Detailed Design

Your Dream, Our Solution

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For: Dr. Timoth Lederman
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1. Introduction

1.1 Purpose

The detailed design document is a refinement and an enhancement of the preliminary design document that Your Dream, Our Solution (YDOS) provided to the client, Dr. Timoth Lederman, last semester. In this document, YDOS will provide a more finalized list of the system requirements, as specified by the client, a detailed description of the user interface, and an organized plan for the system database.

1.2 Product Overview and Summary

Chevrolet Advance-Design Series Paint Visualizer (CADS Paint Visualizer) will be a web application that will provide users a place to customize or restore 1947-1955 Chevrolet Advance-Design Series trucks. Users will be able to restore a truck, customize a truck, or load a pre-existing customized/restored truck.

CADS Paint Visualizer allows the user to customize/restore either pickup trucks or cab over engines from 1947-1955. Depending upon the desired year, the body style of the truck will change with the user's selection. Further, the user does not have to customize/restore the standard truck from the years 1947-1955, but the user will also have the ability to change the window style of the truck.

If the user chooses to restore a truck, the user will have access to the original factory colors for the desired truck year. If the user chooses to customize a truck, the user will have access to a variety of custom colors.

After the user is satisfied with the customized/restored truck, the user may save the truck on the application's database. In order to save a truck, the user must enter a unique code name that will be associated with that specific truck. This code name is used upon return to the site so the user can find the truck at a later date.

If the user chooses to view already existing trucks, the user may either search for the associating code word, search through a specific truck year, or look through thumbnail images of all customized/restored trucks on the web application. At any point, any user can customize/restore any trucks on the site. Editing a previously existing truck, however, does not erase the pre-existing truck image. Rather, a new image is saved with a new unique code word every time an image is edited.

2. Detailed Design Specification

2.1 Use/User Case

CADS has three users that will be using the application.

The main users can be classified as a restorer or a customizer. Both users will have the same functionality but different tendencies. The Restorer will most likely choose factory colors and paint schemes to replicate how the truck looked when new from the factory. The customizer will most likely want to use custom paint colors and the paint scheme could involve many different colors to give the truck a one of a kind look.

A user may also be classified as a casual user. The casual user will use CADS Paint Visualizer to browse the customized/restored trucks. The casual user may also act as a customizer/restorer.

2.2 Functional Requirements Inventory

A functional requirement specifies a functionality of the application or component that the application must perform. Functional requirements define the behaviors of the application. As displayed in the test plan, the functional requirements of the application include the following:

Select Truck

- Does the standard 1947 truck image load?
- Does the standard 1948 truck image load?
- Does the standard 1949 truck image load?
- Does the standard 1950 truck image load?
- Does the standard 1951 truck image load?
- Does the standard 1952 truck image load?
- Does the standard 1953 truck image load?
- Does the standard 1954 truck image load?
- Does the standard 1955 truck image load?
- Does the 1947 pickup truck with vent window image load?
- Does the 1948 pickup truck with vent window image load?
- Does the 1949 pickup truck with vent window image load?
- Does the 1950 pickup truck with vent window image load?
- Does the 1951 pickup truck with vent window image load?
- Does the 1952 pickup truck with vent window image load?
- Does the 1953 pickup truck with vent window image load?
- Does the 1954 pickup truck with vent window image load?
- Does the 1955 pickup truck with vent window image load?
- Does the 1947 coe truck with vent window image load?
- Does the 1948 coe truck with vent window image load?

- Does the 1949 coe truck with vent window image load?
- Does the 1950 coe truck with vent window image load?
- Does the 1951 coe truck with vent window image load?
- Does the 1952 coe truck with vent window image load?
- Does the 1953 coe truck with vent window image load?
- Does the 1954 coe truck with vent window image load?
- Does the 1955 coe truck with vent window image load?
- Does the 1947 pickup truck without vent window image load?
- Does the 1948 pickup truck without vent window image load?
- Does the 1949 pickup truck without vent window image load?
- Does the 1950 pickup truck without vent window image load?
- Does the 1951 pickup truck without vent window image load?
- Does the 1952 pickup truck without vent window image load?
- Does the 1953 pickup truck without vent window image load?
- Does the 1954 pickup truck without vent window image load?
- Does the 1955 pickup truck without vent window image load?
- Does the 1947 coe truck without vent window image load?
- Does the 1948 coe truck without vent window image load?
- Does the 1949 coe truck without vent window image load?
- Does the 1950 coe truck without vent window image load?
- Does the 1951 coe truck without vent window image load?
- Does the 1952 coe truck without vent window image load?
- Does the 1953 coe truck without vent window image load?
- Does the 1954 coe truck without vent window image load?
- Does the 1955 coe truck without vent window image load?

Custom Color

- Does the custom controller panel load properly from the factory panel before the truck image is altered?
- Does the custom controller panel load properly from the load panel before the truck image is altered?
- Does the custom controller panel load properly from the save panel before the truck image is altered?
- Does the selected color box match the selected color on the custom controller panel color wheel?
- Does the desired truck part color properly and match the desired selected color?
- Is the truck still customized/restored properly when the custom controller panel is loaded from the factory panel?
- Is the truck still customized/restored properly when the custom controller panel is loaded from the load panel?

- Is the truck still customized/restored properly when the custom controller panel is loaded from the save panel?

Factory Color

- Does the factory controller panel load properly from the custom panel with the correct 1947 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1948 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1949 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1950 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1951 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1952 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1953 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1954 factory colors?
- Does the factory controller panel load properly from the custom panel with the correct 1955 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1947 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1948 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1949 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1950 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1951 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1952 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1953 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1954 factory colors?
- Does the factory controller panel load properly from the load panel with the correct 1955 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1947 factory colors?

- Does the factory controller panel load properly from the save panel with the correct 1948 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1949 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1950 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1951 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1952 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1953 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1954 factory colors?
- Does the factory controller panel load properly from the save panel with the correct 1955 factory colors?
- Does the selected color box match the selected color on the custom controller panel color wheel?
- Does the desired truck part color properly and match the desired selected color?
- Is the truck still customized/restored properly when the factory controller panel is loaded from the custom panel?
- Is the truck still customized/restored properly when the factory controller panel is loaded from the load panel?
- Is the truck still customized/restored properly when the factory controller panel is loaded from the save panel?

Save Truck

- Does the save controller panel load properly from the custom panel?
- Does the save controller panel load properly from the factory panel?
- Does the save controller panel load properly from the load panel?
- Does the application accept a valid code word?
- Does the application reject an invalid code word?
- Does the application reject a pre-existing code word?
- Does the application reject an empty code word?
- Does the application accept a truck description?
- Does the application accept an empty truck description?
- Is the truck still customized/restored properly when the save controller panel is loaded from the custom panel?
- Is the truck still customized/restored properly when the save controller panel is loaded from the factory panel?

- Is the truck still customized/restored properly when the save controller panel is loaded from the load panel?

Load Truck

- Does the load controller panel load properly from the custom panel?
- Does the load controller panel load properly from the factory panel?
- Does the load controller panel load properly from the save panel?
- Does the load controller panel warn users of lost progress?
- Does the application accept and load valid code words?
- Does the application reject invalid/not-existing code words?
- Does the application reject valid truck year, body/cab style, and window style combinations?
- Does the application reject invalid truck year, body/cab style, and window style combinations?
- Is the truck still customized/restored properly when the load controller panel is loaded from the custom panel?
- Is the truck still customized/restored properly when the load controller panel is loaded from the factory panel?
- Is the truck still customized/restored properly when the load controller panel is loaded from the save panel?

2.3 Non-Functional Requirements Inventory

Non-functional requirements are intangible requirements. In other words, non-functional requirements are very difficult to test. These requirements describe how the software will perform rather than what the software will do. The non-functional requirements for CADS Paint Visualizer include the following:

- CADS Paint Visualizer must be intuitive and user friendly

3. External Design Specification

3.1 User Displays

The following user displays are intended to portray the final appearance and functionalities of CADS Paint Visualizer. Upon client review, Your Dream, Our Solution has the right to modify any, and all, of the prototype screens.

