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GEARS MANUFACTURING AND MESHING – A DIDACTIC POSTER

J. Iwaszko[1)]

The poster is intended for Design of Machine elements courses typically given in Universities of Technology. It will be useful for mechanical engineering students.

The poster helps to imagine and understanding how tooth profiles depend on:

- number of teeth N,
- pressure angle α,
- addendum and dedendum coefficients h_a^* ,
- fillet radius in basic rack,
- addendum modification coefficient x

and when undercutting occurs. It is presented on the poster the gearset in successive teeth position as well. The aim is to explain how teeth move into and out of mesh.

Some figures from the poster are presented here as an example.

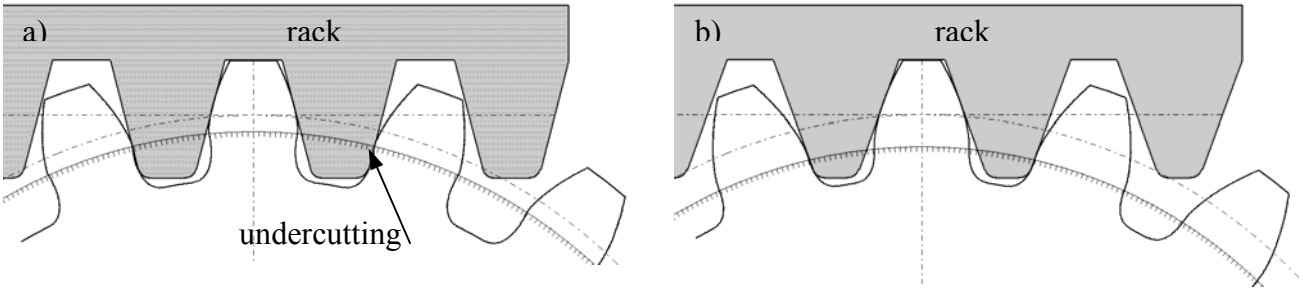

Fig. 1 The gear N = 19 teeth is cutting with a rack of pressure angle: a) $\alpha = 14.5^0$,b) $\alpha = 20^0$,c) $\alpha = 25^0$

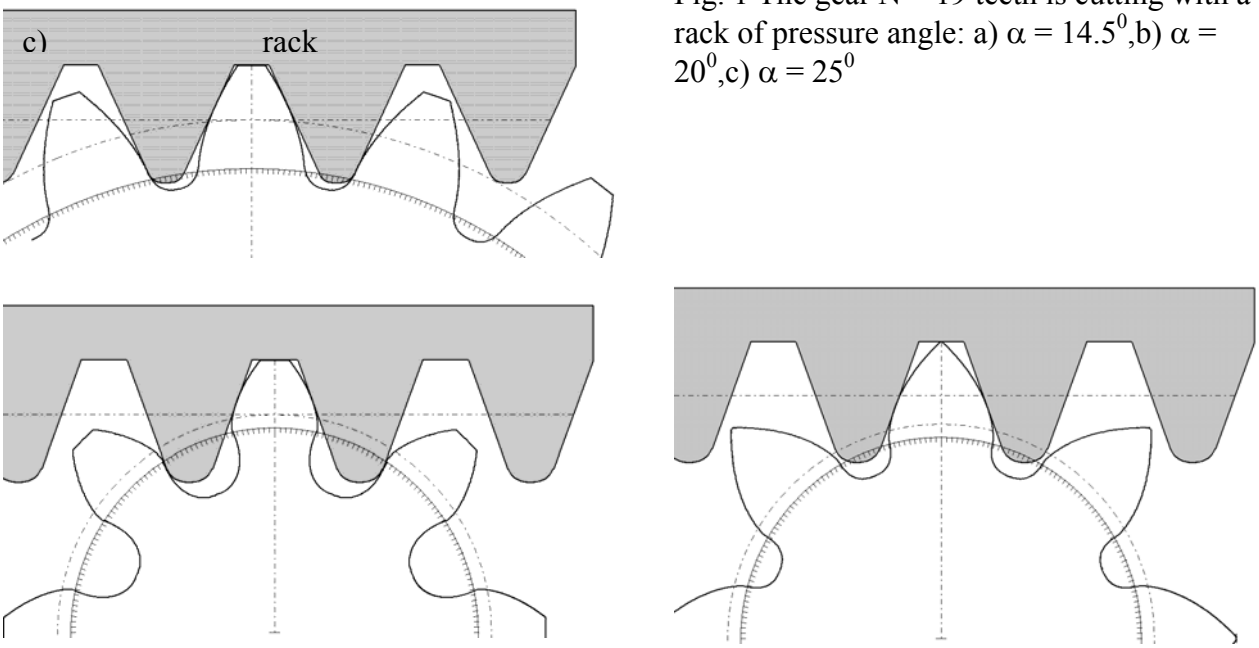

Fig. 2 If N = 8 then $N < N_{min}$ so undercutting occurs (left); the rack is shifted (right) to avoid them; $N_{min} = 2h_a^*/(\sin\alpha)^2$ addendum modification coefficient $x = h_a^*(N_{min} - N)/ N_{min}$

