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WEB BASE EXPERT SYSTEM FOR DESIGNING SPUR GEAR

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Abstract
Nowadays internet and World Wide Web are growing very fast as a source of communication technology and also work as important data providers for industry. In this research paper, we have discussed the development and implementation of a web-based gear design system with an interactive and user-friendly interface. By providing access to our web-based system, any user with a WWW browser can use our site and can design their gear. Once the designer enters our web page designer follows system instructions and can submit their data in our designing system. As soon as the system receives inputs it invokes a Common Gateway Interface program that processes the information provided by the designer through the user interface. The Common Gateway Interface breaks down the data provided by the designer and has the ability to remotely run the knowledge-based gear design system that integrates knowledge about all aspects of gear design and manufacturing and provides powerful reasoning and decision-making capabilities for reducing the time between gear tooth creation, detailed design and manufacturing process specification via the Internet. When our system completes the execution of the given data full specifications definition, kinematic loads, bending stresses, and pitch circle are determined and sent back to the designer on the web browser. To accomplish all data we used a combination of HTML, CSS, JavaScript, DBMS, MySQL is used.

Keywords: WWW browser, Gear designing and manufacturing.

I. Introduction
Gear designing and manufacturing are critical and time-consuming components of many mechani systems' the traditional method of designing and manufacturing gear has been a time-consuming and complex task. However, using web-based expert systems, the design process of spur, helical, and bevel gear has been made more efficient. This process eases the long and time-consuming traditional designing process. This system lightens the designing process which helps in improving productivity and efficiency. By leveraging the power of computer language, these expert systems can provide with designers accurate and reliable gear designs in a fraction of the time in comparison with traditional methods. The system uses computer programming languages to improve the quality of future designs. The expert system also incorporates a knowledge base containing information about the properties and characteristics of different materials, manufacturing processes, and gear types. The web-based interface will allow the user to input their requirements such as load, Input and output speed, gear ratio, and torque. The system will generate the result from input data and display the result summary on the graphical user interface. The user can modify the gears as per the requirements. The development of a web-based expert system for designing gears has the potential to improve the efficiency, productivity, and accuracy of the design process, while also reducing the time and resources required to develop the

design. Designing this web-based system also provides flexibility in design, so the unskilled designer also develops the design of gears on this system. This flexible system can be easy to understand and adopt for new users it only needs the knowledge of operating computers. The system provides control over the design process.

II. Literature

The development of web-based expert systems for designing spur, helical, bevel, and worm gears involves the integration of mechanical engineering knowledge and software engineering techniques. In this literature review, we will explore some of the relevant studied design data and Machine design book

By V. B. Bhandari:

In the above book, we studied the design theories of spur, helical, bevel, and worm gear. Solve the problems on the design of gears and understand how to prepare backend code for design. Also studied the design procedure and different theories of design for the same gears.

In the design data book, all the formulas are listed which are required for the design of spur, helical, bevel, and worm gear. Understand the basic terminology of gears. Studied beam strength theory and wear strength theory.

By A. Kumar and P. R. Goyal:

This study proposes an expert system for designing worm gears. The system uses an analytical approach based on the worm gear geometry and kinematics. The system provides a user-friendly interface for inputting the design parameters and viewing the results.

By A. Ghiasi and S. M. Mirsalim:

This study proposed an expert system for gear selection and design using fuzzy logic. The system provides a user-friendly interface for selecting the appropriate gear type, material, and manufacturing method based on the input data. The system was tested in several case studies, and the results showed its effectiveness in designing gears with minimal error.

By A. R. Syahrom and A. H. M. Yatim:

This study proposes an expert system for gear design and optimization using a genetic algorithm. The system is trained using a large database of gear design parameters and their corresponding performance measures. The GA algorithm is then used to optimize the design parameters for the best gear performance.

