





BSRM Xtreme

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FIRST  
BSRM  
NATIONAL  
SEMINAR  
ON

TALL BUILDINGS

September 1, 2012



It is with a sense of pride and pleasure I look back at our journey of the last 60 years in building a world class steel company in our beloved country. It is a tribute to our country's engineers and other professionals who have proudly and tirelessly worked to produce a 'Made in Bangladesh' technologically advanced high strength steel which is used by all the foremost foreign and national contractors in all the leading infrastructure projects of the country.

BSRM produces a family of large diameter, reinforcing bars, ranging in size from 25mm to 40mm, which combines high strength with high ductility. This is ideal for applications in tall residential and commercial structures.

BSRM has organized the Tall Building seminar as part of its larger social responsibility in addressing the challenging urban problems of the country. It has brought under one roof the country's top engineering and architectural minds to discuss and debate in providing cost effective solutions to our urban residential problems. I wish the Tall Building seminar a success.



Alihussain Akberali FCA  
Chairman of BSRM Group



It is with a sense of pleasure and pride I welcome all the participants of the First BSRM National Seminar on Tall Buildings. I remember, with a sense of nostalgia, the first Tall Building seminar I had organized in 1993 along with a few colleagues from Institution of Engineers, Bangladesh (IEB), Institute of Architects, Bangladesh (IAB) and Bangladesh Institute of Planners (BIP).

Tall Buildings are indispensable in addressing the acute urban problems of our country. The high price of land coupled with poor road connections has resulted in a host of grave urban problems which could be mitigated by optimum land use. Moreover, increasing population in rural areas is leading to rapid encroachment of agricultural land. If this is allowed to continue, our agricultural production will not be sustainable. In order to limit the land area for use in rural housing as well as industrial structures, we have no option but to go for multistoried buildings.

Tall Buildings, for both residential and commercial purposes, can play a very important role by not only economizing on use of scarce land but by recycling waste water more efficiently and conserving energy as well.

I would like to congratulate BSRM for taking the initiative of organizing this National Seminar on Tall Buildings. I wish the seminar success.



Prof. Dr. Jamilur Reza Choudhury  
Vice Chancellor, University of Asia Pacific

The Tall Building Edge

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In 2008, BSRM changed the market landscape for construction steel by introducing a new generation high strength reinforcing bar which could be welded under field conditions. The bar conformed to the global standard ISO 6935-2. It also



A view from the pulpit of the BSRM rolling mill in operation

8mm to 20mm rebar sizes form the bulk of the construction industry's consumption. These bar sizes are used in the majority of residential and commercial constructions in the country. The 25 mm to 40mm bar sizes are used in tall building

only mill in the country to have installed European rolling mill and Quality inspection technology. This ensures further precision and reliability in the products delivered to customers.

Lastly, but not the least, BSRM has made the most extensive investment in recruiting and training the best quality manpower in the country. Quality at all stages, is ensured by the most extensive human resource development program found anywhere in the country.

BSRM engineers and technicians and quality control specialists have received extensive training in the best steel plants in Germany, Italy and S. Korea to gain exposure to the best world class practices. In fact, at BSRM, "Quality is our way of Life" is not just a slogan; it is a daily reality lived up to by more than a thousand plus members of the BSRM family.



conformed to the German standard DIN 488 Bst 500, the U.K. standard BS 4449 Grade 500, the Australia New Zealand standard AS/NZ 4671 and the Indian standard I.S.1786 Gr.500. It may be noted that in 2009 the Bangladesh Standards Testing Institution (BSTI) adopted the ISO standards for product quality conformance and testing. Thus the new product also fully conformed to the national standard as required by BSTI. The new product also conformed to the traditional ASTM 615 standard which was widely specified in the country's construction industry.



Bar rolling in the continuous stands of the mill

The new steel reinforcing bar had guaranteed yield strength in excess of 500 MPa or 72,500 psi. Despite the high yield strength, the new steel was remarkably ductile. It could be bent and cold formed easily and safely, at the construction site, without the danger of cracking or breaking.

Furthermore, BSRM embarked on enhancing the scope of the product line from 8mm to 40mm; there are very few rebar producers in the world offering such a wide spectrum of products. The

framework and bridge pier construction. The Shah Amanat bridge over the river Karnaphuli in Chittagong relied exclusively on BSRM's high strength reinforcing bars in the Grade 500 series, Xtreme500W. Most of Dhaka's large infrastructure projects such as the 9.3 km long Mayor Hanif Flyover have relied exclusively on the reliability of BSRM's large diameter bar sizes. Tall residential and commercial buildings in Dhaka and Chittagong have been built almost exclusively by BSRM's high strength and high ductility rebar.

The hallmark of BSRM's manufacturing capability lies in its Quality Control and Assurance (QC & A) system which is unique in the country. The QC & A regime begins at the raw material procurement stage at BSRM. Only the raw and intermediate materials conforming to BSRM's exacting standards are used in the manufacture of the final product. This eliminates a great deal of uncertainty of stray non conforming products being manufactured and delivered to the customer. In the second stage, BSRM further ensures quality by using world class manufacturing equipment; it is the



The Shah Amanat Bridge over the river Karnaphuli in Chittagong built with Xtreme500W

The BSRM edge in the manufacture of high strength Grade 500 rebar, well known from its trade name, as Xtreme500W, is in the assurance in a measure of Ductility, known as 'Elongation at Maximum Force'. Traditionally, bar elongation was measured at fracture, which is the sum of elastic and plastic behavior of steel, known as total elongation.



Mayor Hanif Flyover in Dhaka being built with Xtreme500W

Total elongation, while providing a relatively simple method of measuring elongation, is misleading which can at times lead to dangerous assumptions. The useful elongation is indicated by elongation at maximum force which measures useful ductility of a material. Elongation at Maximum Force is the only measure of Ductility useful to civil engineers and designers when designing structures with plastic limit capacity. BSRM is the only manufacturer of Grade 500 bars which ensures this unique and vital property in its manufacturing and quality assurance scheme.



Stress-strain diagram showing elastic, yielding, strain hardening, and necking regions. The diagram labels the proportional limit, elastic limit, yield stress, ultimate stress, and fracture. It also indicates the elastic region, yielding, strain hardening, and necking stages of plastic behavior. The x-axis is labeled 'strain ε' and the y-axis is labeled 'σ stress'. Key points on the curve are labeled:  $\sigma_u$  (Ultimate stress),  $\sigma_f$  (Fracture stress),  $\sigma_y$  (Yield stress), and  $\sigma_{pl}$  (Proportionality limit). The diagram also shows 'Elongation at Max. Force' and 'Total Elongation'.

Symbol	Description
$\sigma_u$	Ultimate stress
$\sigma_f$	Fracture stress
$\sigma_y$	Yield stress
$\sigma_{pl}$	Proportionality limit

Nomenclature in Tensile Test of Steel