

Problem Statement

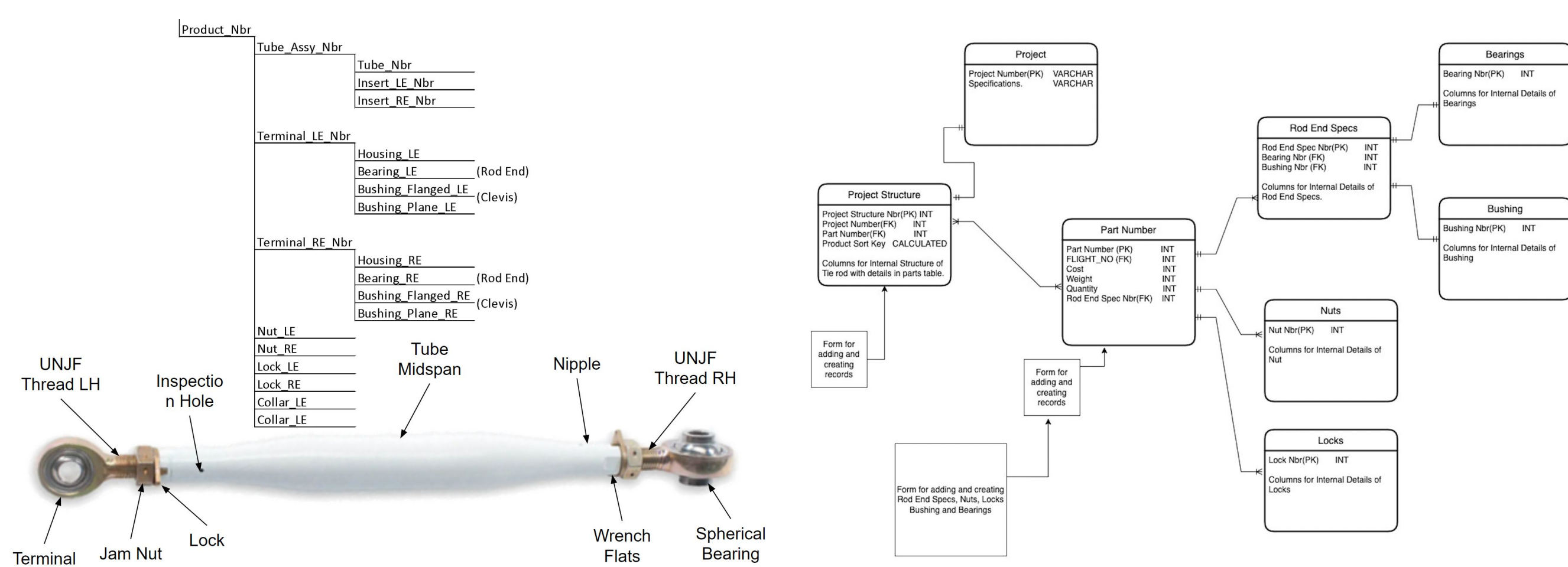
- Database Creation: Develop a database using MS Access and MS SQL Server, categorizing AvtechTye's 50+ years of data to cut Non-Recurring Engineering costs.
- Search Tool: Develop a GUI and search tool for easy retrieval of parts and materials based on various parameters.

Requirments

- Forms containing Product structure, Parts list, Tubes, Terminals, and Hardware.
- Design a Programmable search engine.
- Transfer data from printed/electronic documents to the database.
- Design assistance to display information from specifications.
- CATIA and ANSYS interfaces that combine custom and standard parameters, also can update CATIA and ANSYS models.
- Beautiful and concise Graphical User Interface.

