# Computer  Aided Kinematic Analysis of Epicyclic Gear Train

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## *Abstract*

*This represents a method for computer aided calculation of parameters of  Epicyclic Gear Train such as  No. of teeth on different gears, speed of different gears, torque  & holding torque.*

*Following this method a program is compiled which very much facilitates the work of engineers in the choice and analysis of the most appropriate gear train system.*

**Keywords:** *- Kinematic Analysis, Epicyclic Gear Train, Gear ratio, Input Torque, Holding Torque*

## 1.  Introduction

In industries the power or rotary motion from one shaft to another is usually transmitted by means of belt, chain, rope and toothed gears. In case of belt and rope the drive is not positive, there is slip & creep and in case of chain drives the chordal action & impact loading restricts its use. The gear drive is positive & smooth but it suffers from one limitation that the shaft are at a comparatively short distances can be connected by means of gears.

Epicyclic gear train basically contains at least four co axial links are commonly used in automotive automatic transmissions. At the early stage of designing automatic transmissions, the designer need to find a promising gear train to be the transmission mechanism such that it can provide the desired number of speed ratios. The epicyclic gear trains re useful for transmitting high velocity ratios with gears of moderate size in comparatively lesser space. The epicyclic gear trains are used in back gear of lathe, differential gears of the automobiles, hoists, pulley blocks, wrist watches, etc.

Due to  their undisputed qualities epicyclic gear trains have wide application in the field of automotive automatic transmissions.
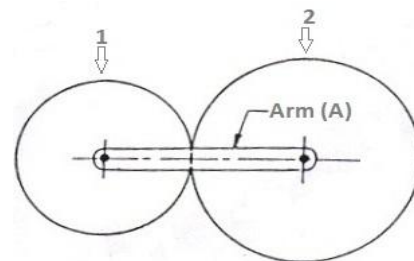


Figure.1. Basic Epicyclic Gear train system

The methods available for calculation of parameters like speed , torque,  no. of teeth are tabulated as well as algebraic and etc. For this there is a great scope for developing such a method for computer aided calculation of parameters of Epicyclic Gear Train such as speed of different gears, torque , velocity ratio.

Following this method a program is compiled which very much facilitates the work of engineers in

the choice and analysis of the most appropriate gear train system.

## 2. Gear Train analysis

An algebraic relations can be used for the preparation of program.

For each combination of epicyclic gear trains there are different relations for no. of teeth on each gear and for calculation of speed of gears

Accordingly the relations are developed for the compilation of program.

## 3. Software Product

A program is compiled for the kinematic analysis of epicyclic gear train of the different types in MATLAB. Figure 2 shows the main screen of the program interface before entering the input parameters and Figure 3 shows it with input data. Figure 4 shows screen with calculated parameters along with input data.

The following course of work is recommended:

1. Input of data.
2. Calculation of no. of teeth on each gear, speed of different gears, torque and holding torque.
3. Check whether the rest of tooth meshing parameters are in the allowed limits.
4. Change of input data if requires.

## 4. Result and Analysis

With the help of program a specific problems can be solved for the choice of specific combination otherwise it will take a lot of time if calculations are done manually.
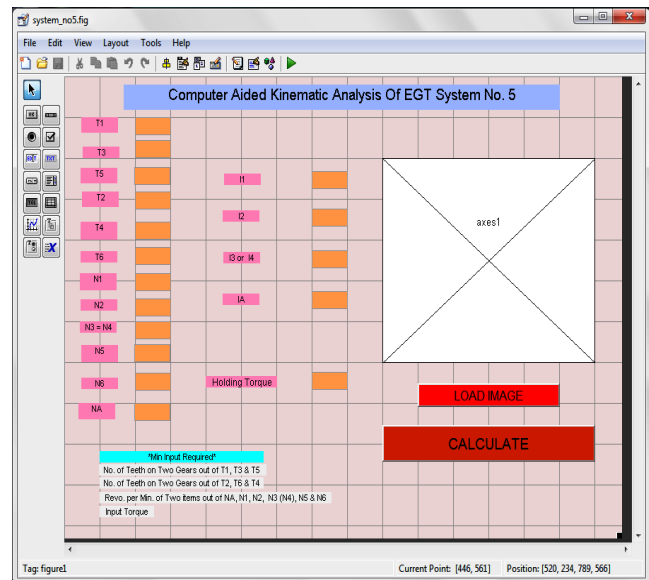


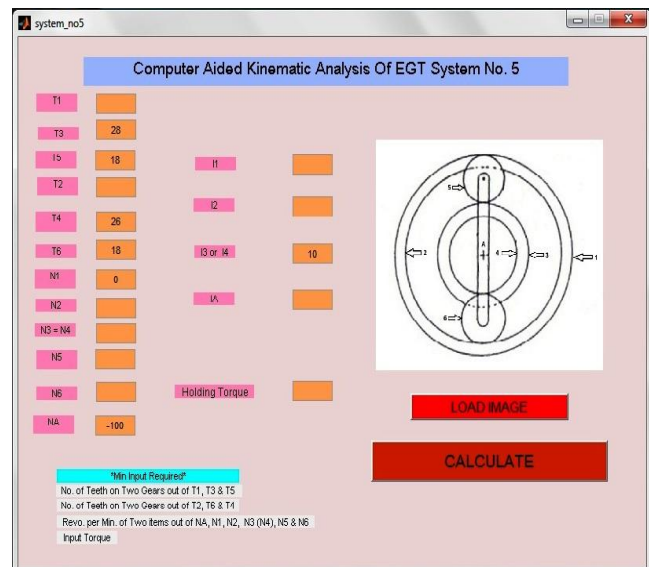Figure 2. Main screen of the program interface before data input.



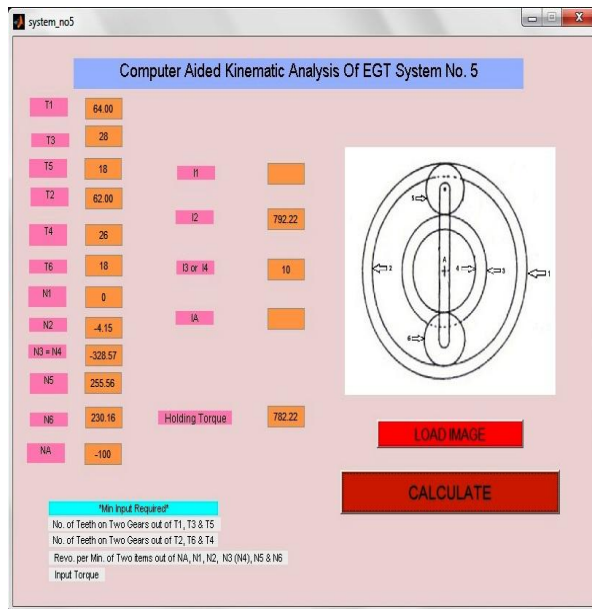Figure 3. Main screen after data input.

Figure 4. Main screen after calculation of all parameters.

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## 5.  Conclusion

A method is established for calculation of parameters of epicyclic gear train system, which method is appropriate for computer aided analysis. This represents a method for computer aided calculation of parameters of  Epicyclic Gear Train such as speed of different gears, torque , holding torque.

Following this method a program  is compiled which very much facilitate the user  in the choice and analysis of the most appropriate gear train system.

## 6.  References

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