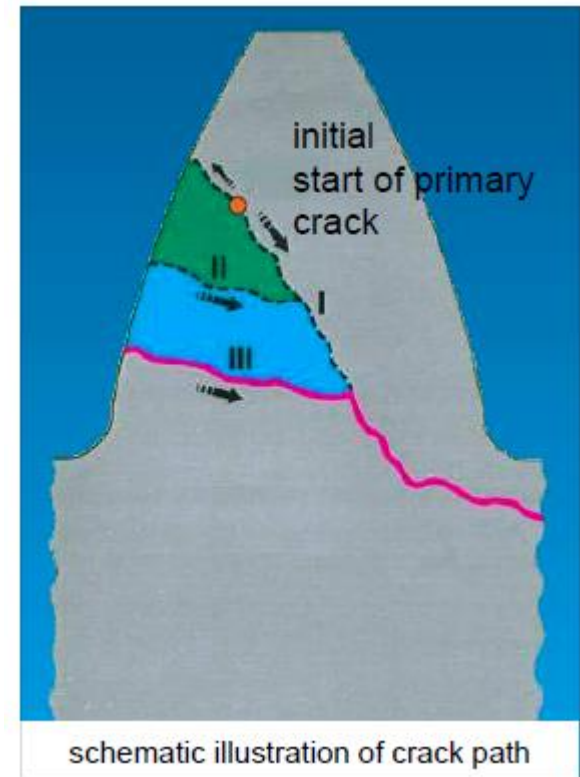


Tooth Flank Fracture

What is TFF (Tooth Flank Fracture) ?

- The primary crack propagates from the initial crack starter in both directions – towards the surface of the loaded flank and into the core towards the opposite tooth root section;
- Due to the high hardness in the case, the crack propagation towards the surface is smaller as through the core;
- Angle between primary crack and flank surface is **approx. 40-50°**;



Calculation method for TFF

Method proposed in the draft ISO DTR 19042-1

(based on the proposition in the Witzig dissertation for a practical calculation rule)

Safety factor against tooth flank fracture S_{FF}

Local material exposure $A_{FF,CP}(y)$

$$S_{FF} = \frac{1}{A_{FF,max} + c_2} + c_2 \geq S_{FF,min} \quad A_{FF,max} = \max(A_{FF,CP}(y)) \quad A_{FF,CP}(y) = \frac{\tau_{eff,CP}(y)}{\tau_{per,CP}(y)} + c_1$$