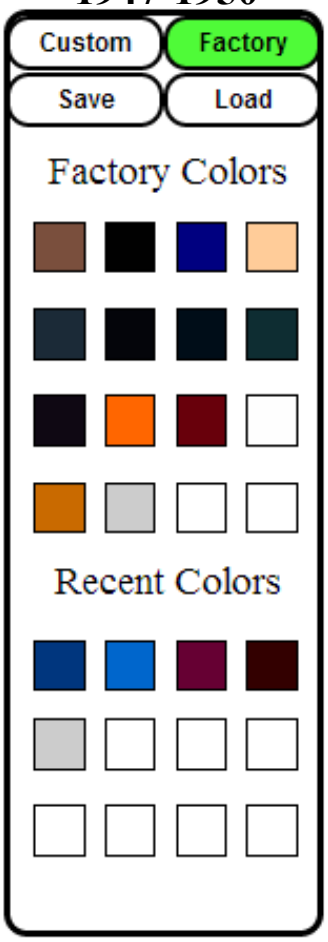
3.1.1 Custom Controller Panel

Below is the custom color controller panel that displays a custom color wheel:

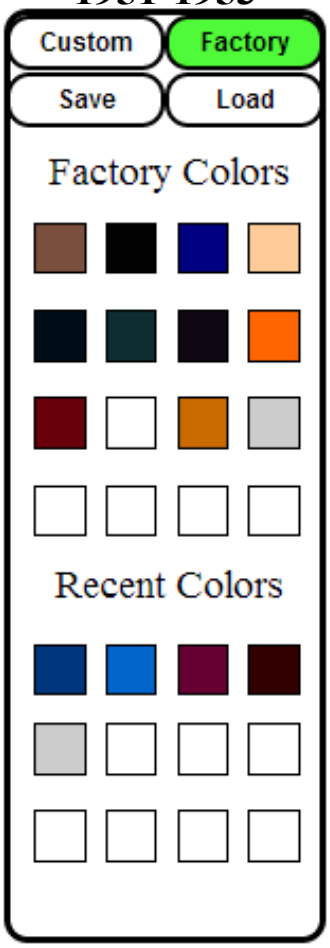
3.1.2 Factory Controller Panel

Below are the factory colors for all truck years:

