Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 181 (2017) 206 – 213

Procedia Engineering

www.elsevier.com/locate/procedia

10th International Conference Interdisciplinarityin Engineering, INTER-ENG 2016

Theoretical Peculiarities Regarding the Definition and Representation of the Rolling Surfaces for Chain Transmission

Constantin Bucur[a,]*, Máté Márton[b]

[a]„Petru Maior" University of Tîrgu Mureş, Nicolae Iorga Street, No. 1, Tîrgu Mureş 540088, Romania
[b] *Sapientia University of Cluj-Napoca, Şoseaua Sighişoarei, No. 1C, Tîrgu Mureş 540553, Romania*

Abstract

Knowing the wide use of the chain transmission, this article focuses on the computing of the theoretical rolling surfaces of sprocket when it is coupled with a roller chain. The sprocket tooth profile is defined as the envelope of the roller circle manifold defined through the relative motion between the sprocket and the chain. The equation of meshing is computed using two different ways. The paper shows an important peculiarity of the mathematical model, those of the importance of both solutions of the equation of meshing, in opposition with most cases in gearing theory where usually only one solution is applicable.

Peer-review under responsibility of the organizing committee of INTER-ENG 2016

Keywords: sprocket; chain; teeth profile; angular pitch; meshing.

1. Basic definition

The tooth geometry of the sprocket is defined by certain standards as follows:

- The roll chain and hoisting coil chains, according to *DIN 8187 and DIN 8188,* and the standardized toothing by *DIN 8196*, as shown in Fig. 2.
- The symbolization of toothing for 21 sprocket teeth and a double strand roller chain 10 B – 2, according to *DIN 8187* it is: Toothing *DIN 8196*-21 Z 10B-2.

The medium gear ratio for chain transmission having the pitch p and the number of teeth z is

* Corresponding author. Tel.: +40-735-496500; +40-721-255079.
E-mail address: constantin.bucur@ing.upm.ro; mmate@ms.sapientia.ro

Peer-review under responsibility of the organizing committee of INTER-ENG 2016
doi:10.1016/j.proeng.2017.02.372

$$i_{12} \overset{Def}{=} \frac{n_1}{n_2} = \frac{z_2}{z_1} = \frac{d_2}{d_1}, \tag{1}$$

where

- n_1 and n_2 – the driving respectively the driven gear rotation;
- z_1 and z_2 – the number of teeth of the driving, respectively the driven gear;
- d_1 and d_2 – pitch diameter for driven, respectively driving gear, according to relation (3).

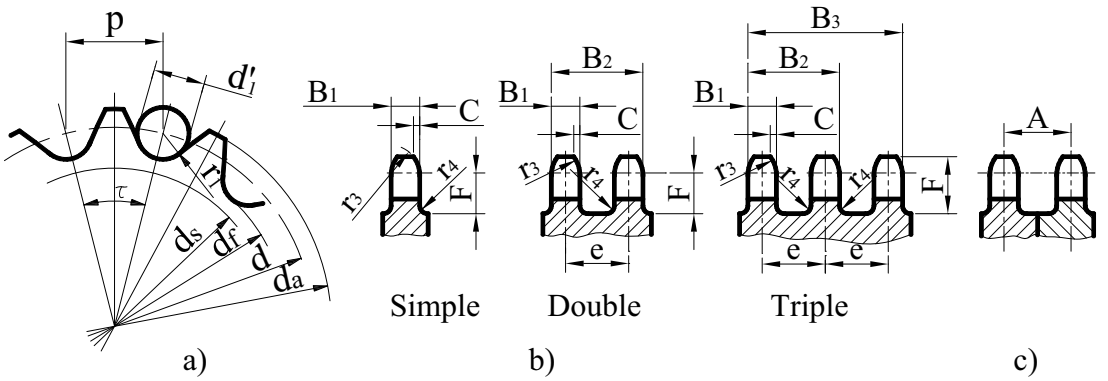

Fig. 1. The roller chain sprocket tooth geometry in accordance with *DIN 8187* and *DIN 8188*. (a) tooth gap profile; (b) gap between tooth profiles; (c) *„A"* distance between two sprockets at two single chains [1]

The geometrical elements of the tooth space are computed using the following formulae:

- The angular pitch

$$\tau = \frac{2\pi}{z} \tag{2}$$

- Pitch diameter

$$d_1 = \frac{p}{\sin\frac{\tau}{2}} = \frac{p}{\sin\frac{\pi}{z}} \tag{3}$$

- Dedendum diameter

$$d_f = d - d'_1 \tag{4}$$

- Addendum diameter

$$d_a = d \cdot \cos\frac{\tau}{2} + 0{,}8 \cdot d'_1 \tag{5}$$

- Rim diameter

$$d_s = d - 2 \cdot F \tag{6}$$