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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Addendum modification of the teeth of cylindrical gears for speed-reducing and speed-increasing gear pairs

Déport des dentures des roues cylindriques pour engrenages extérieurs réducteurs et multiplicateurs

The Technical Committee decided, at its meeting in Bad Dürkheim (Germany) in April 1978, to publish this document in the form of a Technical Report.

The draft Technical Report (DTR 4467) submitted to the members of Technical Committee TC 60 led only to some editing comments and has been approved at the Oslo meeting in June 1981. The following Member-bodies were represented at this meeting :

Belgium	Hungary	Sweden
Finland	Japan	Switzerland
France	Netherlands	United Kingdom
Germany	Norway	USA

0 Introduction

Since Lasche showed empirically in 1889 the advantage of an addendum modification of the teeth for the life of tramway gears geometrical, kinematic and dynamic studies of the gear have shown the importance of the addendum modification in relation to all the characteristics of the gear pair (see clause 2).

In 1957, Henri Deby, who was at that time Chairman of TC 60 — Gears, had the standardization of addendum modifications included in the work programme of this Technical Committee.

Working Group WG 5 was set up and Belgium was entrusted with the Secretariat. Mr Deby was the leader. From the main calculations which he carried out at that time, he drew up a draft proposal for a Standard which was put before WG 5 by the Secretariat as a working document, at the meeting in Chez-le-Bart (Switzerland), September 1970.

It then turned out that some member countries who already had national standards which they found satisfactory, could not approve the rather rigid formulation proposed by the Secretariat of the Working Group, as it did not include their own designs to a sufficient degree.

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The majority of experts thought that the choice of an addendum modification for a given application could not follow a general mandatory rule, but that possibilities of choice should be left to the specialists in each of the particular fields of application for gears, based on their own experience and on the use of methods of calculation which progress with regard to electronic instruments has made easier.

However, it was recognised by these same experts that it was necessary to give non-specialist technicians who are concerned with the problems of gears, practical rules enabling them, without a great deal of experience, to choose carefully an addendum modification of teeth suitable for the problem to be resolved.

1 Scope and field of application

This Technical Report constitutes a good general guide regarding the limits of addendum modifications of teeth and the distribution of addendum modifications between mating gears; however, attention is drawn to the fact that it only regards recommendations which do not have any restrictive nature nor do they require the replacement of existing regulations, instructions or standards which have proved their worth in the past.

This Technical Report only applies to external gear pairs with parallel axes in general engineering, used in speed reducing and speed increasing gear pairs and of which the teeth of spur and helical gears are defined by the standard basic rack tooth profile in conformity with ISO 53.

2 Importance of the addendum modification of the teeth

2.1 Cost of manufacture of a gear-pair

The value of the addendum modification of teeth depends solely, during manufacture, on the relative position of the gear to be cut and the cutter.

The adjustment and control operations are identical whatever the value of this addendum modification. Its influence on the cost of toothed gears is therefore nil in the majority of cases.

2.2 Influence on the normal wear of a gear

An addendum modification of the teeth suitable for toothed gears results in a decrease in specific "slipping" of tooth flanks and, consequently in a decrease in the risk of normal wear of these flanks. Experience and theory both confirm this advantage.

2.3 Influence on the load capacity of the gear

An increase in the sum of the addendum modifications of both toothed gears is beneficial to the gear both on the level of its load capacity under contact pressure (pitting) and on that of its load capacity under tension at the root of the teeth.

2.4 Influence on the shape of teeth (figure 1)

An increase in the addendum modification of the teeth of a gear causes an increase in root thickness and a decrease in the tip thickness for one tooth depth.

A given value which is a function of the number of teeth on the gear under consideration, leads to a zero tip thickness and an increase in the addendum modification beyond this limit leads to both a pointed tooth and a shortened tooth.

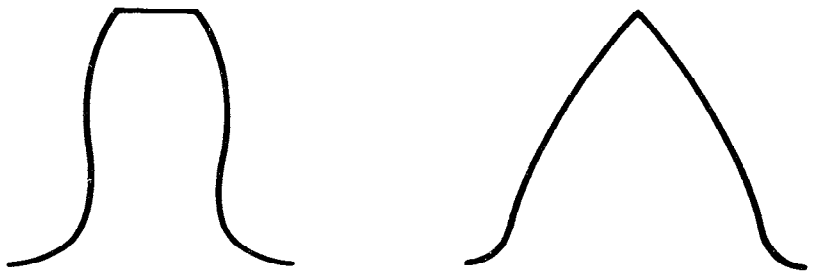

Figure 1