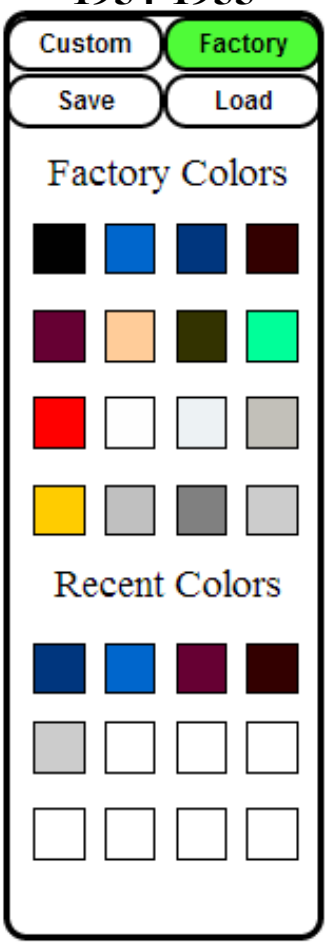
1947-1950

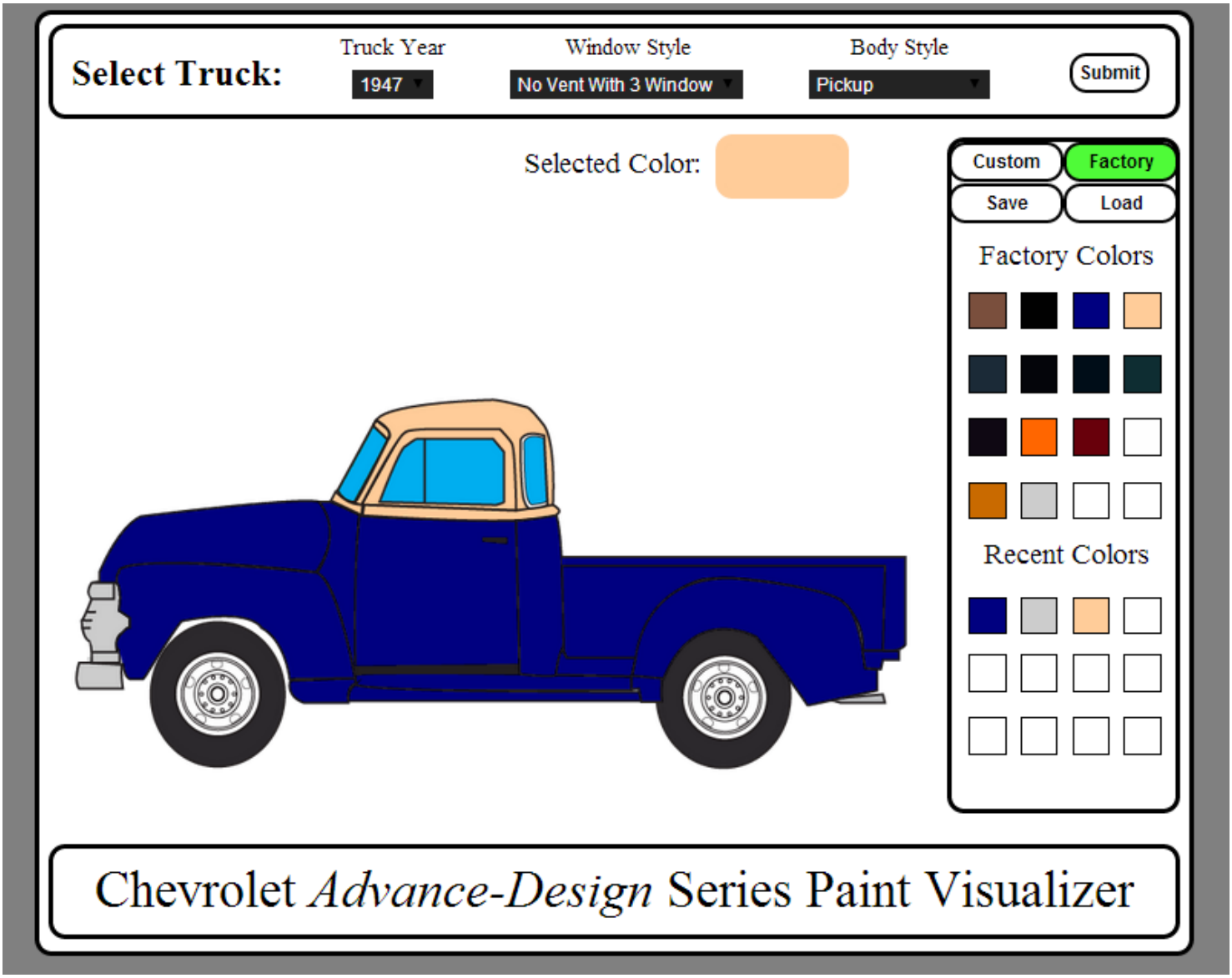


1951-1953



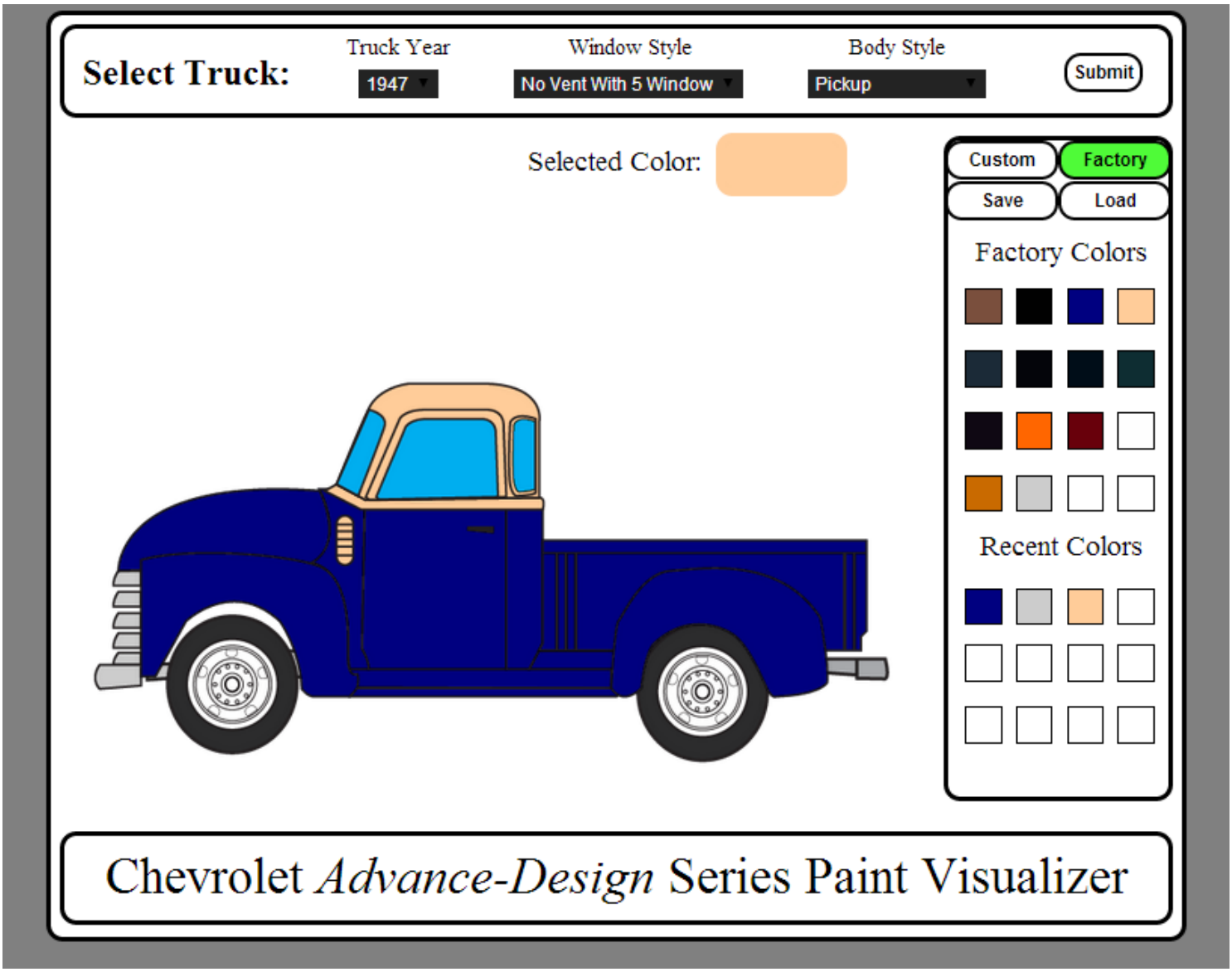
1954-1955



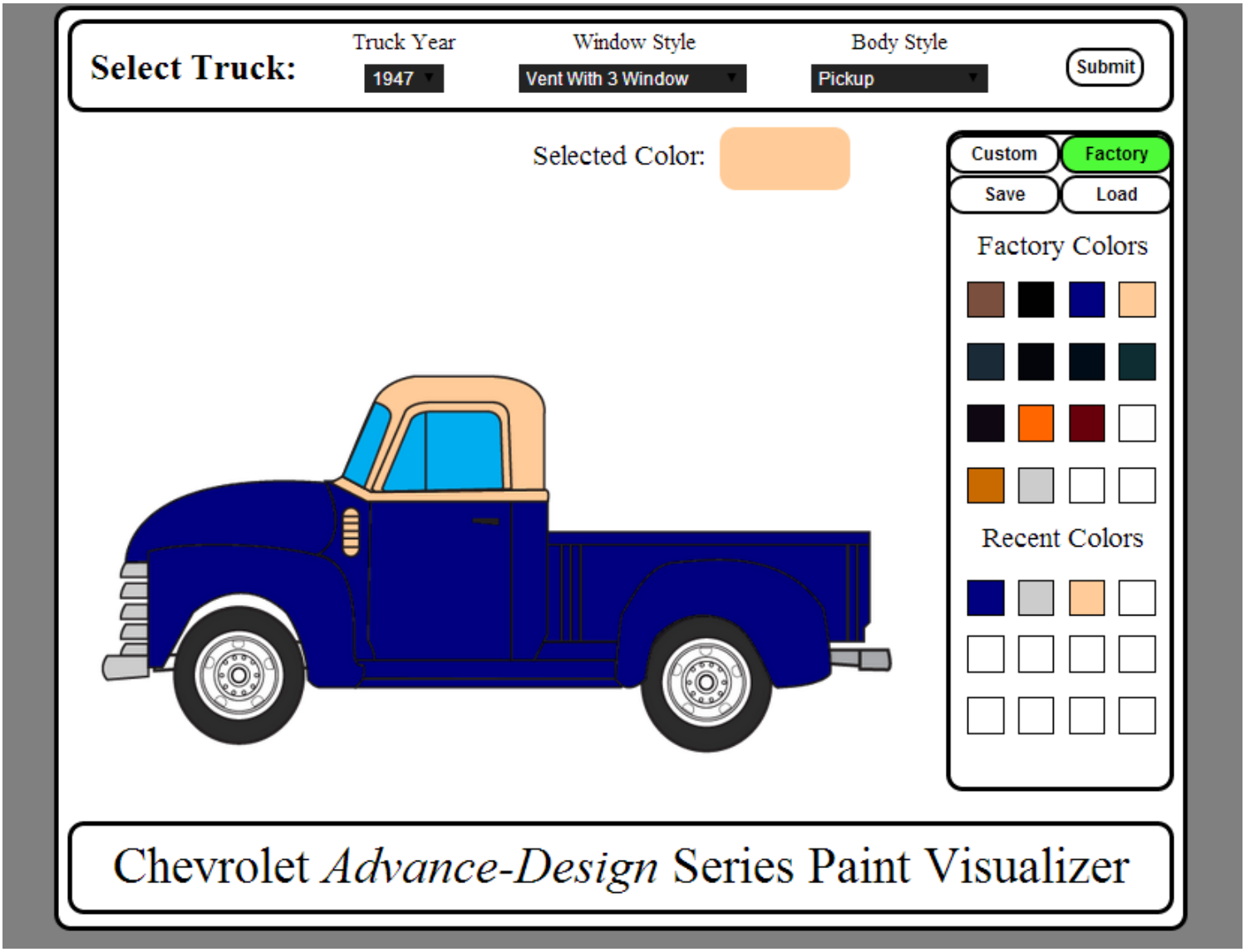


3.1.3 Truck Combinations

This prototype screen displays the factory controller panel with a 1947 pickup being restored. The 1947 pickup truck has a 3 window cab and no vent window. The controller panel also displays the most recently used colors. *1947-1950 body styles are the same*



This prototype screen displays the factory controller panel with a 1947 pickup being restored. The 1947 pickup truck has a 5 window cab and no vent window. The controller panel also displays the most recently used colors. *1947-1950 body styles are the same*