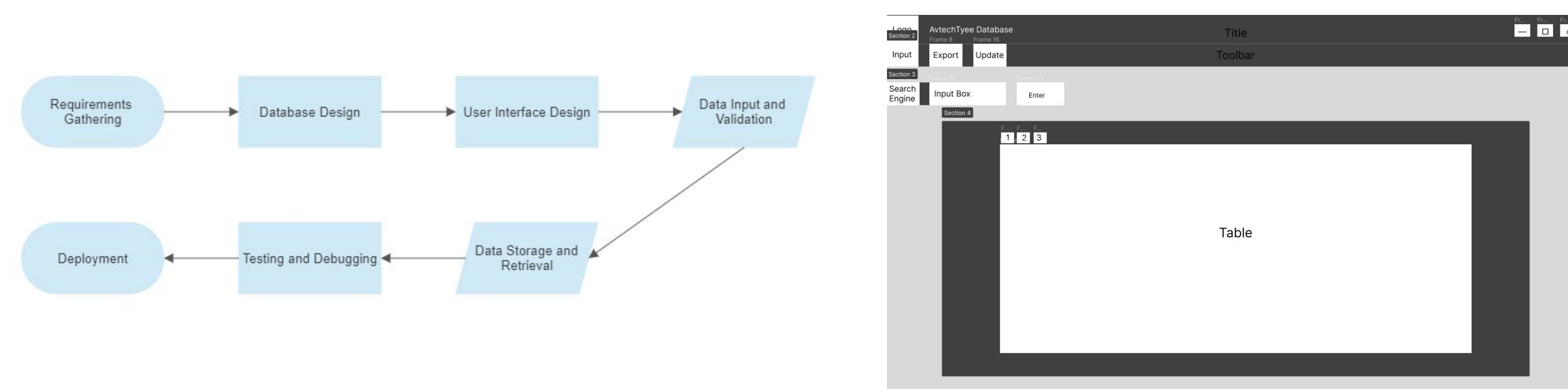
Database Design

- Our database design is based on a hierarchical model, with components arranged in parent-child relationships. Each level in the structure represents a distinct stage in the assembly process. The top level signifies the finished product, while lower levels denote sub-assemblies and individual components.
- Components include tubes [1], terminals, nuts [2], locks [3], collars, and terminals, which can be further subdivided into smaller parts like housing and bearings [4].
- Our analysis of the company's product structure has guided the results and design of our comprehensive database.



