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SUSPENSION BRIDGE OVER THE DANUBE IN BRAILA AREA 1ST MODERN LONG SPAN SUSPENSION BRIDGE OVER THE DANUBE

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1. Introduction

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1. Introduction



Resources, Energy and Environment



- Carbon solutions
- Gas turbine/Diesel engines/ Gas engines
- LNG receiving terminal
- Process plants
- Pharmaceutical plants
- Environmental response plants

Social Infrastructure and Offshore Facilities



- Bridges
- Watergates
- Tunnel boring machines
- Concrete solutions
- Transportation systems
- Security
- Urban development
- Environmental monitoring

Industrial Systems and General-purpose Machinery



- Compressors
- Separators
- Cryogenic product
- Turbochargers for vehicles
- Logistic systems
- Heat treatment and surface engineering
- Agricultural machinery
- · Life associated equipment

Aero Engine, Space and Defense



- Aero engines
- Air traffic control
- Rocket systems and space exploration
- Defense equipment and system



2. Project information



Project:	Proiectare si Executie "Pod Suspendat Peste Dunare in Zona Braila"		
	Design and Construction for Suspension Bridge over the Danube in Braila area		
Client:	CNAIR / Compania Nationala de Administrare a Infrastructurii Rutiere		
Engineer:	MISA / METROUL SA - ITALROM INGINERIE INTERNATIONALA SRL – SISTEMA INGEGNERIA SRL - AREX LIDER COMPANY SRL JV (Joint venture by 3 Romanian and 1 Italian Companies)		
Contractor:	Webuild - IHI JV (JV ratio = 60:40)		

Duration: 48 months (Design 12M + Construction 36M)

Warranty period: 120 months after completion



2. Project information (2/3) – Overall layout





2. Project information (3/3) – Bridge general arrangement



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2. Project information (3/3) – Bridge general arrangement







- Suspended deck : 21,000t
- Main cable : 6,800t
- Concrete volume : 200,000m³ (Lean concrete: 70,000m³)

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3. Topics for suspension bridge

- 1) Aerodynamic stability and wind tunnel tests
- 2) Main cable erection
- 3) Deck erection
- 4) Main cable wrapping



3. Topics for suspension bridge (1/2) – Wind tunnel tests



	Mid center	Deck end
Vehicle load (UDL)	↓ ~5.2m	⇔ +/-0.8m
Temperature change 50°C (+40°C)	↓ 1.5m	←0.4m, 0.6m→

3. Topics for suspension bridge (2/2) – Wind tunnel tests











3. Topics for suspension bridge (1/1) – Main cable erection



3. Topics for suspension bridge (1/1) – Steel deck fabrication







- Fabrication shop in Braila
- VARD Shipyard
 (Fincantieri's subsidiary)
- 21,000t for 24 months
- 86 blocks
- 9km away from site

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Typical deck segment will be lifted from barge by four sets of 2000 kN class strand jacking system. After reaching to the designated height, the deck segment is connected to the hanger cables and transferred the load to hanger cables by releasing the strand jacking systems. The jacking system consists of a strand jack and a strand reel, a pump unit and a generator to drive them, lifting girder, a scaffolding for work, and temporary cable clamps installed to main cable.











All wrapping work shall be executed with machine controlled operation tensioning wires for the target of 2200N, tolerance is +/- 200 N so that the induced tension falls within the specification requirement maximum 2400N. Entire machine frame moves to the spot by winch, then the wrapping frame wraps the wires in clockwise rotation. As wrapping frame rotates, the frame travels forward with rack and pinion system. Wrapping work shall be done up-ward direction.















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