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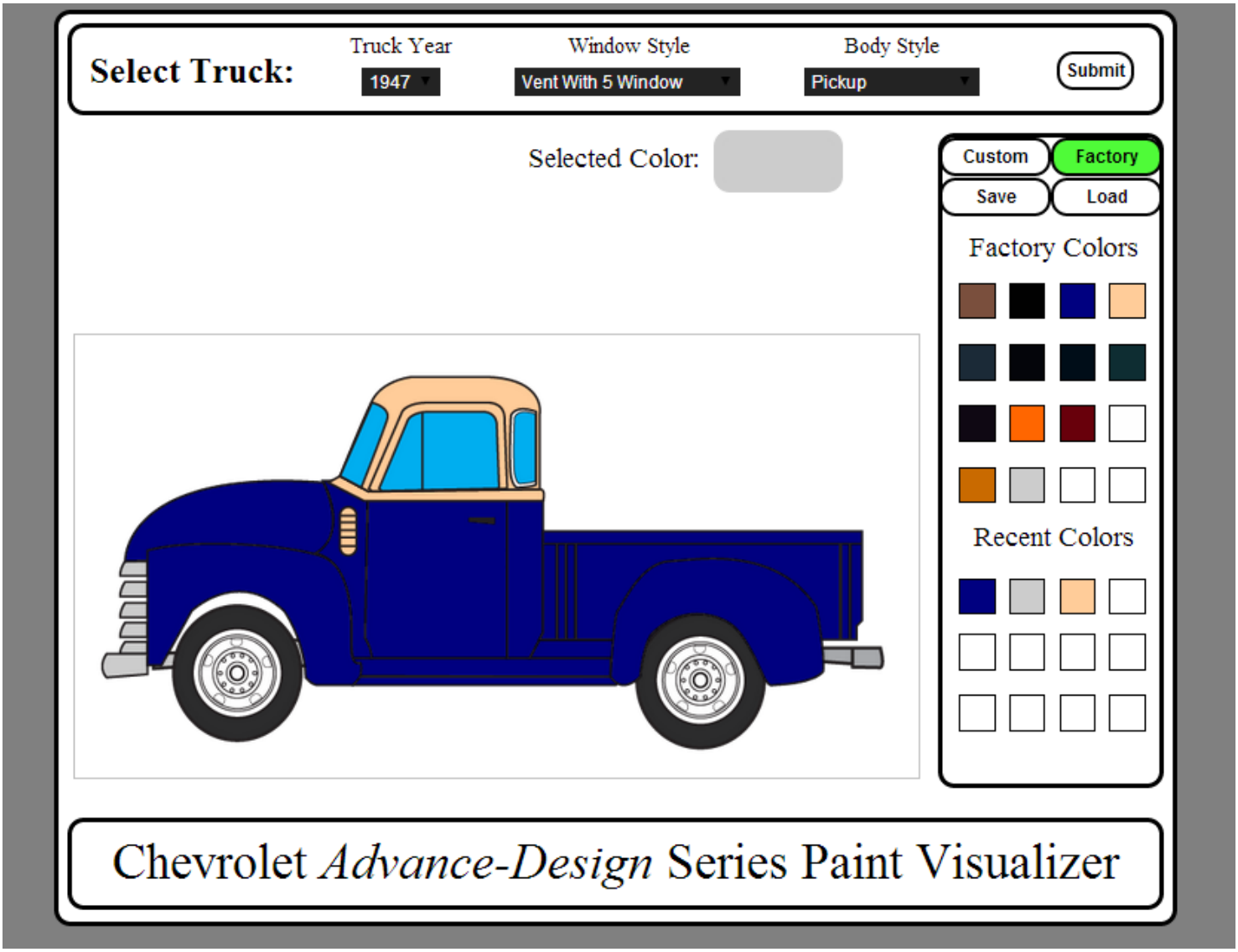

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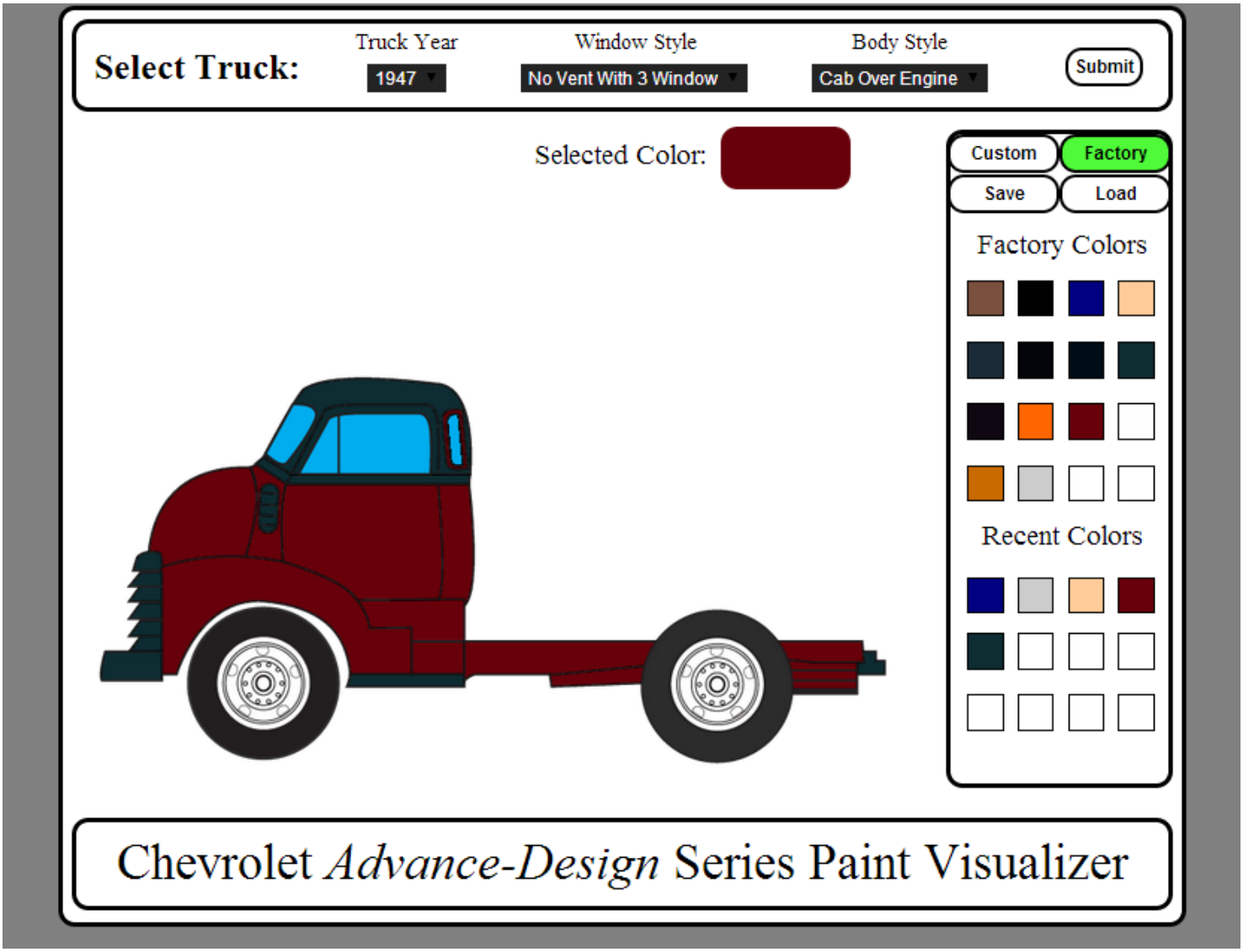
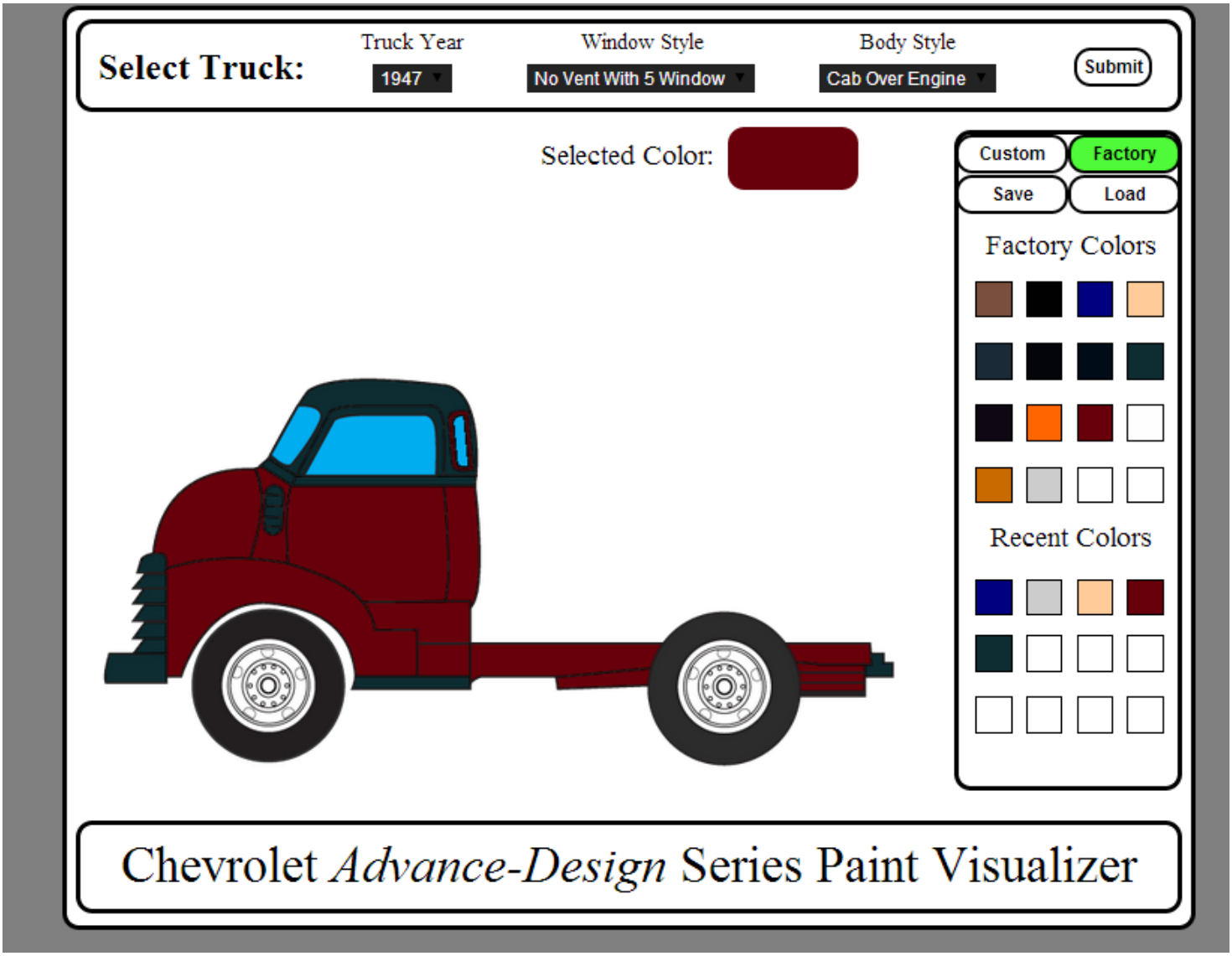


