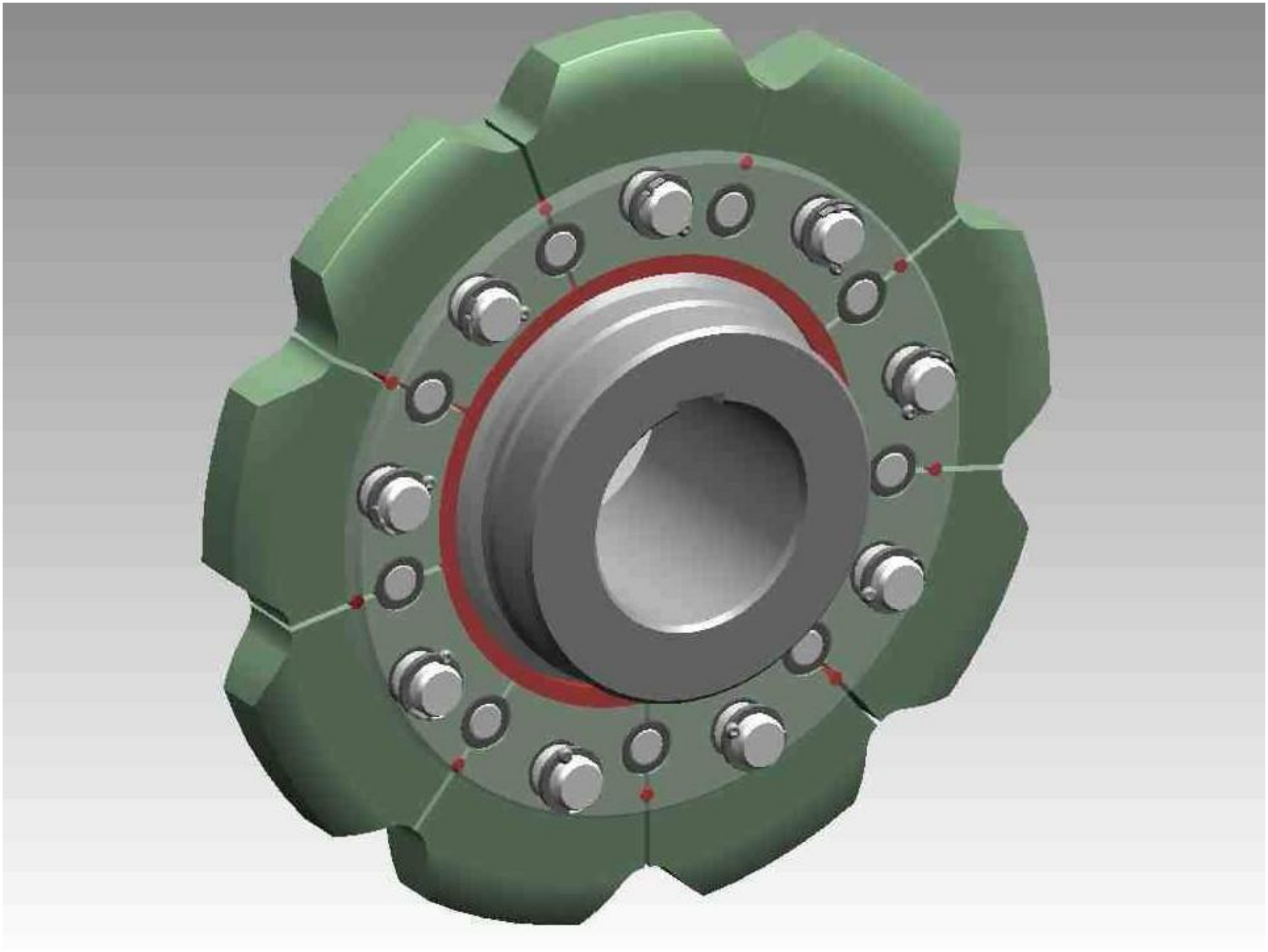

PATENT
“Self-Adjusting Chain Sprocket”

Patent Document EP 12007544.5

Karl Herkenrath

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Starting Situation and Problem Description

STARTING SITUATION

Chains and sprockets in conveyor systems are subject to constant wear and tear not only requiring the chain and sprocket to be regularly replaced but also producing additional costs. Another weak point of chain drives is the sometimes high noise generation.

