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## V a 2

### Discussion - Diskussion - Discussion

**Assemblages des éléments dans les constructions composées préfabriquées  
(C. Fernandez Casado, L. Huarte Goñi, V a 1)<sup>1</sup>**

*Verbindung der Konstruktionsteile bei zusammengesetzten vorfabrizierten Bauten  
(C. Fernandez Casado, L. Huarte Goñi, V a 1)<sup>1</sup>*

*The Joining of Structural Members in Composite Prefabricated Structures  
(C. Fernandez Casado, L. Huarte Goñi, V a 1)<sup>1</sup>*

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The Paper by CASADO and GOÑI is of particular interest as it gives an opportunity to discuss in detail some basic principles relating to the formation of joints between pre-cast concrete members. To those closely concerned with the development of this type of construction careful attention must be focused on the necessity for developing joints that give adequate strength and rigidity combined with economy and speed of erection.

The Paper states that the left-hand joint shown in Fig. 4 is made monolithic by welding and grout injection. While I would agree with grouting, preferably in the form of fine concrete, for the top part of the joint, the tension zone, I would not recommend this procedure for the bottom part, the compression zone. My proposal would be that having positioned the beam on its bearing on suitable packers and carried out the welding, grout-tight formwork should be fixed to cover the bottom of the vertical joint and vertically on each side an inch or so, to the top of the steel only, the void thus formed being filled with a stiff grout. The remainder of the lower vertical joint and the horizontal bearing can then be formed by means of dry packing and the workman will be able to see the efficiency of his work at all stages. My proposals

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<sup>1</sup>) Voir «Publication Préliminaire» — siehe «Vorbericht» — see “Preliminary Publication”, p. 731.

would, of course, apply if high compression were expected, if not, grouting would be quite adequate.

Presumably the Authors' intention is to make the joint shown in Fig. 9 fully rigid. Rigidity of joint can only be obtained by tightening the bolts sufficiently to give good contact between the concrete surfaces but as there must be adequate clearance to allow the beam to enter the forked end, this tightening would tend to crack the forks unless the clearance space had been taken up by grouting or packing. Furthermore, for complete rigidity it would be necessary to grout up the bolt hole clearance spaces unless high tensile bolts tightened by means of a torque wrench were used. There do, therefore, appear to be site expenses which might well bring the cost of the joint up to that which would be obtained if the joint were made by reinforcing bars from the ends of the joint-members projecting into a gap filled with a rapid-setting and hardening concrete mixture. Perhaps the Authors could give some information on their site experience with these joints and their views on the economy of their use.

It is gratifying to note that the example of a freely-supported joint shown in Fig. 13 indicates that the space between the main beam and the end of the supported beam is left entirely void. Any tendency towards filling voids of this description should be strongly resisted as not only is it entirely unnecessary but can be dangerous and might well act against the development of this form of construction. Several examples have come to my notice where this type of joint has been filled and the mortar has eventually dropped out, in some cases I trust, on the head of the Designer responsible.

To obtain continuity, frequent use is made by the Authors of butt welding of reinforcing bars projecting from individual pre-cast members. While this is obviously a most convenient method on the Drawing Board, considerable cost can be incurred on site if the precast members with their protruding steel are not jig made to very close tolerances. Some notes would be helpful on the order of the precision which the Authors have obtained in practice and the means used, together with the steps taken on site on the occasions when the distances between the butting ends of reinforcing rods were too great for straightforward welding.

Professor WÄSTLUND makes an early mention in his General Report of the full duties of a Designer of pre-cast concrete structural members. It must be appreciated that it is not good enough for the Designer merely to design a structural element in its final position and entirely ignore fabrication, lifting off the beds, transport and erection. There have been too many examples where manufacturers have had to re-design units before they could be safely cast and handled. As we tend to construct pre-cast units of ever increasing size, it cannot be over-emphasised that if the Designer is carrying out his proper function, he must consider fully, manufacture, handling off the casting beds, transport to site and erection, in addition to the often comparatively

simple matter of the design of the unit in its functional position. Full liaison between the Designer, the Fabricator and the Erector is essential if proper economy is to be assured.

### Summary

Mr. NEW commented on various details of the joints between pre-cast elements shown in the Paper by CASADO and GOÑI. He emphasised the point made by Professor WÄSTLUND that the Designer should design any unit for handling in all its stages of manufacture and erection and not merely in its final position.

### Résumé

L'auteur discute divers détails relatifs aux assemblages entre éléments préfabriqués, problèmes dont traite le rapport de MM. CASADO et GOÑI. Il insiste tout spécialement sur le fait, déjà relevé par M. le Professeur WÄSTLUND, que l'ingénieur doit tenir compte de tous les états de fabrication et de montage et ne peut se limiter à considérer les sollicitations de l'ouvrage terminé.

### Zusammenfassung

Herr NEW behandelt verschiedene Einzelheiten von Stößen vorfabrizierter Elemente, die im Beitrage der Herren CASADO und GOÑI gezeigt werden. Wie Herr Professor WÄSTLUND, betont er nachdrücklich, wie wichtig es sei, daß der projektierende Ingenieur nicht nur den Endzustand eines Elementes vor Augen habe, sondern auch sämtliche Fabrikations- und Montagezustände erfasse.

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