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Industries: Steel distributor
Region: USA

PROJECT TYPE
WEB

TECHNOLOGIES
RoR, PostgreSQL, API
windows server with excel

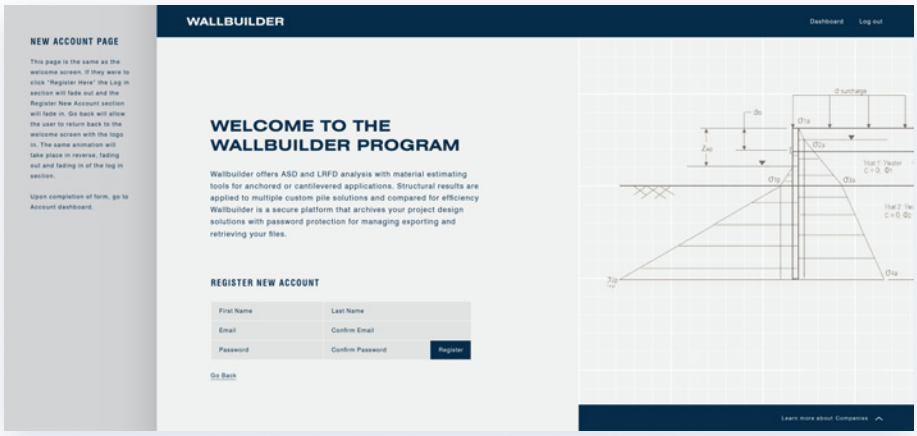
DURATION
3 months

METHODOLOGY
Scrum

TEAM
1 Dev (RoR)
1 PM

Advanced Structural Analysis Web Application for a Leading Steel Distributor

A web application that performs complex structural analysis for geotechnical and structural engineers. The solution includes deep integration with the client's Excel spreadsheet, visualization of key parameters, comprehensive calculation record management, and more.



Project Special Features

1. **Integration with Existing Excel Spreadsheet:** The application maintains the robust and trusted calculation logic of the Client's existing Excel model, eliminating the need for redeveloping these from scratch, thus saving significant development time and cost.
2. **Thorough Analysis of Structures:** The application provides a comprehensive analysis of structures based on soil properties and key design criteria, generating crucial measurements and recommendations related to design and installation.
3. **Visual Representation:** The app presents Shear, Deflection, and Moment parameters graphically for three different structural solutions, aiding engineers in evaluating and choosing the most suitable option.
4. **Personalized Dashboard:** The platform provides a user-friendly dashboard with a complete history of a user's calculations. This feature allows engineers to review, analyze, and guide their future calculations.
5. **Dual Server Setup:** To ensure optimal performance and data accuracy, the application runs on two servers. One server handles user registration, calculation records management, and the user interface. The other is dedicated solely to the Excel calculations for load analysis and material estimation.

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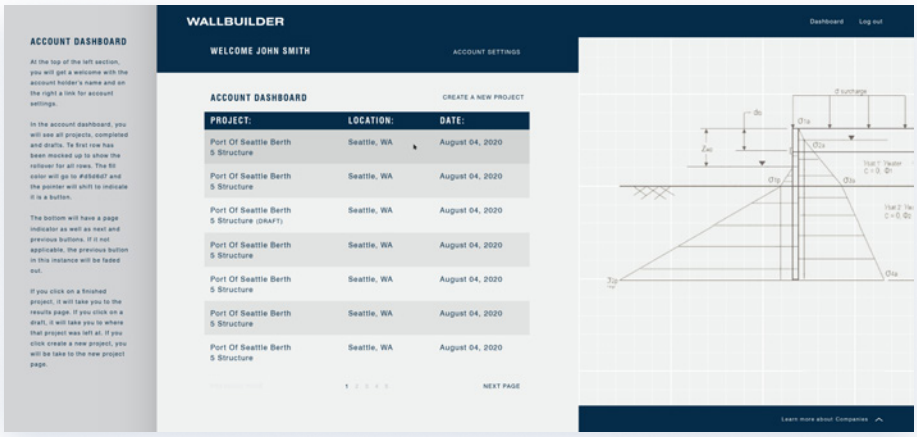
6. **User-friendly Functionalities:** The application includes additional features like password recovery, account restoration by username, calculation records management, and measurement unit alteration for enhanced user experience and efficiency.
7. **Project Modification and Creation:** When a user edits the parameters of an existing project, the system offers to create a new project based on these changes, allowing users to maintain a comprehensive history of project calculations for future reference and comparison.

Business challenge

Our Client is a leading steel distributor based in Houston, specializing in API line pipe and steel foundation piling systems for heavy civil marine and oil & gas applications. They possess over 10 stocking locations throughout North America and handle an inventory of 150,000 tons of steel. Their goal was to enhance their services by offering an online tool for structural analysis and material estimation to attract more geotechnical or structural engineers.

Main Challenge

The Client had been relying on an Excel spreadsheet for critical load analysis and material estimations. We were expected to develop a web application that reproduces the logic of this analysis.



Our solution

Recognizing the complexity of the Client's existing calculation model in Excel, SumatoSoft decided on an efficient and cost-conscious approach. We chose to create a web application, integrating the existing Excel model directly into the system. This move not only preserved the robust calculation logic the Client already utilized but also saved significant development time and cost.

