OMS Technical Note TN17
POLYGON EFFECT in Chain Drives

Polygon Effect

When using chain drives, the power transmission is not taking place at a constant velocity. On top of an average (constant) velocity there is a modulation, i.e. variation of the velocity, which has its cause in the polygon nature of the chain drive.

Public Applications:

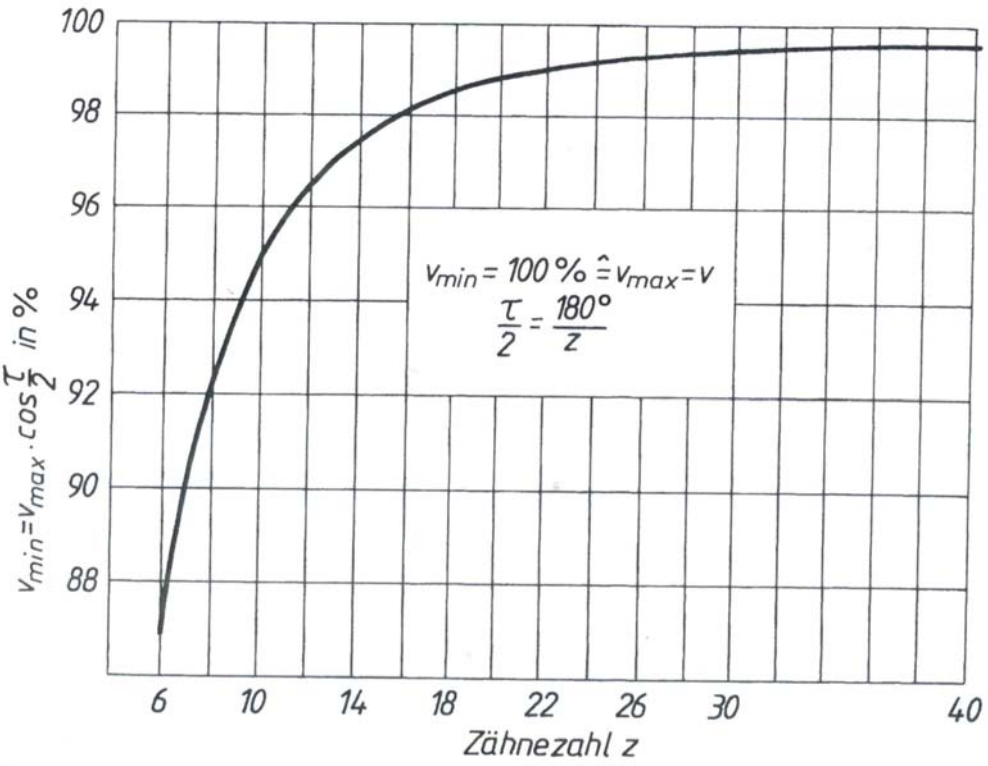
For practical applications with slow running chains (as in escalators), z = 18 poses a lower practical limit for the sprocket on the traction machine, the modulation of the velocity being about 1,5%. This is lowest number of teeth for the traction machines sprocket, which is generally acceptable in practice for public applications.
Using a sprocket with z = 17, and a velocity variation of about 1,7%, may be acceptable in some instances, but vibration due to the polygon effect will be noticeable already.

Commercial Applications:

For *high quality* escalators in commercial applications, z = 21 is the lowest practical limit, with about 1,0% modulation.
For less demanding commercial applications, which do not require utmost travelling comfort, using a sprocket with z = 20 or even z = 19 may be acceptable, depending on customers requirements. However, some loss in riding comfort will be noticeable for the experienced.

From the below diagram it becomes evident, that for z < 17 the modulation and thus the vibration due to the polygon effect will become inacceptable.

The below diagram was taken from a mechanical engineering textbook
(Roloff / Matek, Maschinenelemente, page 587, pic. 17-11).



Uniformity of chain velocity (% velocity versus number of teeth)