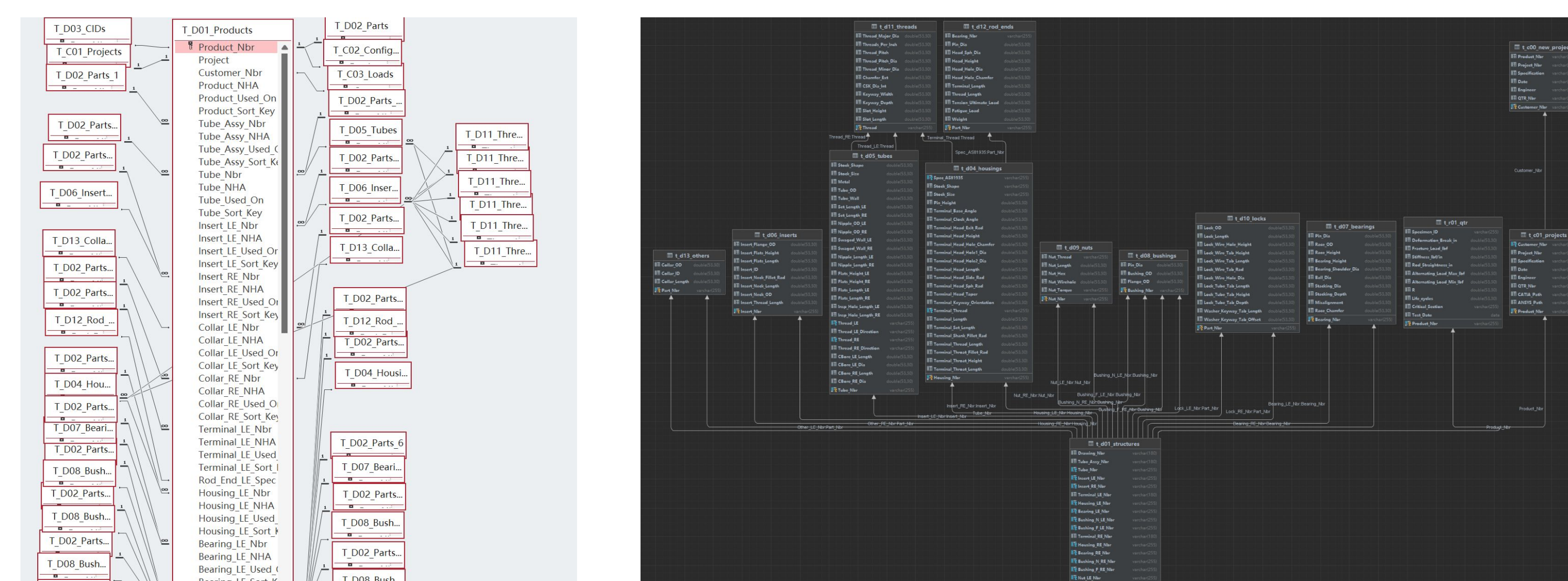
GUI Design

- Our solution utilizes MS Access to design and develop a Graphical User Interface (GUI) for efficient data management.
- MS Access is a powerful relational database management system with built-in visual development tools. With MS Access, you can easily integrate GUI with databases, enabling seamless management and interaction of data.
- MS Access GUI operates within the MS Access environment, eliminating the need for users to install extra software or plugins. Simply having MS Access installed on their computers lowers technical obstacles and enhances the user experience.
- The GUI is implemented by creating forms and connecting them to tables. It is divided into two parts: a main interface that includes most of the functionalities, and a dedicated interface designed for the search engine, which serves as the main functionality.
- To clearly and concisely explain our approach, we employ the use of flow charts :



Results of the Database

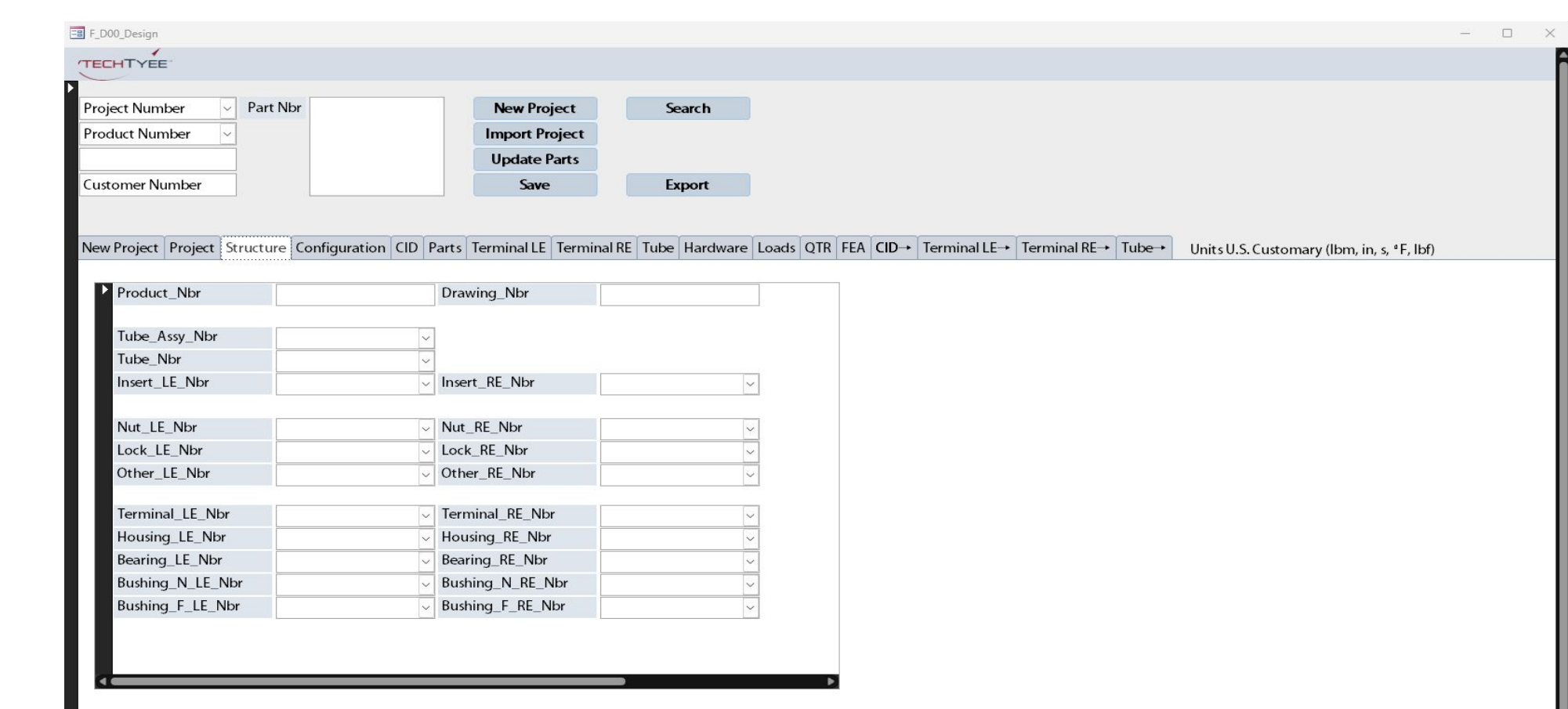
- Using a redesign of the intricate relationships found in the original Ms Access table, we have employed MySQL to eliminate relationship redundancies.



