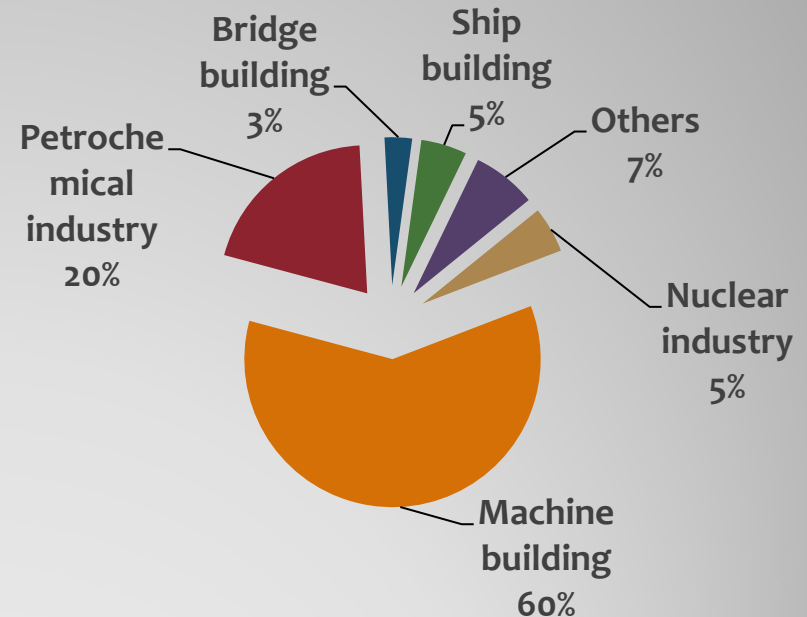
\*Evaluation

## 2. Consumption of Bimetal in Russia

### Dynamics of production of bimetal in Russia



### Structure of consumption of bimetal in Russia\*



Average annual growth rate up to 2007 made up 15%

Expected growth for 2012-2014 – 25%

\*Evaluation of SC Metal Market LLC

### 3. Methods of Production of Bimetal Consumed in Russia

#### PACK ROLLING

Voest-Alpine,  
Izhorskiy Zavod

High productivity

1. Requires a powerful rolling equipment
2. Large quantity orders
3. Limits on the range

#### ELECTROSLAG SURFACING

Institute of  
bimetal alloys

May be combined with  
steel production

1. Requires a powerful rolling equipment
2. High electric power and surfacing materials consumption
3. Limits on the range

#### EXPLOSIVE WELDING

DMC,  
Bitrub Intl.,  
Uralhimmash,  
VTM

1. No restrictions on the range
2. Universality
3. Ability to produce bimetal of any quantity
4. The minimum electric power consumption
5. Coefficient of materials consumption– 1,05
6. Initial material do not undergo any changes

1. Requires special firing fields for explosive works
2. Required heat treatment and leveling equipment

# 4. Quality Analysis

## 4.1. Bimetal grades

Bimetal grades*	Bimetal characteristics				Base material characteristics			
	Breaking str MPa	Shear stress MPa	Bend test 180°	Lateral bending test	Tensile str MPa	Yield str MPa	Elong %	KCU, Joule/cm <sup>2</sup>
09Г2C+AISI 410S	297-347,4	150-345,5	+	+	462	352	35	
09Г2C+AISI 321	557-565	286-395	+	+	493	282	29	at t=20°C 290-325 at t=-70°C 71-219
12XM+AISI 321	449-581	321-480	+	+	508	275	27	
09Г2C+AISI 316Ti	430-470	350-370	+	+	480-530	310-360	27-32	at t=40°C 210-250
09Г2C+AISI 316L	480-510	330-350	+	+	500-520	320-420	21-32	at t=40°C 200-250
12XM+AISI 316Ti	460-520	390-520	+	+	490-520			at t=20°C 90-210

\*09Г2C = SA 516 Gr.60/70

12XM = SA 204 Gr A, B / SA 387 Gr12

# 4. Quality Analysis

## 4.2. Results of ultrasonic testing

Bonding class to GOST 10885-85	Defect area cm <sup>2</sup>	Type of defect	Steel grade, dimensions (mm)			
			09Г2С + TP316Ti 23(20+3)x1400x5900		09Г2С + TP321 45(41+4)x1400x5900	
			Quantity of plates, pcs			
			Total	Defective	Total	Defective
I	10-50	strength stabilization	21	0	208	0
		faulty fusion		1		3
		surface blowhole		0		1
II	20-100	strength stabilization		0		0
		faulty fusion		0		0
		surface blowhole		0		0
III	50-250	strength stabilization		0		0
		faulty fusion		0		0
		surface blowhole		0		0

\*09Г2С = SA 516 Gr.60/70

## 4. Quality Analysis

Bimetal plates before and after  
heat treatment and leveling



**BEFORE**



**AFTER**



## 4. Quality Analysis

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### 4.4. Main standards that cover quality requirements of bimetal produced by explosive welding

1. GOST 10885-85 “Hot-rolled corrosion-resistant clad steel sheets”
2. TU 27.32.09.010-2005 “Two-layer stainless steel plates produced by the method of explosive welding”
3. TU 27.81.09.009-2005 “Two-layer steel-titanium ingots, produced by the method of explosive welding”
4. EXPLOSION BONDED CLAD METALS NC 501 General Specification
5. AD Merkblatt W8, Juli 1987, Specification 1264

# 5. Geography of supplies

**09Г2С + Тр316Тi**

Dzerzhinskhim mash ZIO-Podolsk  
Volgogradneftemash  
Salavatneftemash  
Penzkhim mash Rosneft  
Kurganhim mash  
Glazovhim mash

\*09Г2С = SA516 Gr60/70



**09Г2С/12ХМ + Тр321**

Kaluga Turbine Works Kurganhim mash  
Volgogradneftemash  
Penzkhim mash Mostotrest  
Rosatom Zenit-Him mash  
Glazovhim mash

\*09Г2С = SA516 Gr60/70  
12ХМ=SA204 Gr A,B / SA387 Gr12

**09Г2С + 08Х13**

Dzerzhinskhim mash  
Glazovhim mash  
Zenit-Him mash  
Uralhim mash

\*09Г2С = SA516 Gr60/70  
08Х13=AISI403



**09Г2С + BT1-0/163/М1/АI**

Kaluga Turbine Works  
NIIPThim mash  
Sibelectrotherm  
Rosatom

\*09Г2С = SA516 Gr60/70  
Ti, brass, Cu and Al grades

**Thank you for attention!**

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