This prototype screen displays the factory controller panel with a 1947 cab over engine (COE) being restored. The 1947 COE has a 3 window cab and no vent window. The controller panel also displays the most recently used colors. *1947-1950 body styles are the same*



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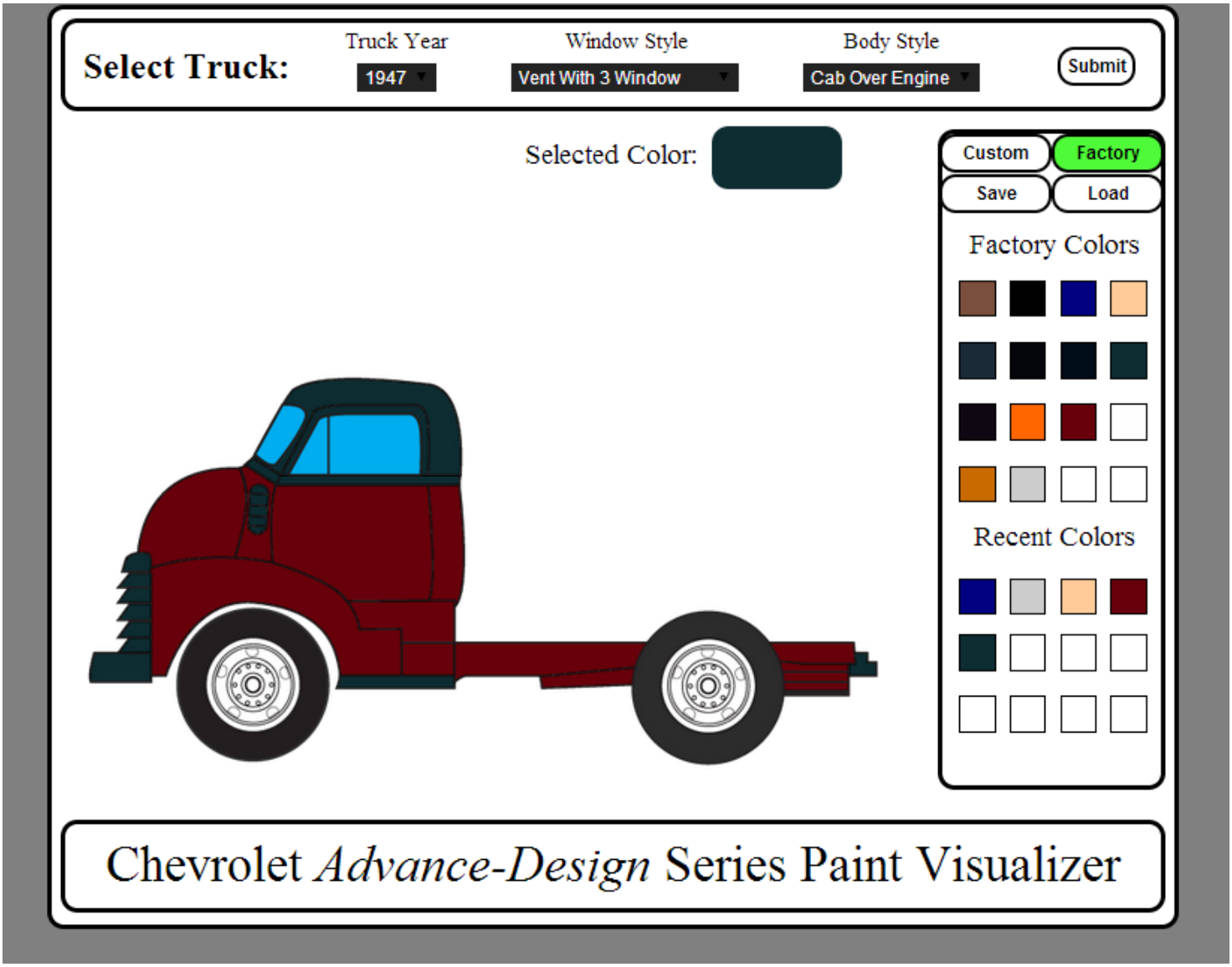

