

7 GeV PROTON SYNCHROTRONMAGNET SECTORS : BUILD-UP PLATES

1. During October, 1958, a number of modifications were made to the design of magnet sectors and the specification altered in order to overcome certain fundamental manufacturing difficulties at Messrs. J. Sankeys. One such modification was the introduction of additional insulating material (impregnated paper) between the sector laminations.
2. The general design of the synchrotron magnet is such that no increase in the overall thickness of a sector, beyond the specified dimensions, is permissible. Thus the total thickness of steel in each sector had to be decreased by about $\frac{1}{4}$ inch to make room for the additional insulation. This amounts to displacing some 150 tons of steel from the whole magnet.
3. The principal consequences of this reduction in magnet steel content, if not compensated in any way, would be :-
 - (a) A reduction in pulse repetition rate and output beams intensity of the synchrotron, in the region of 5% - 10% at 7 GeV
 - (b) A considerably greater reduction in the probability of 7.5 or 8 GeV operation being achieved
4. The proposed method of compensating for the displaced magnet steel is to bolt a number of relatively small steel plates to the top, bottom and rear edges of each sector. For reasons of sector geometry, the total weight of build-up plates required is not 150 tons but 300 tons.
5. Tenders for manufacture of the build-up plates have been received as follows :-

J. Sankeys, Ltd.,	...	£36,039. 0. 5
Hall Engineering Ltd.,	...	37,574.18. 9
H. & E. Lintott	...	41,144.19. 7

The lowest tender (J. Sankeys) offers plates to a flatness tolerance of $\frac{1}{8}$ inch, whereas the specification called for $\frac{1}{16}$ inch. This point has already been cleared technically with the firm who will be asked, formally, to amend their tender. The amendment is likely to be an increase of about £1,000.
6. It is essential to take the decision now, relative to the build-up plates as, once the magnet is erected, it will be impracticable to add steel to the lower side.
7. In arriving at the overall cost of the build-up plates, the following consequential costs must be added to the above

tender prices :-

(i)	Fixing studs and nuts	£600
(ii)	Assembly gear for build-up plates	350
(iii)	Additional costs due to having drilled and tapped holes in the welded plates at the top, bottom and back of sectors	750
(iv)	Estimated installation costs	4,000
		£.5,700

Thus, the net overall cost should not exceed :

Total consequential costs	5,700
Cost of build-up plates	37,500
Less decrease for 150 tons steel	43,200
	9,800
	£.33,400

8.

It is therefore recommended that :-

- (a) The steel be added to the magnet sectors and that a contract for the manufacture of these build-up plates be placed with the lowest tenderer, Messrs. J. Sankeys Ltd., at a cost not exceeding £37,500
- (b) The magnet estimates be revised to include the total cost of £33,400.

J. J. WILKINS ✓

P. BOWLES ✓

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