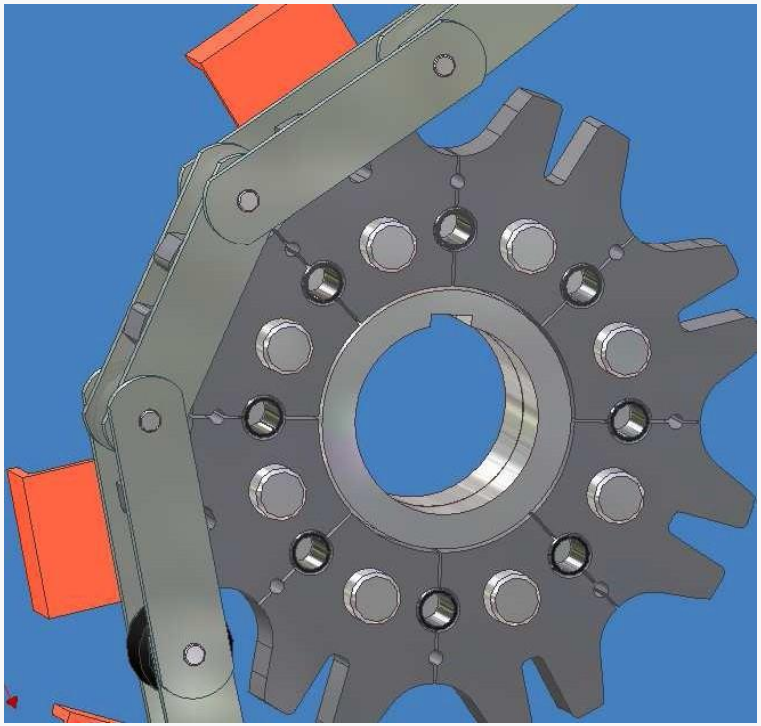
Problem:

- constant wear
- noise generation
- high costs

Motivation and Objective

Motivation

The problems caused by wear and tear and noise generation as well as the resulting costs can be considerably reduced by the „self-adjusting chain sprocket".



Objective:

- reduction of wear
- noise reduction
- reduced costs

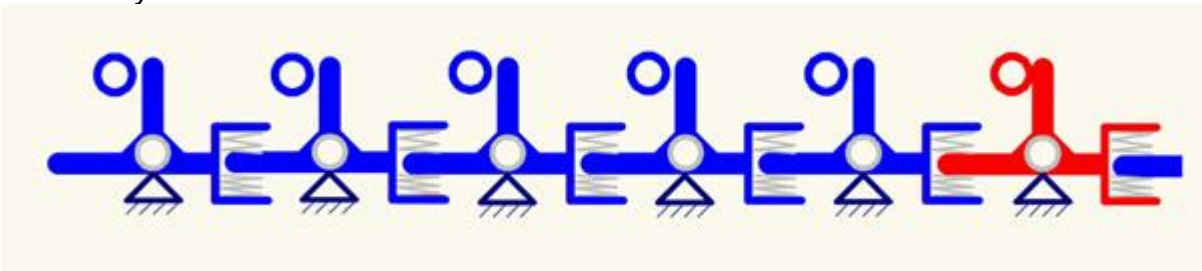
Functional Principle / Schematic Representation

Functional Principle/Schematic Representation

Each sprocket tooth segment is equipped with a pivot bearing below the centre of the tooth as well as cavities on both sides to hold the transmission springs.

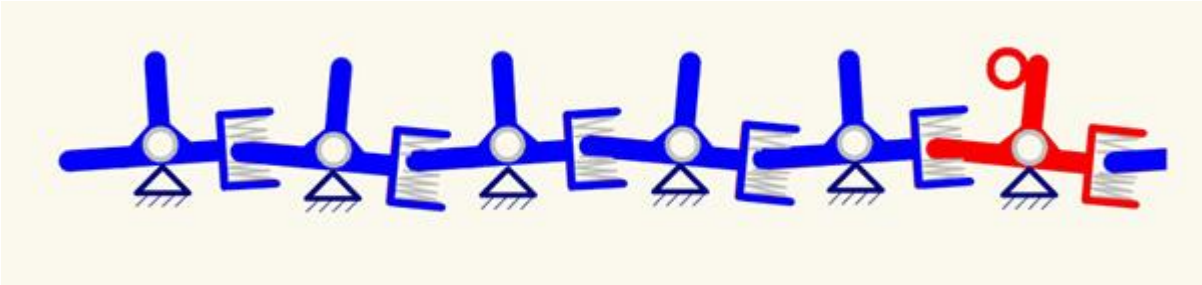
System 1

Every tooth is equipped with a pivot bearing below the centre of the tooth. Forces acting on any of the teeth will generate a torque on this respective tooth. With the help of the springs this torque will then be equally transferred to the following teeth, reduced by friction losses.