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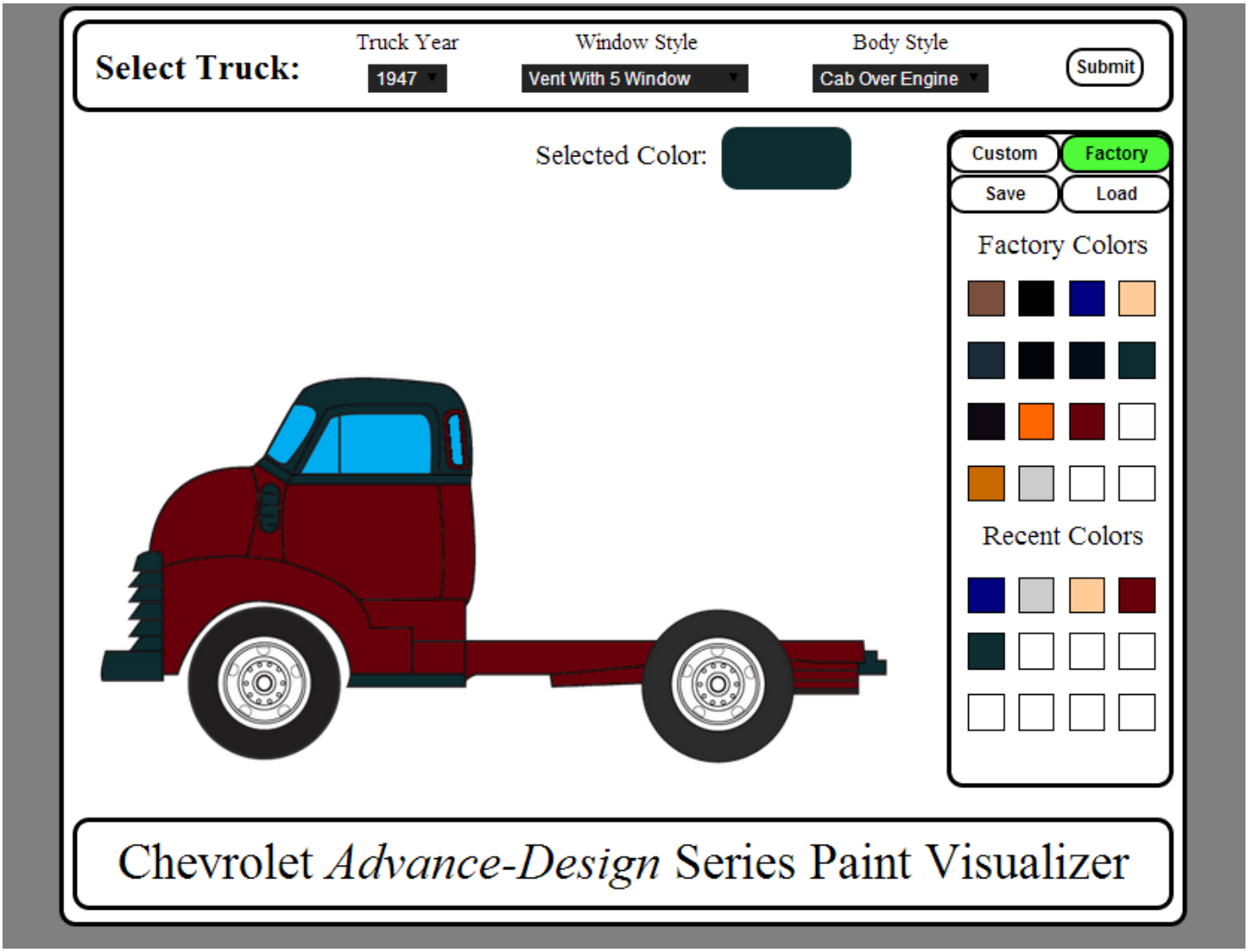
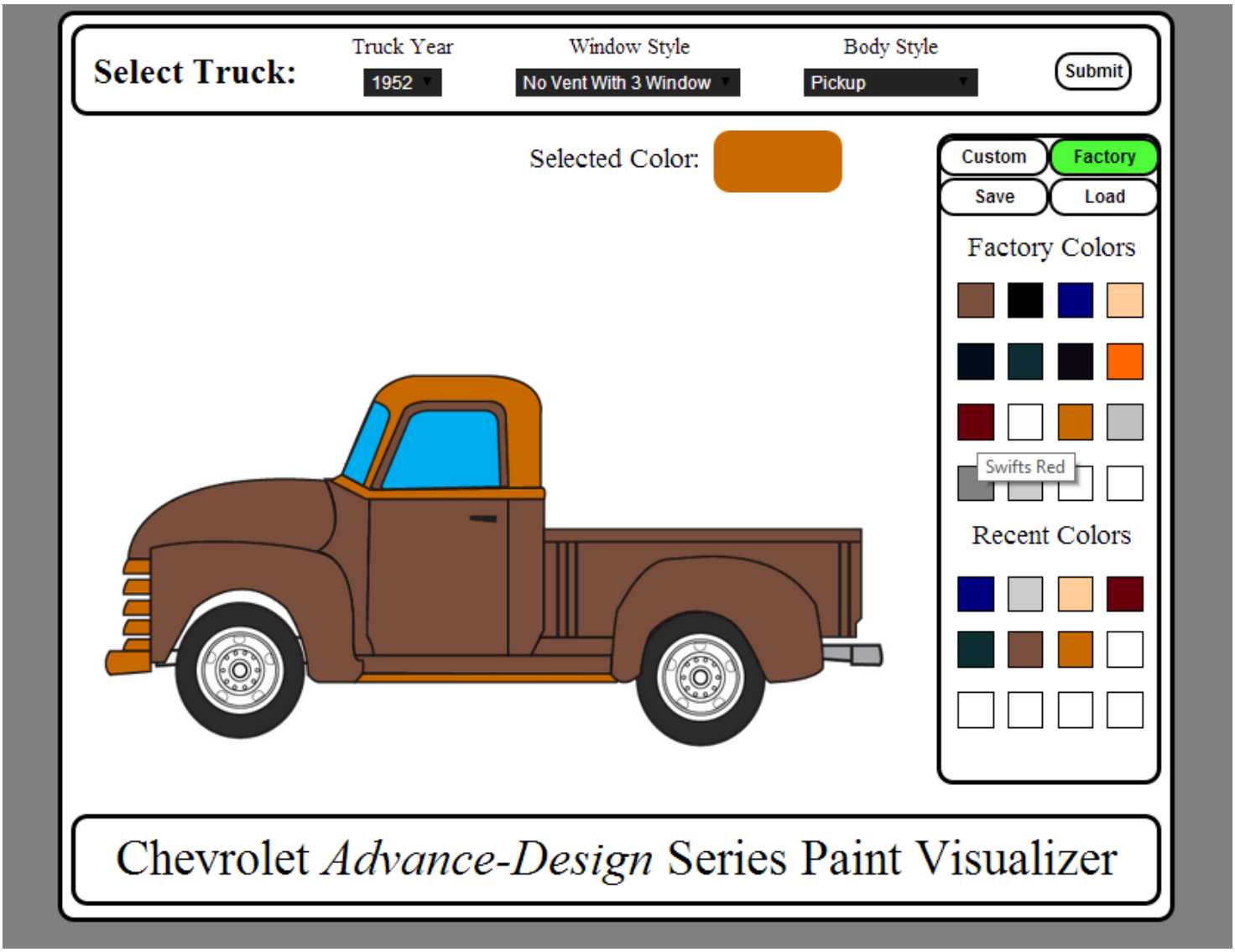
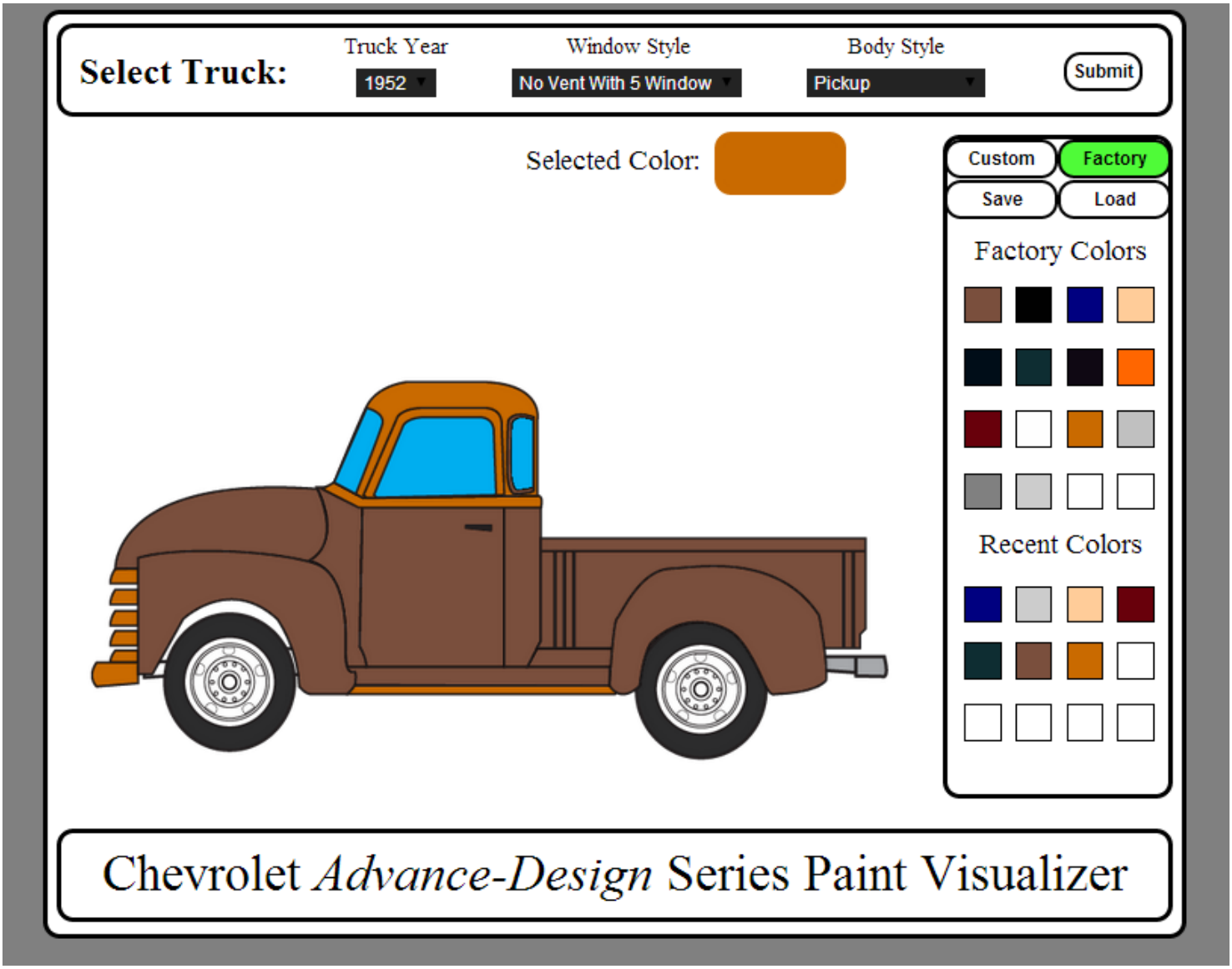

