that the difference in drag would probably be negligible. At the same time, the use of arcs of circles enabled the calculations to be carried out with a reasonable and practicable amount of work, although even so the task was very great, and it proved necessary in the calculation of the detailed geometry to work to fifteen significant figures ! On the face of it, this sounds perfectly absurd, but it should be remembered that these figures were the result of *differences* and that the cumulative effect of many sections having to be added together to form a hull many hundred feet long might have caused a great deal of trouble unless the work was carried out to very close limits indeed.

It would have been forgivable if the firm had been daunted by such demands, but Boulton & Paul's went into the matter, convinced themselves that it could be done, and undertook the work. The results appear to have justified their confidence, and we are informed that although the majority of the work has been completed, there has not been a single rejection due to the geometry and dimensional accuracy having been at fault. That, we submit, is an eloquent testimony to the order of accuracy that is practically obtainable when a firm really sets out to see what it *can* do.

It may not be realised that there are very fundamental differences between the R.101 form of construction and that of the Zeppelin airships built so far. Whereas the Zeppelin airships have been largely built " in place," *i.e.*, the members brought together in their final relationship and then riveted up, R.101 has been built in sections, the sections being completed at the Boulton & Paul works, sent to Cardington, and there erected simply by being bolted together. With the German system the actual manufacture may (we doubt if it is) be a little cheaper, but the erecting must be much more expensive, if, indeed one can refer to the process as practised at Friedrichshafen as erecting. Moreover, with the German system, the building of two or more airships of the same type does not result in as great a saving in cost as would the British system. Put in another way it may be said, although not, perhaps, with entire accuracy, the Zeppelin airships are individually built ; the R.101 type of construction calls for great standardisation and the extensive use of jigs. Indeed, without such use of jigs the airship could not have been built with the form of construction employed.

The remarkable thing is that, in spite of the necessity for working to what has been almost absurdly close limits, the manufacture of the structure of R.101 has not proved anything like such an expensive business as might have been expected. Jigs and special tools have naturally cost considerable sums, but much of this expense must have been retrieved in the resulting accuracy which enabled the erecting to be done in a very short space of time and by a very few workers, without any fitting having to be done.

Space and time do not permit of giving in this week's issue of FLIGHT details of the construction used in R.101 ; these must be reserved for a future occasion. But to give some idea of the accuracies to which the manufacturers had to work, it is of interest to mention here that on longitudinal girders 45 ft. in length, the tolerances permitted were only $\pm 0{\cdot}03$ in. In the socketed stranded cables, of the same length, the tolerances were $+ 0{\cdot}2$ and $- 0{\cdot}0$ after stretching. That this degree of accuracy has, in actual fact, been not only attained but exceeded, is proved by the fact that the assembly in the airship in continuous lengths was carried out without a hitch. The assembly stage reached at present gives 15 continuous girders of approximately 500 ft. in length, and if the cumulative effect of inaccuracies were to have proved of any importance, it would have been reached by now. This has not been the case, and in this fact may be found the proof of the excellence of the work carried out by Boulton & Paul.

To us the real significance appears to lie in the proved possibility of working, on a very large scale, to such fine limits. Whether R.101 is a complete success or not, the construction of the structure has proved that a British aircraft firm is capable of undertaking work which, we confidently assert, could not have been excelled anywhere in the world. As a piece of structural engineering, and quite apart from its specific purpose, the R.101 girder work is little short of a revelation.

To give some idea of the magnitude of the task of buildingt he structure of R.101, it may be stated that the longitudinal girders total a length of two miles and comprise 6 miles of booms, 18,000 side and base struts (which absorb 8 miles of tubing), 26,952 tie rods totalling 15 miles in length. The ridge girders add another two miles, and comprise 6 miles of booms, 12 miles of webs and 450,000 rivets. The main and intermediate radial struts total $3\frac{1}{2}$ miles of booms, $3\frac{1}{2}$ miles of webs, $1\frac{1}{2}$ miles of tubing and 150,000 rivets. The tubing in fins and rudders total $1{\cdot}8$ miles. The tubing of all types in the airship total no less than 27 miles. Of bolts and nuts there are 65,000 in the structure, while the bracing cables used amount to a bagatelle of 11 miles.

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T. O. M. Sopwith Flies Again

LAST week—on November 14, if we are not mistaken—Mr. T. O. M. Sopwith, one of our pioneer pilots, once more flew an aeroplane after an interval of several years. In this flight, from Brooklands to Martlesham in a new Hawker machine, Mr. Sopwith showed that he had lost none of his previous skill, and his take-off and landing called for little, if any, criticism. Except for occasional flights during the war, this was his first " solo " since the good old days at Brooklands-cum-box-kites. Flight-Lieut. P. W. S. Bulman was Mr. Sopwith's passenger on this little trip to Martlesham.

Another Large Aeroplane Factory in Canada

THE Fairchild Aviation Company of Canada has decided to erect a new $500,000 plant at Grand 'Mere, Que., for the manufacture of aeroplanes. Operations are to be begun early in 1929, and production will probably be at the rate of five or six machines weekly. The company's programme is stated to include also the erection of hangars and the preparation of landing fields. Some five to six hundred men are to be employed by the company.

Sir John Salmond and Canada

AT Montreal, Canada, where he arrived on November 16, in the course of his return from Australia to England, Sir John Salmond said that he was impressed with the work of the patrols carried out in Canada.

The M.V. Isacco Design

THE Isacco machine now under construction at Messrs. Saunders, Isle of Wight, for the Air Ministry, will, it is suggested, combine helicopter with autogiro virtues in its design. It is expected to rise and descend vertically. In appearance it will be like an autogiro mounted above an ordinary fuselage, but each of the two windmill blades will carry a small engine driving an airscrew. These revolve the blades.