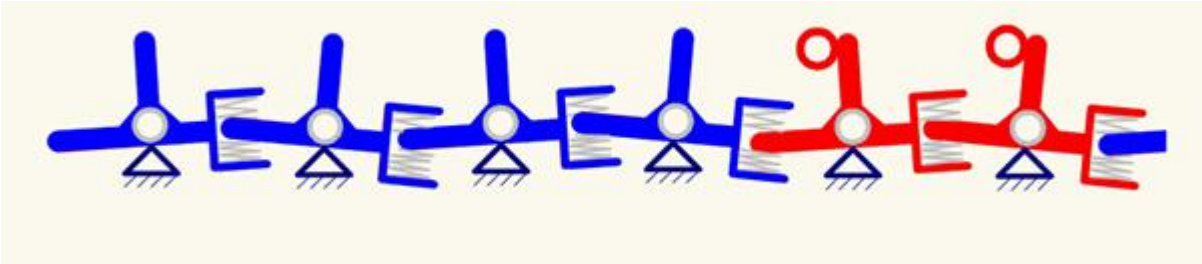
System 2

The chain force F acting on the tooth no. 1 generates a clockwise torque resulting in a counter-clockwise torque acting opposite to the direction of the force on tooth no. 2. Chain and tooth pitch will keep tooth no. 2 from tilting any further and spring no. 1 will establish an equilibrium between the forces acting on tooth no. 1 and tooth no. 2.



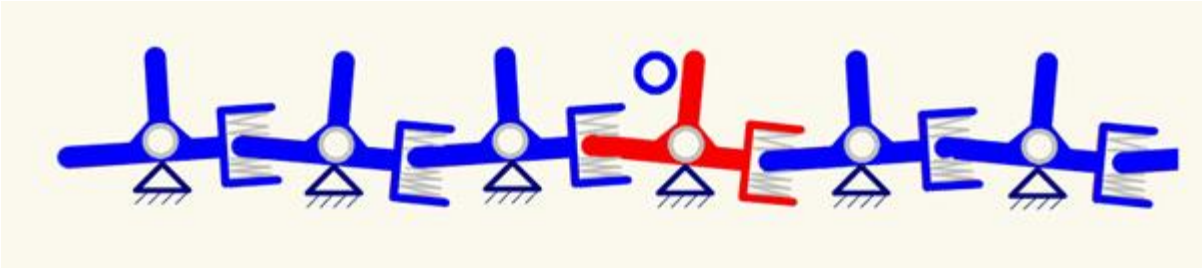
System 3

Due to the positioning of tooth no. 1 and 2, tooth no. 3 moves in direction of the force, thus changing the pitch spacing. Due to this, tooth no. 3 is not involved in the force transmission to the chain. All the same, tooth no. 3 is involved in the torque transmission via spring no. 2 leading to a compensation of the pitch change caused by wear and tear through tooth no. 3.



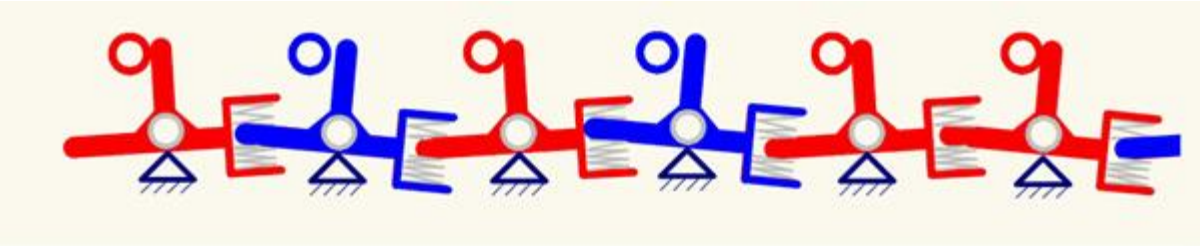
System 4

After the establishment of an equilibrium of forces on the teeth no. 1 to 3, tooth no. 4 will turn against the direction of the force involving tooth no. 4 in the force transmission via spring no. 3. As the same torques will be acting on every tooth the stress acting on the chain and tooth will also be equal. As a result, with 4 teeth engaged 3 of them will be supporting almost 1/3 of the force.