Select Truck:
Truck Year
1947
Window Style
Vent With 5 Window
Body Style
Cab Over Engine
Submit
Selected Color:
Custom
Factory
Save
Load
Factory Colors
Recent Colors
Chevrolet Advance-Design Series Paint Visualizer

This prototype screen displays the factory controller panel with a 1947 cab over engine (COE) being restored. The 1947 COE has a 5 window cab and a vent window. The controller panel also displays the most recently used colors. *1947-1950 body styles are the same*



This prototype screen displays the factory controller panel with a 1952 pickup being restored. The 1952 pickup truck has a 3 window cab and no vent window. The controller panel also displays the most recently used colors. This screen shot also displays the text of the factory color when the color is moused over. *1951-1953 body styles are the same*



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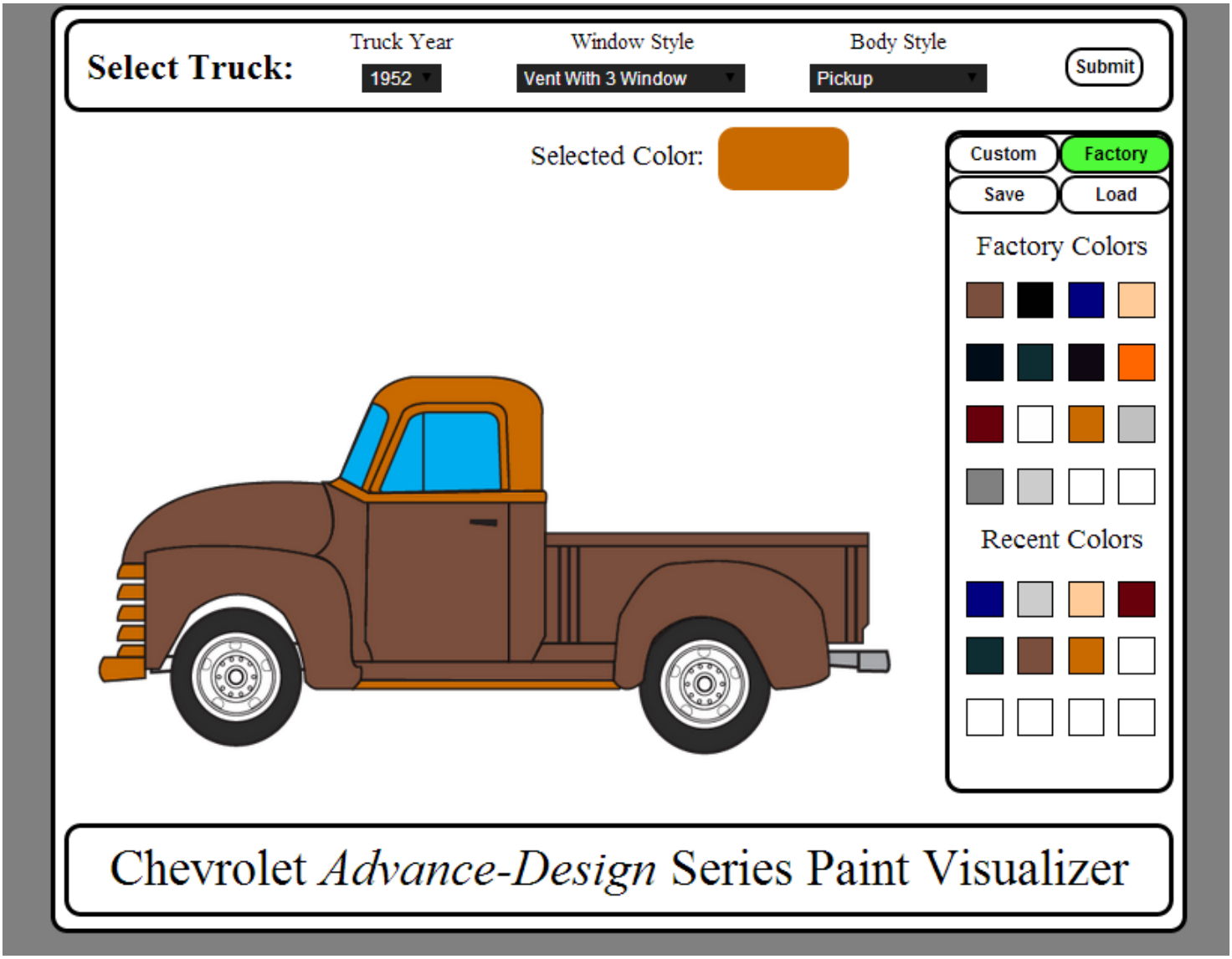

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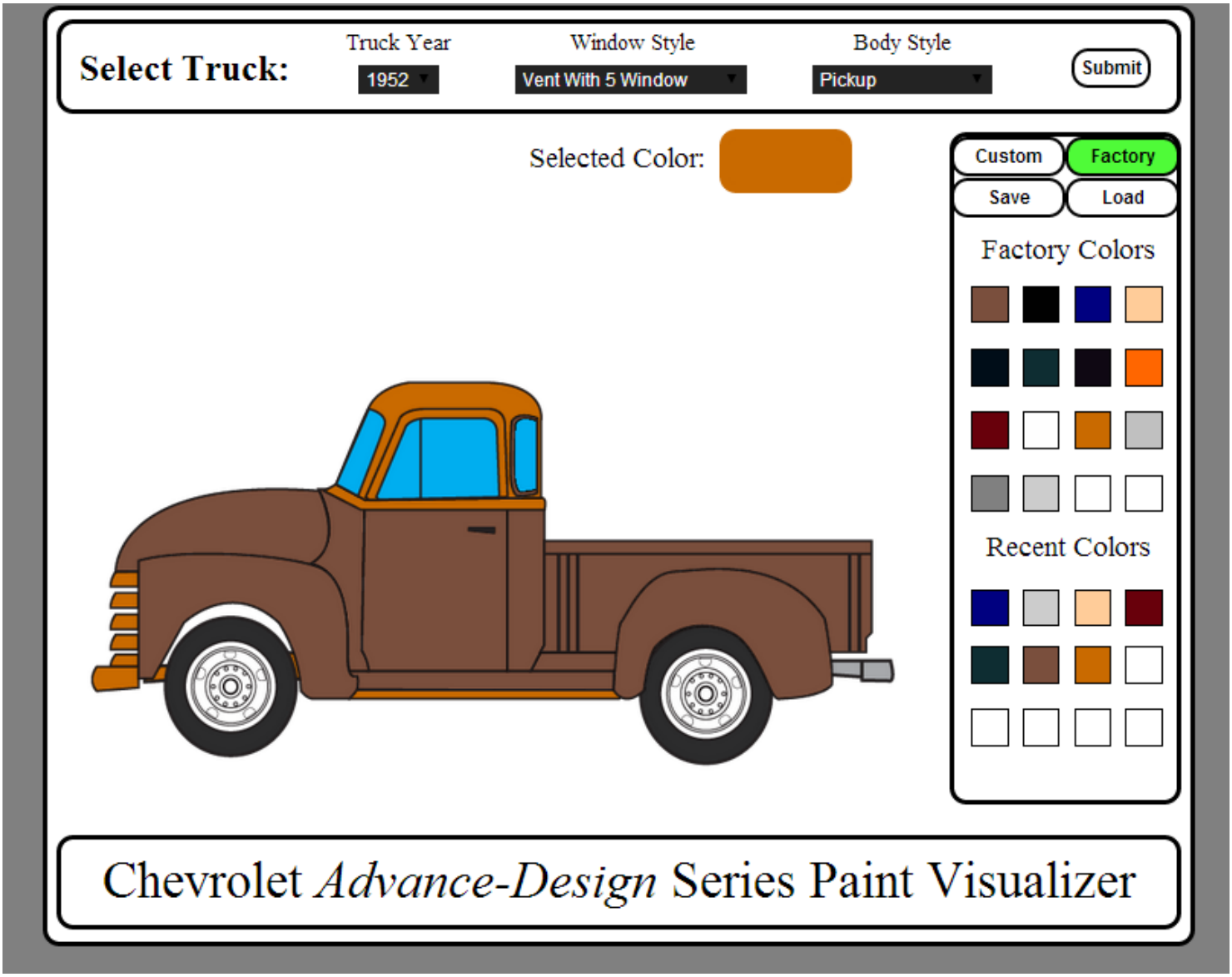