[1)] Jerzy Iwaszko, DRSc, Warsaw University of Technology, Poland, Institute of Mechanics and Design

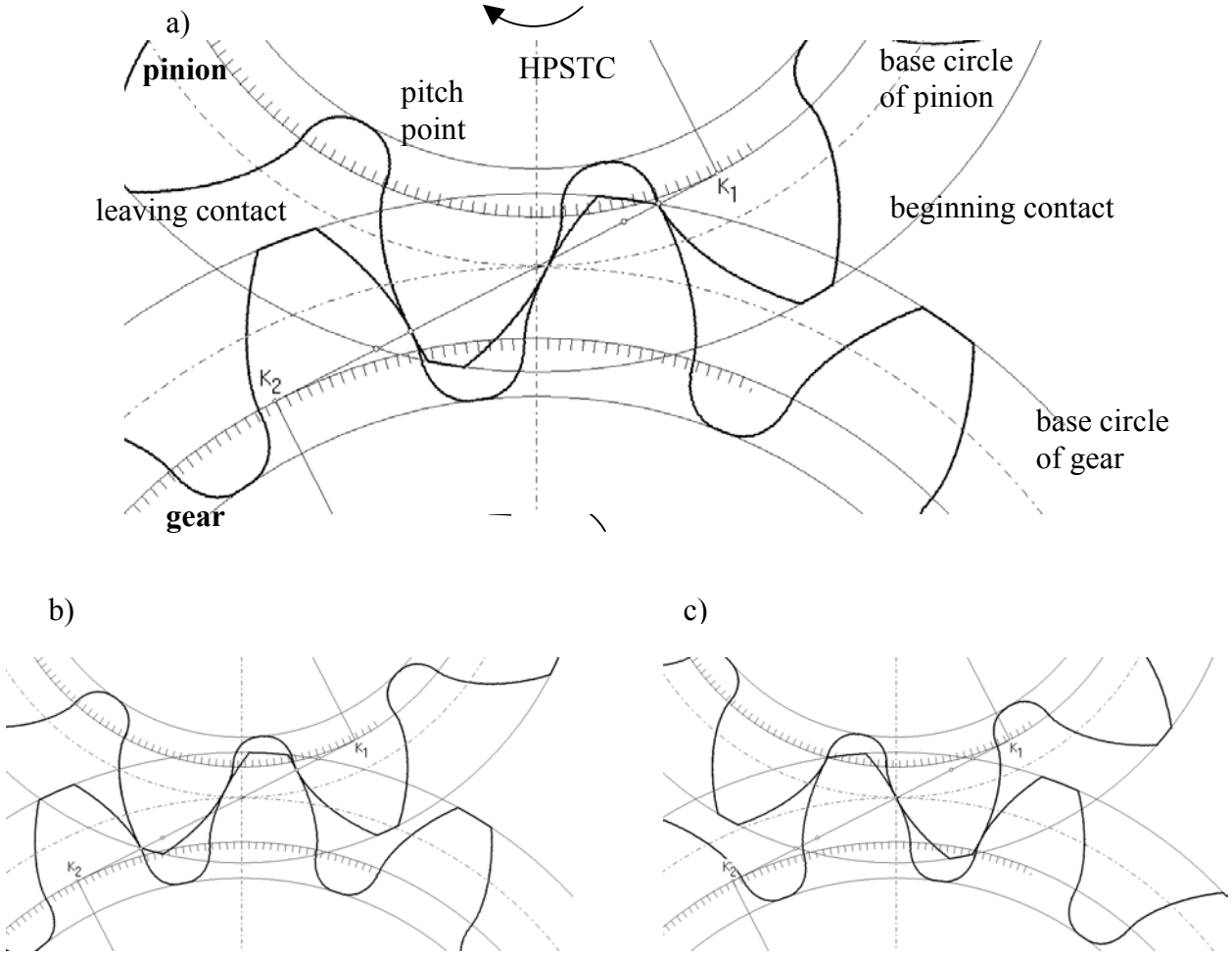

Fig.3 External gearset with profile shifted teeth – increased center distance.
Pinion: number of teeth N = 9, addendum modification coefficient x = 0.47.
Gear: number of teeth N = 13, addendum modification coefficient x = 0.24.
Nominal pressure angle $\alpha = 20^0$, new pressure angle $\alpha = 27^0$.
a) contact begins,
b) contact in highest point of single-tooth contact (HPSTC),
c) contact in pitch point.

REFERENCES

[1] Dudley D. W. Handbook of Practical Gear Design. Mc Graw-Hill, New York, 1984
[2] Dziama A., Michniewicz M., Niedźwiedzki A. Przekładnie zębate. Wydawnictwo Naukowe PWN, Warszawa 1995 (in Polish)
[3] Norton R. L. Machine Design. An Integrated Approach/2nd ed. Prentice Hall, 2000