# VISVESVARAYA TECHNOLOGICAL UNIVERSITY
# BELGAUM

**A PROJECT0 Report On**

**"FINITE ELEMENTAL ANALYSIS OF ASYMMETRIC SPUR GEAR TEETH"**

(Sponsored by KSCST-Bangalore)


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# ABSTRACT

Gearing is one of the most critical components in a mechanical power transmission system and in most industrial rotating machinery. It is possible that gears will predominate as the most effective means of transmitting power in future machines due to their high degree of reliability and compactness. In addition, the rapid shift in the industry from heavy industries such as shipbuilding to industries such as automobile, manufacturing etc. will necessitate a refined application of gears.

Presently, gears are suffered by backlash, undercut and interference. Interference is a serious defect in the involute system of gearing when the number of teeth is less than the minimum required number of teeth. In gears with interference defect, when the involute portion of a tooth mates with the non involute portion of the mating tooth, the two meshing gears will not have free rotation thus hampering the conjugate action. Hence, the gear will have a tendency to jam on the flank of the pinion causing interference, unless ofcourse, the pinion tooth root has already been undercut making room so as to provide free movement of the gear tooth. Besides, due to interference and in the absence of undercut, the mating gear will try to scoop out metal from the interfering portion. Therefore, the teeth are damaged and it will have an overall detrimental effect on the gearing system.

These defects can be eliminated by increasing the pressure angle or increasing the addendum of the mating gears. An additional alteration that is very rarely used is to make the gears asymmetric i.e. different pressure angles for drive and coast side of the tooth.

A C-program is developed for asymmetric spur gear tooth profile generation and estimation of bending stress different parameters.

As a major part of present project, a series of finite element analysis has been carried out for different sets of symmetric and asymmetric spur gears using finite element analysis software ANSYS.

Photoelastic stress analysis has been carried out for spur gear teeth on the basis of established methods. The asymmetric spur gear tooth models of photoelastic material, fabricated by laser cutting process have been taken up for studies.