System 5

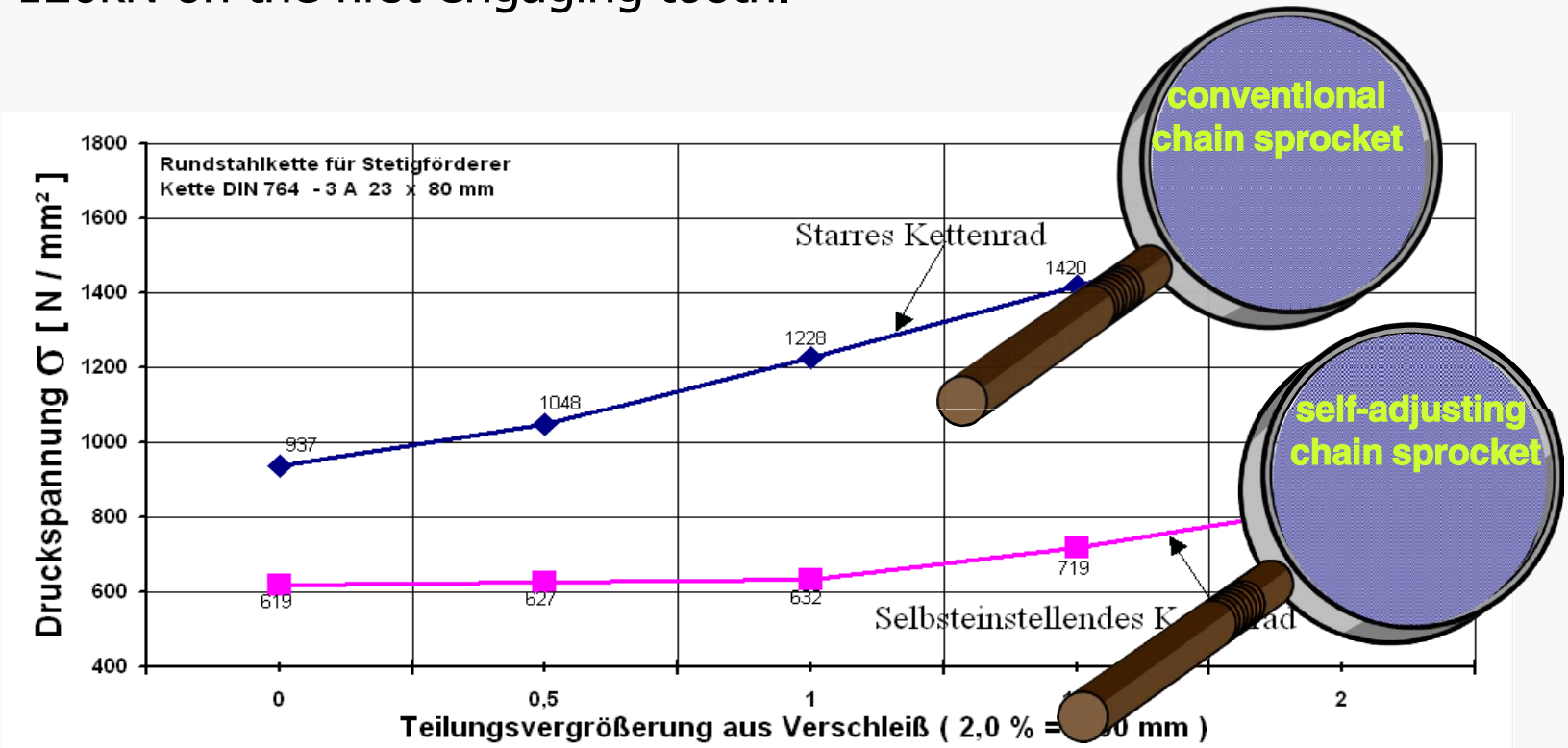
System 1 to 3 and then system 4 will be repeated with all the following teeth until the first tooth is reached again and thus the torque chain acting on the teeth will be closed. This process starting from system 1 through to system 4 will be changing continuously from the first tooth to the second tooth, etc.



Comparison
„self-adjusting“ to „conventional“

Comparison self-adjusting and conventional

Round link chain load based on a localized contact with a tensile force of 120kN on the first engaging tooth.