- To implement the NHA structure and equations of Tie-Rods engineering, we also incorporate specific constraints among some attributes.
- This database will be finally deployed to AvtechTye database server for company-wide usage.

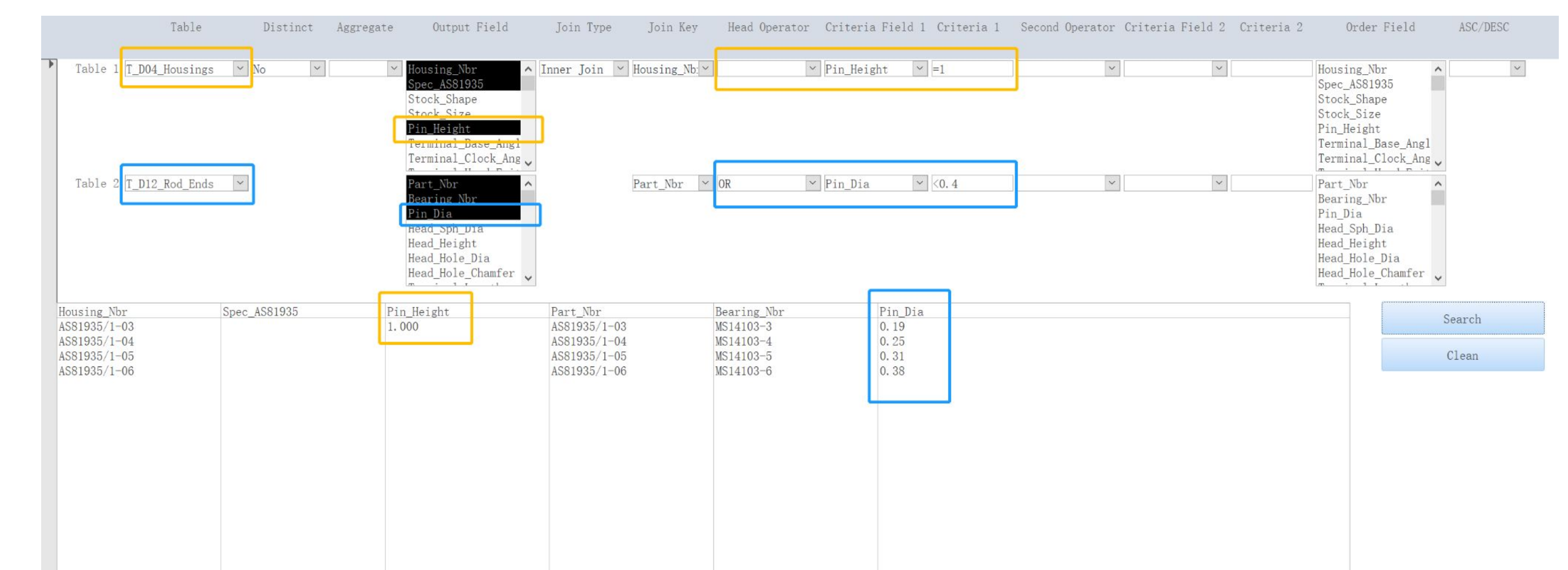
Results of the GUI

- We link this GUI to SQL Server through ODBC connection so that user can directly operate the database through MS Access side.
- Through this GUI, user is capable with the following operations:
 - Query a product's specific information
 - Add or update attributes of a product or a part
 - Data import and export to CATIA and ANASYS application



Main function - Search Engine

- Additionally, we have developed a search engine that encompasses 90 percent of the functionality offered by SQL. Moreover, we have integrated VBA code into the user interface, eliminating the need for users to learn SQL and simplifying their experience.



Future Work, References, and Acknowledgments

Potential future work directions :

- I. User permissions and security
- II. Data analysis and reporting
- III. Data validation and integrity
- IV. User interface enhancements
- V. Database migration and scaling

Industry Mentors: Igor Goniodysky
Faculty Mentors: Prof. John Raiti

- [1] Bearing Rod End: http://everspec.com/MIL-SPECS/MIL-SPECS-MIL-B/MIL-B-81935-1B_48973/
- [2] Clevis End: http://everspec.com/MS-Specs/MS2/MS21000-MS21999/MS21252P_13621/
- [3] Jam Nut: <https://milspechardware.files.wordpress.com/2015/07/nas1423-spec-sheet.pdf>
- [4] Lock Device: <https://html.alldatasheet.com/html-pdf/1132226/ETC2/NAS1193/465/4/NAS1193.html>