Our team built a web app that geotechnical and structural engineers can use to determine the safety and suitability of steel pile structures. The calculation is based on the input from the engineer that includes soil properties (such as Soil Density, Water Density, and Active/Passive Water) and key design criteria (like Reduction Factor, Safety Factor, and Max Deflection).

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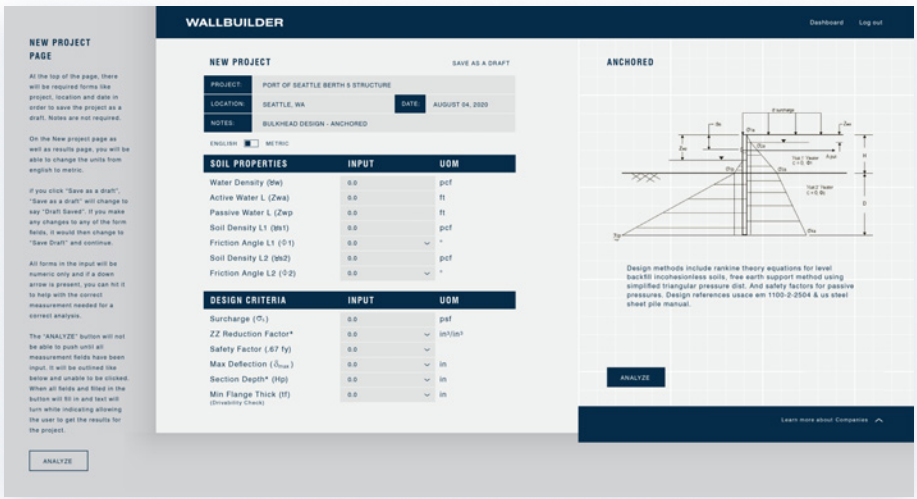
The system carries out a thorough analysis:

1. **Generates key measurements of the structure resilience** such as Max Waterline, Max Shear and Max Deflection. These measurements serve as valuable indicators of how resilient the structure is against forces like torsional, compressive or tensile.
2. **Dispenses crucial recommendations related to the design and installation** of the structure, offering guidance on factors like Minimum Embedment, Pile Length, and Actual Deflection.
3. **The web app also visualizes Shear, Deflection, and Moment parameters** through graphs for three different structural solutions. These visuals empower engineers to evaluate and contrast the three solutions effectively, which helps them to choose more appropriate for their needs.

A web app provides a **personal dashboard** with a historical record of all user's calculations. This history is not only a record but also a tool that engineers can use to review, analyze, and inform their future calculations.

SumatoSoft set up two servers for calculations:

- ✓ **The first server** hosted the web application, responsible for user registration, calculation records management, and serving as the user interface for engineers to input their data and view results.
- ✓ **The second server** was dedicated solely to the integrated Excel spreadsheet, carrying out the intricate calculations for load analysis and material estimation, and then transferring the data back to the first server.



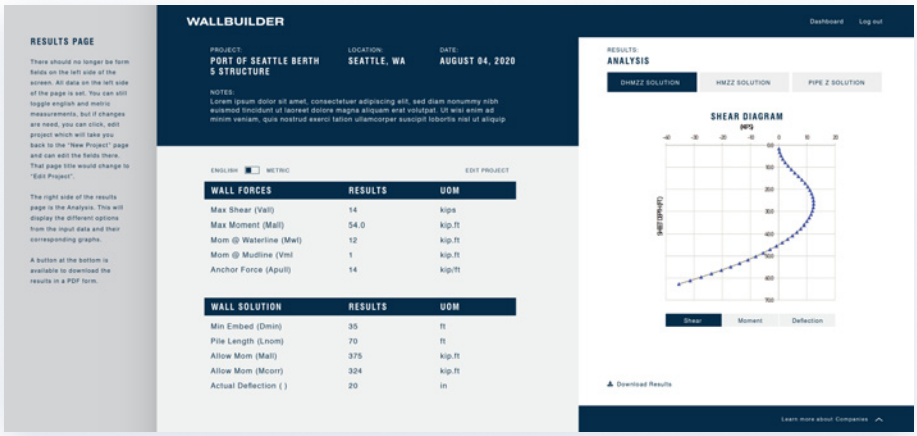
By separating these two functionalities onto different servers, we ensured optimal performance and responsiveness for the users, while maintaining the integrity and accuracy of the calculation processes.

Alongside this central feature, the SumatoSoft team added additional functionalities to enhance user experience and efficiency. These include:

- ✓ **Password recovery** – ensuring that users can regain access to their accounts quickly if they forget their password.
- ✓ **Account restoration by username** – allowing users to retrieve their accounts using their usernames if they lose their login details.

- **Calculation records management** – engineers can create new projects (records), save them and browse the history of their projects, thus enabling the option to use them for future reference or modification.
- **Measurement alteration** – providing the ability for engineers to change measurement units as per their requirements.
- **The modifications of the record create a new record** – when users edit the parameters of an existing project (records), the system offers to create a new project based on these changes. In this way, users have a consistent history of project calculations, providing a resource for comparison and potential future reference.

The end product is a sophisticated yet user-friendly web application that seamlessly performs complex structural analyses and delivers clear, actionable results to engineers.



Customer’s benefits

We delivered a sophisticated web application that offered a new opportunity to the Client's customer experience to calculate structure resilience. Moreover, our idea of integrating a web app with Excel resulted in a significant saving in both time and financial resources.

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