- pitch extension (of 2%) due to wear based on almost the same load.
- distribution of chain force on several engaged tooth segments.
- low wear and tear based on the same chain and load.

Self-Adjustment of the Tooth Segments

Self-Adjustment of the Tooth Segments

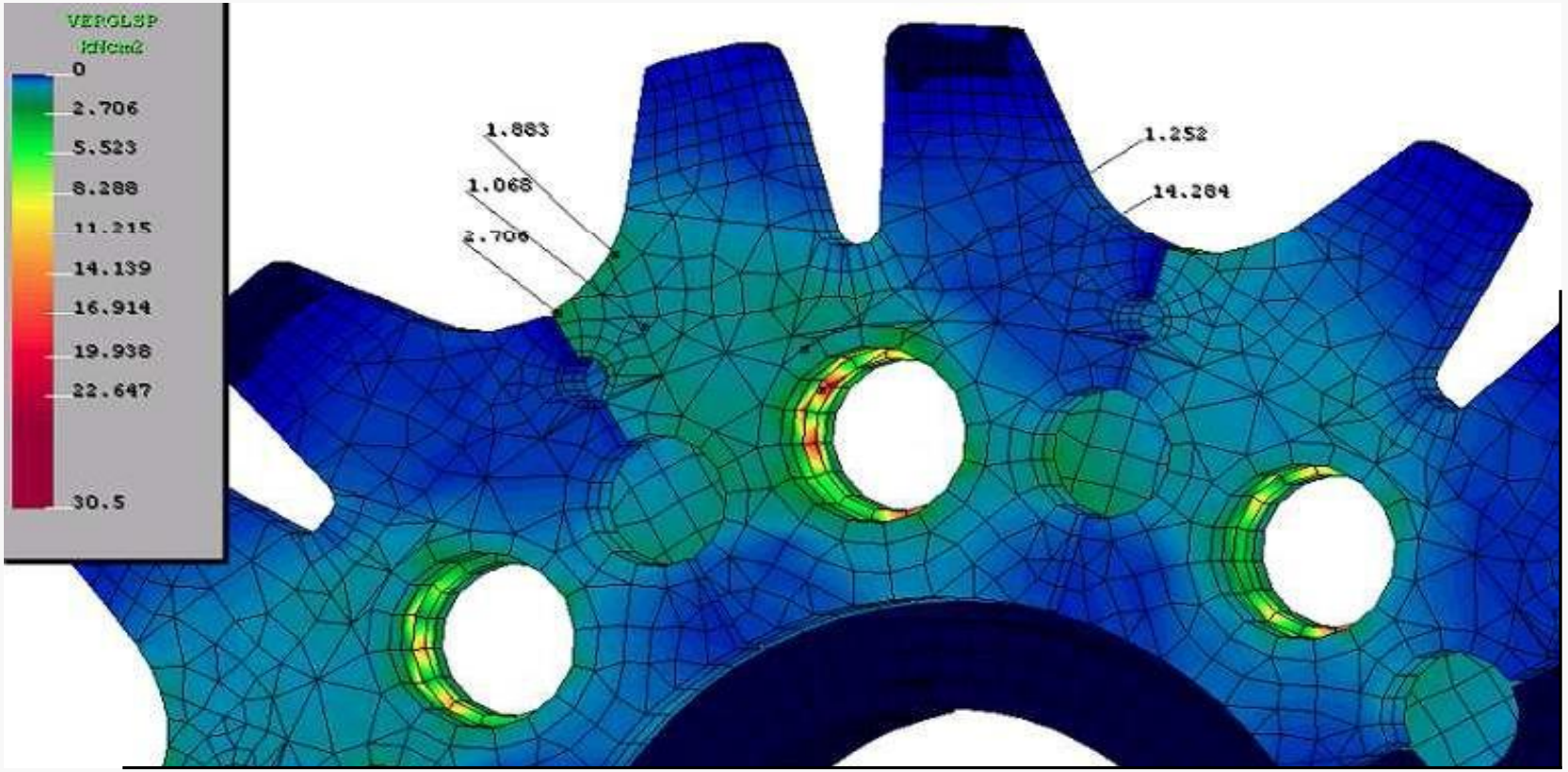
Each tooth segment of the chain sprocket „self-“adjusts to the respective conditions.

pitch error sprocket & chain	due to the self-adjustment of the tooth segments the sprocket will adjust to the chain pitch.
flank form, flank lines	spring compensation between tooth segments.
pressure angle, concentricity	adaptation to the break-in conditions of the chain.
axle position, deflection	in the case of double strand chains there is a load compensation between the two chain strands.
damages tooth form, chain	loads will be distributed across the engaged tooth segments.