Concluding Remarks:

From the above literature, we concluded that,

1. Automatic speed reduction and adjust the ground clearance by using various sensors.
2. Use of an RF sensor the speed of the vehicle is controlled below the set speed.
3. Use of pneumatic cylinders to adjust the ground clearance.
4. Use of an ultrasonic sensor the obstacle is detected and gives signals to the system.

III. METHODOLOGY

From the flow chart, this project started with a Literature survey of the project. In which the survey has been taken. After that, we define the problem statement. We found that calculating the gears is hard and requires more time. After defining the problem statement, we plan how to solve this problem in the easiest way. So, we decide to build a web page using HTML, CSS, and Python programming language. Once the requirement analysis is done the next step is to clearly define and document the product requirements. A design approach clearly defines all the architectural modules of the product along with its communication and data flow representation with the external and third-party modules. The internal design of all the modules of the proposed architecture is to be clearly defined. In this stage, the actual development starts, and the web page is built. The programming code is generated as per requirement during this stage. This stage is usually a subset of all the stages. However, this stage refers to the testing-only stage of the product where product defects are reported, tracked, fixed, and retested until the product reaches the quality standards as defined. If the design is performed in a detailed and organized manner, code generation can be accomplished without much hassle. Then based on the feedback, the product may be released as it is or with suggested enhancements

3.1 Introduction and Formulae for Gear Designing:

3.1.1 Spur Gear:

Spur gears or straight-cut gears are the simplest types of gear. They consist of a cylinder or disk with teeth projecting radially. Viewing the gear at 90 degrees from the shaft length (side on) the tooth faces are straight and aligned parallel to the axis of rotation. Looking down the length of the shaft, a tooth's cross section is usually not triangular. Instead of being straight (as in a triangle) the sides of the cross-section have a curved form (usually involute and less commonly cycloidal) to achieve a constant drive ratio. Spur gears mesh together correctly only if fitted to parallel shafts. No axial thrust is created by the tooth loads. Spur gears are excellent at moderate speeds but tend to be noisy at high speeds.

Formulae for Design of Spur Gear

Beam strength-

Fb = σmby* $\prod$

Yp = 0.154 – $\frac{0.912}{Zp}$

Yg = .154 – $\frac{0.912}{Zg}$

σbp = $\frac{Syt}{3}$

m = module (mm)

b = 10*m (mm)

Wear strength

Fwp = dp*b*Q*k

dp = m*Zp

b = 10m

Q = $\frac{2Zg}{Zg+Zp}$

Effective load

Feff = $\frac{Ka*Km}{Kv}*\frac{p}{v}$

KA = Applications Factor = 1

Km = Service factor = 1.5

Kv = velocity factor = $\frac{6}{6+v}$

v = $\frac{\pi*dp*np}{60000}$

Fbp = FOS * Feff

Ft = $\frac{p}{v}$

Dynamic load

Fd= ft+$\frac{21v(bc+ft)}{21v+(bc+ft)^{(1/2)}}$

error e= 2+0.16φ

φ= m+0.25(d)^(1/2)