$\tau_{eff,CP}(y)$: Local occurring equivalent stress state

$\tau_{per,CP}(y)$: Local material strength

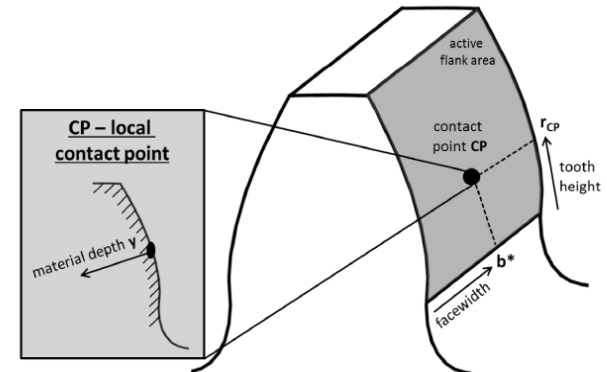


Figure 1 — Definition of local contact point CP and material depth y

Calculation in KISSsoft

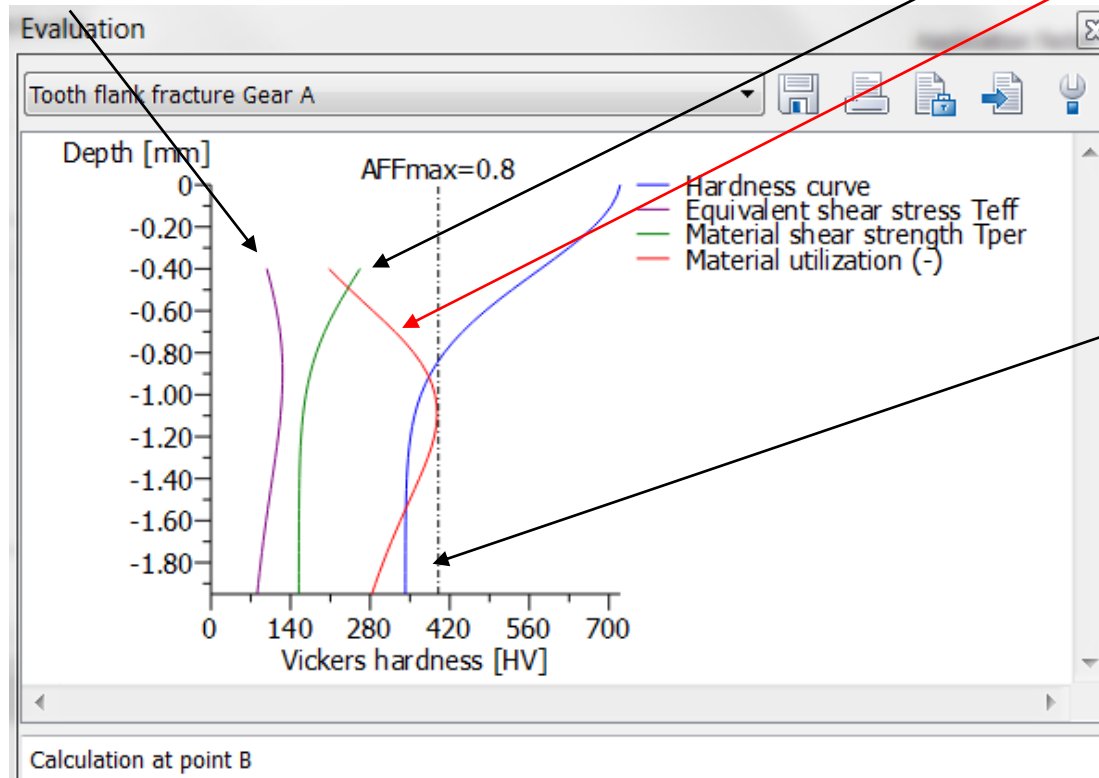
Calculation in a specific Contact Point (CP)

ISO DTR 19042-1

$AFF_{CP}(y)$ Local material exposure (Factor; displayed by 1/500)

$\tau_{per,CP}(y)$: Local material strength (HV)

$\tau_{eff,CP}(y)$: Local occurring equivalent stress state (HV)



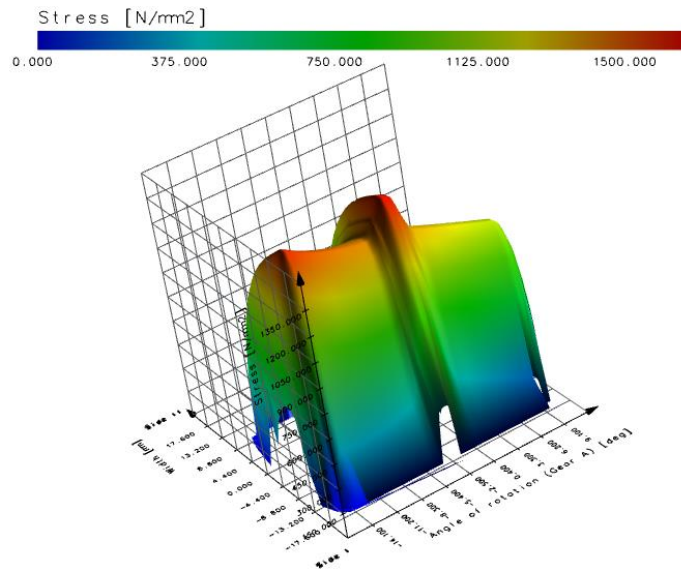
Maximum admitted
 $AFF_{max} := 0.8$
(corresponds to
Safety 1.2)

Calculation in KISSsoft

Method A and B in ISO DTR 19042-1

A: Hertzian pressure from LTCA

B: Hertzian pressure based on analytical formulas (as in ISO TR 15144)



Method A: Hertzian pressure calculated by LTCA



Load sharing factor for cylindrical spur gears with unmodified and quality grade ≤ 7

Method B: Hertzian pressure calculated using load sharing factor for contact points A, AB, B, C, D, DE, E