Reduction of Wear

Reduction of wear

- reduced load on the pins, chains and chain links.
- noise-reduced due to spring compensation, low break-in shock.
- maintenance-free due to self-adjustment of the chain sprocket.



Contact Details & Contact Person

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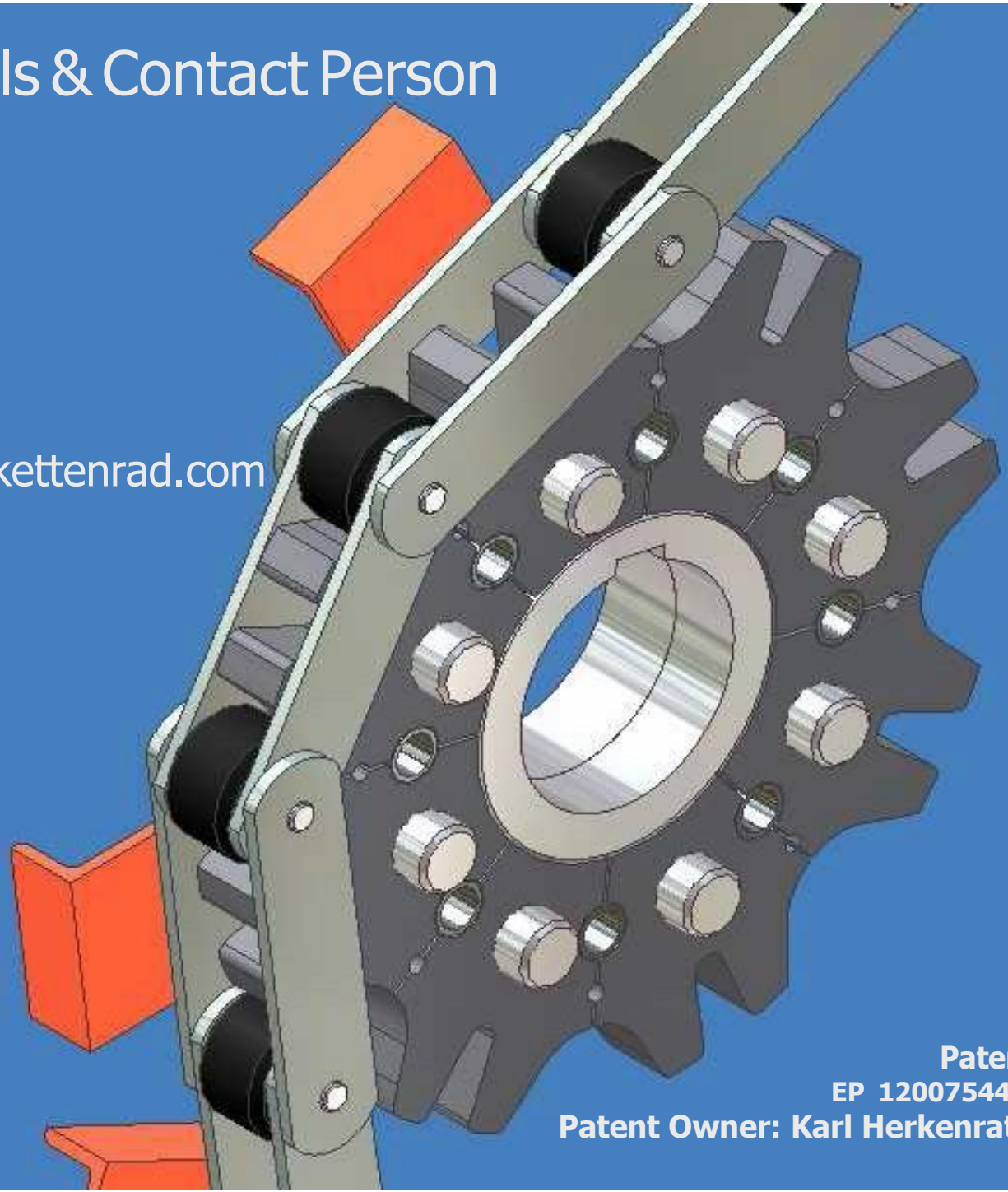

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