

roach, to calculate the requirements and to get people interested in making them available in the time they want for such a massive effort of welfare effecting not merely this industrial belt but its whole hinterland of 1,50,00,000 people.

I would request all to consider the problem of unemployment in the State and make our deliberations labour-oriented as far as possible and suggest measures which will

help in combating this also—at all levels.

Great stakes are involved in this effort and these cannot be calculated in terms of profits and losses only and here is a challenge before our Engineers and Entrepreneurs which I am sure they will face boldly.

I wish all success to this Conference and thank the organisers for the effort and also for allowing us to participate in this.

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Papers for Session S-1

1. Precast Concrete—the Building Material of the Day by Dr. **K K. Banerjee**, Professor, Bengal Engineering College.

Although the history of concrete dates back to the Egyptian time, precast concrete is a recent development and is considered as the most versatile building material at the present time. In advanced countries precast concrete components are produced in mass in the factories thus saving in material, cost and time of construction for buildings and bridges. Most up-to-date knowledge in cement and concrete is being utilised and various types of cement and aggregates are employed. Various types of machines and equipment have been developed for the precast concrete industry. Particular attention has been very recently paid in producing lightweight concrete products so as to reduce handling, transportation and erection cost, which account a considerable proportion of the total cost.

Unfortunately in India large-scale use of precast concrete is not made but only a beginning has been made. Neither various types of cement nor sophisticated equipment are available. The Experimental Building in precast concrete has been particularly built at the Bengal Engineering College to explore possibilities in this direction under typical Indian conditions that exist today. However, it is believed that with gradual and increasing use of precast concrete in buildings much of the draw back that exist will be overcome.

It is emphasized that only precasting of buildings can cope with shortage of material and the unusually long period of construction time.

[The lecture was illustrated by slides]

2. Production and Inspection of Rail road Rails by Sri. **S. K. Lahiri**, Director, Indian Standards Institution.

The process of making steel and roll-

ing of rail section to proper contour warrant many a problem, in precision manufacture of rails. The inspection of rails is a very responsible job as any fault would be fraught with hazard of lives and properties.

3. UCOPAN system of Housing—
Durgapur experience by Sri
P. K. Saha, Asansol Planning
Organisation. (The paper was
read by Sri A. Bhattacharyya)

Prefabricated units used for the experiment at Durgapur, are the Universal Concrete Panels (UCOPAN) as developed by Dr. Z. A. Zelinsky, a Ford Foundation consultant at the Calcutta Metropolitan Planning Organisation.

UCOPAN is a modular structural system allowing for the construction of single or multistoried houses consisting of rectangular rooms. Walls, floor, and roofs are constructed with the same type of modular prefabricated panels. There are only two basic modules—one for walls and the other for floor and roof, made out of two separate forms or from the same form with different types of removable sides. There are solid and open panels—the latter for doors and windows, as well as panels with extensions on one or both sides and the top, which are produced from the same basic form with special inserts depending on requirement of panels.

While economy in terms of time could be established in favour of UCOPAN we are still not in a position to say so regarding economy of cost.

Beside cost, time factor and adaptability to mass construction techniques we are fully aware that for its acceptance in the housing market, UCOPAN houses would have to be satisfactory on some more aspects such as long term economy, heat and sound insulation, water proofing etc. The basic material of construction being reinforced cement concrete the effective life span of UCOPAN houses could be taken as longer than those built with cement brick work. Maintenance cost over the years is also expected to be minimal since thick plastering coat is not used here and that ageing is not of much prominent in RCC construction. However RCC in general is not very water proof. In spite of the rich mix used (4:2:1 with $\frac{1}{2}$ " down graded stone chips) and the quality control which can be enforced in the panel casting, the units being only 1.5" thick damping of the external walls during prolonged rainfall of moderate intensity can not be ruled out. Leaking of the joints may also be a problem though not of very high magnitude since the joints have eight inches deep concrete in them. But sound and heat insulation could really be a problem and in case of extreme weather such as in Durgapur, we may have to go in for some insulation for the external walls and the intermediate floors.

Success of UCOPAN as a building component in the ultimate analysis will depend inter alia on its acceptance by the public in general.

[The lecture was illustrated by slides.]

4. Rational Exploitation of Strength of Reinforcement Bars, by Sarvasree **A. B. Naik, B. S. Bulsarai and M. C. Thakkar**, *Lecturers in Applied Mechanics*, Sardar Vallabhbhai Regional College of Engg. & Tech., Surat.

(Paper presented by Prof. A. B. Naik)

The reinforced concrete is the most popular construction material and widely adopted construction technique in this country. The mild steel bars used in this construction are rolled with a specific chemical composition irrespective of the diameters of the bars.

Prior to the first world war the value of allowable stress in steel in tension was 12,000 psi (8.45 Kg/mm²). From the point of the view of steel shortage the stress value was increased to 16,000 psi (11.3 Kg/mm²) during the first world war. Similar rise was also observed during the second world war. It was further increased to the value of 18000 psi (12.7 Kg/mm²). Now the value stands at the figure of 20,000 psi (14.00 Kg/mm²) for smaller diameter bars and 18000 psi (12.70 Kg/mm²) for larger diameter bars in I. S. 456 : 1964. Such increases in stress values indicate the necessity for rationalising these values, not only for bars but for all the rolled steel sections.

The stress value specified in the relevant I.S. requires very urgent consideration for rationalisation. Such an amendment will have considerable impact on the cost of the structures. A very exhaustive testing is necessary for establishing these values not only for

m.s. bars but for other rolled steel sections also. The saving on a national level will pay off more than the cost of such an investigation. Even 10% saving per year amounts to about 11,40,000 tonnes of steel costing about rupees twenty crores.

It is recommended that till exhaustive testing is taken up and final results are available the ranges may be maximised in the first instant and the rational yield stress values be specified in the ranges as shown below :

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| 1. 6 mm to 8 mm
(inclusive) : | 35 kg/mm ² |
| 2. Above 8 mm to 12 mm
(inclusive) : | 30 kg/mm ² |
| 3. Above 12 mm to 20 mm
(inclusive) : | 28 kg/mm ² |
| 4. Above 20 mm : | 26 kg/mm ² |

5. Roof Terracing Compound by :
Sri S.N. Bandopadhyaya, former Chief-engineer, Construction Board.

Water proofing of terraces is a must in building industry and the practice of using patent water proofing compounds is widely followed. Chemico-cement water proofing Industries (P) Ltd. is engaged in the production of water proofing compounds and good results have been achieved by their product.

Brig. K. C. Soni, Chief-Engineer, Eastern Command in winding up the discussion, referred to salient features of the papers. He mentioned about the pre-fabricated construction as prevails in the army.