

Purpose for Chamfer on Edge of Spur Gear Teeth?

[thread406-264403](#)

What purpose would a chamfer on the edge of a spur gear serve (refer to red chamfer in attached picture)?

It is not for (housing corner radii) clearance.

The last guy liked chamfers, but I can't figure out why.

Replies continue below

Recommended for you

Condomínio de Luxo Interior SP

Ad Condomínio Porto SãoPedro

A06B-6093-H113 Testado em 100% - Em stock - No mesmo dia

Ad cnc-shopping.co.uk

Acoustic Induced Vibration

Ad Armech Solutions

Graduação Fisioter:

Ad Graduação São Camilo

one answer is

depending on the type of material & heat treat process, case hardening such as ion /or gas nitride, vacuum or endo gas carburize.

it prevents gear teeth from chipping.
having chipped teeth is very bad.

easier engagement of gear teeth

When the shafts become misaligned, e.g. while deflecting under load, that general area will be particularly stressed, and relatively likely to fail in fatigue, throwing a chip that will eventually into the mesh and destroy the gears. Better to remove it preemptively.

Still better; cut a small chamfer over the entire end profile, which is laborious and expensive when done by hand, but I think some machinery exists for the purpose.

NOT better; abrasive flap wheels and related items. The random scratches from the abrasive grains don't help fatigue life.

Mike Halloran
Pembroke Pines, FL, USA

It reduces the burring caused by the gear manufacturing process.

Ted

an other answer is

to prevent cracks from propagating
from sharp edges!!!

badpeanut,

Gear tooth chamfers and corner breaks are very critical on case hardened, high performance gears. As others noted, the primary function is to prevent through hardening of those sharp e carburize/nitride. The hard brittle corners would fracture and break off during operation of the gear. The amount of chamfer or edge radius depends upon the case depth.

As for why a chamfer is used, the chamfer is usually easier to machine than a corner radius. But a radius would work just as well.

Because tooth edge breaks can be so critical, there is specialized machinery to produce very precise gear tooth edge breaks:

http://www.star-su.com/pages_blocks_v3_exp/index.cgi?Key=339&Field=key_field&catg=gear_tool_products&Exact=Yes&this_sect=Gear%20Cutting%20oot=/pages

Like most things with regards to high performance gear design, it's all about the details.

Good luck.
Terry

Thanks for the input everyone!

These gears are through hardened 4340 steel, or through hardened 440C stainless depending upon where they are located. The final stage is shot peened.

Any guidelines as to the chamfer size (minimal, down to the pitch diameter, down to the root diameter, larger than the root diameter, etc.)?

It also helps in handling these parts if you do not have sharp corners on the outside diameters. We used a rough approximation of 1/4 times the module for the chamfers.
When the pinions are over hung, often a very large chamfer was initiated at that leading edge equivalent to 1.2 times the module or greater.

Besides the reasons mentioned above, I'm sure that they help align the gears during assembly...

The size of the chamfer depends on the pitch. We make some very large gears with a 1/4 X 45 chamfer. We also make smaller gears with 1/8 or even a 1/32 chamfer.

The tip diameter of this gear is 1.35 inches.

[Join](#) | [Advertise](#)

Copyright © 1998-2021 [engineering.com, Inc.](#) All rights reserved.

Unauthorized reproduction or linking forbidden without expressed written permission. Registration on or use of this site constitutes acceptance of our [Privacy Policy](#).