c=11400*e

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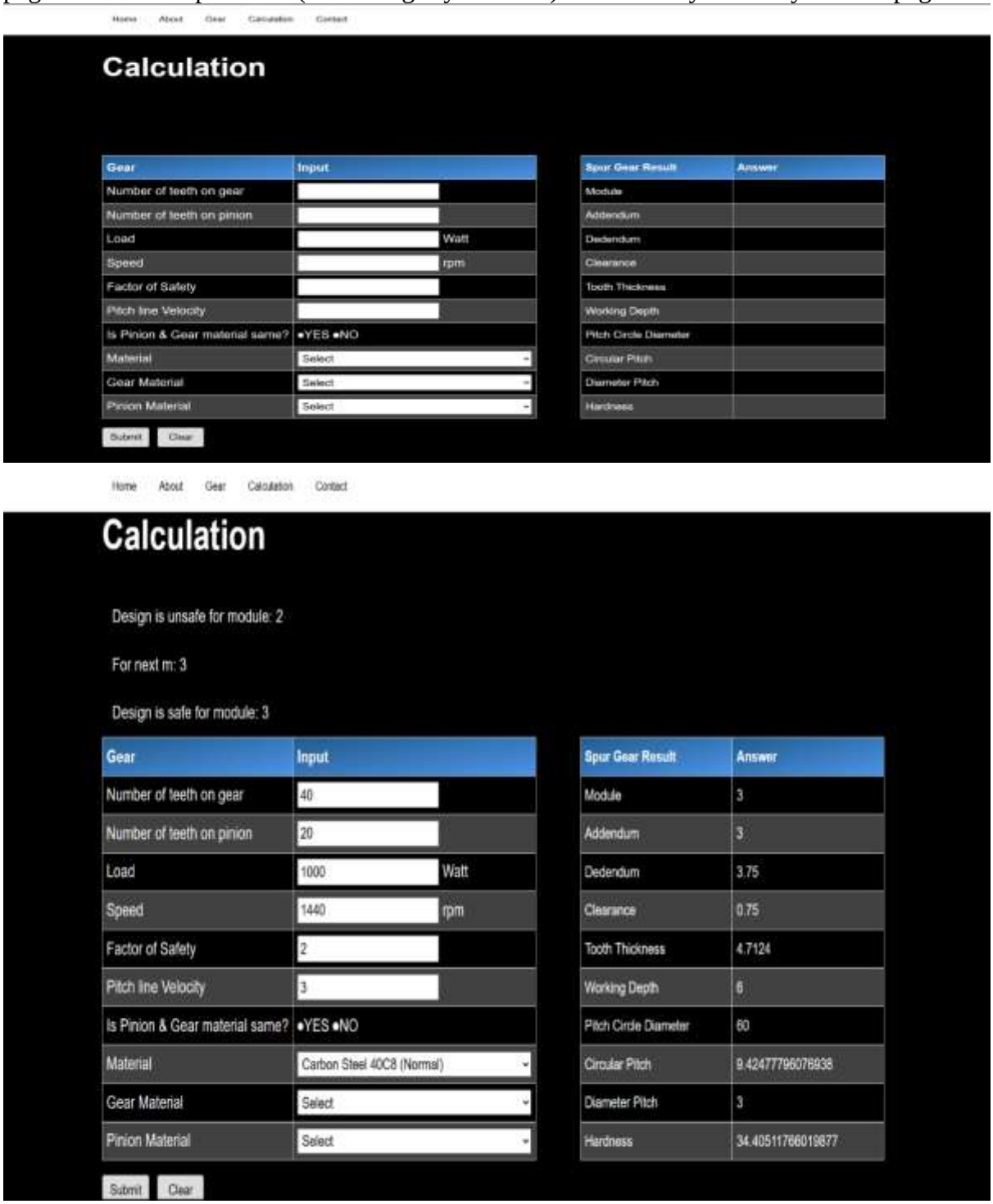
3.3 Web Page:

Procedure:

The entire web page has been designed with the help of HTML, CSS, and JavaScript programming languages.HTML helps in building the body of a web page so that we can give a specific structure to the page. With the help of CSS (Cascading Style Sheets) is used to style and layout web pages.



IV. CONCLUSION

Nowadays time is very precious to everyone as the world is moving faster. So, to save time and money we build this project. This web page can help users to solve the design problems of spur, helical, bevel, and worm gears. It requires very less time and saves time for the user. Before user have to remember

all the formulae and processes to solve the calculations which waste lots of time for the user. Also, there was a requirement for skilled workers for the design calculation of gears, and because of that, there was a waste of money on the requirement of skilled workers. By using this web users can save lots of time and money. It does not require skilled workers; anyone can solve the gear designing problems if the user uses this web page. It solves lots of problems in industries where the requirement of calculation needs to be accurate with saving time and money of the industries.

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