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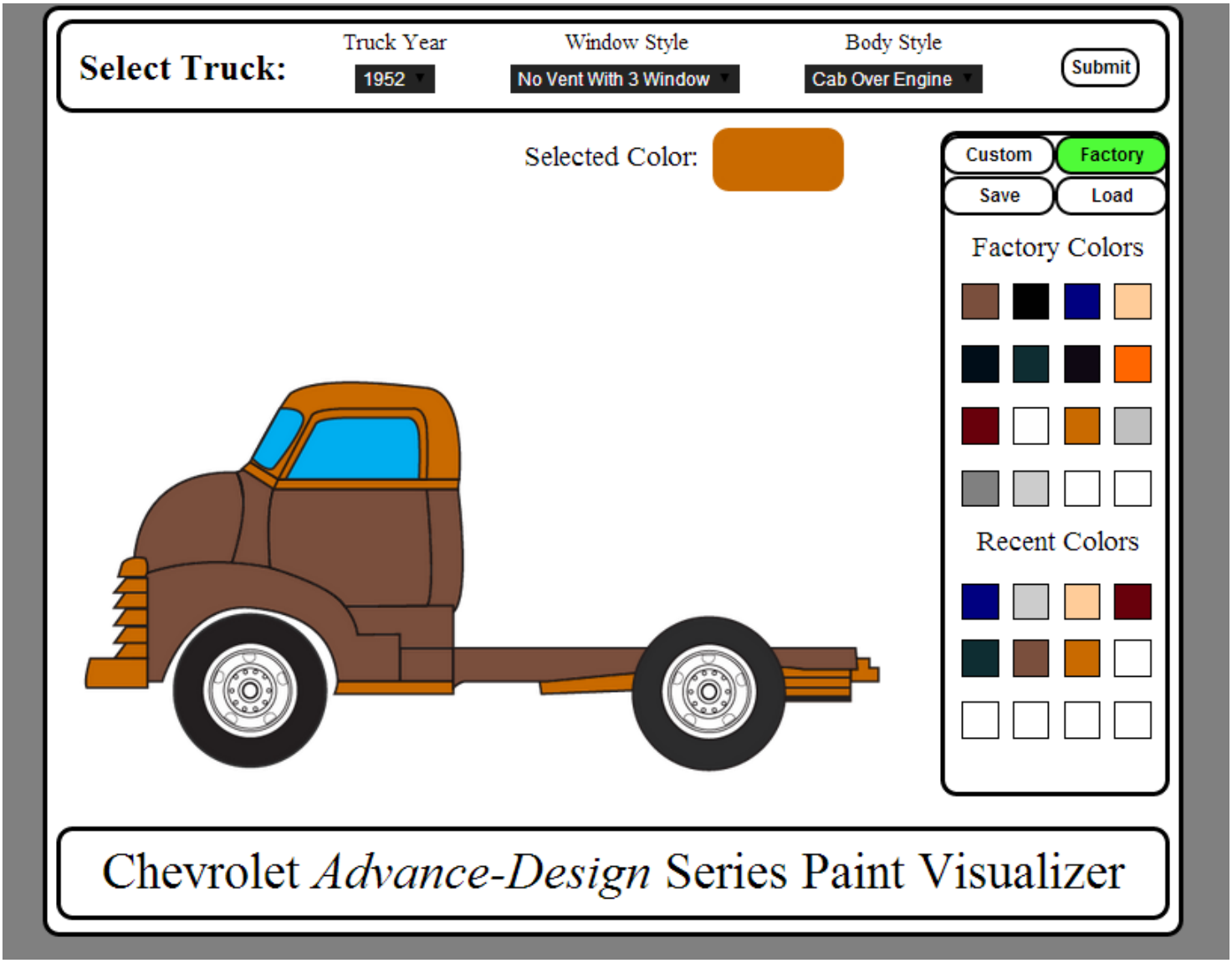
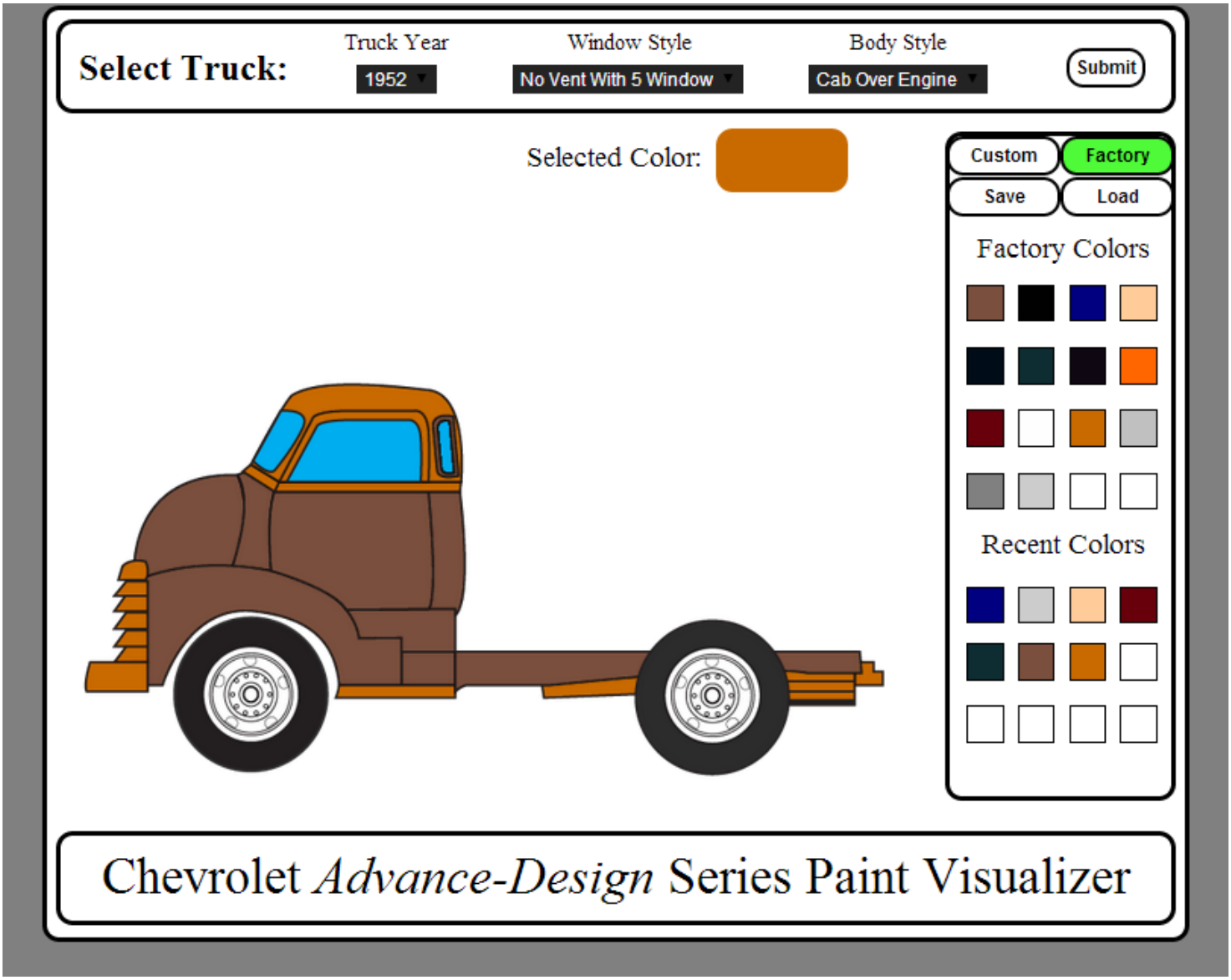


This prototype screen displays the factory controller panel with a 1952 cab over engine (COE) being restored. The 1952 COE has a 3 window cab and no vent window. The controller panel also displays the most recently used colors. *1951-1953 body styles are the same*



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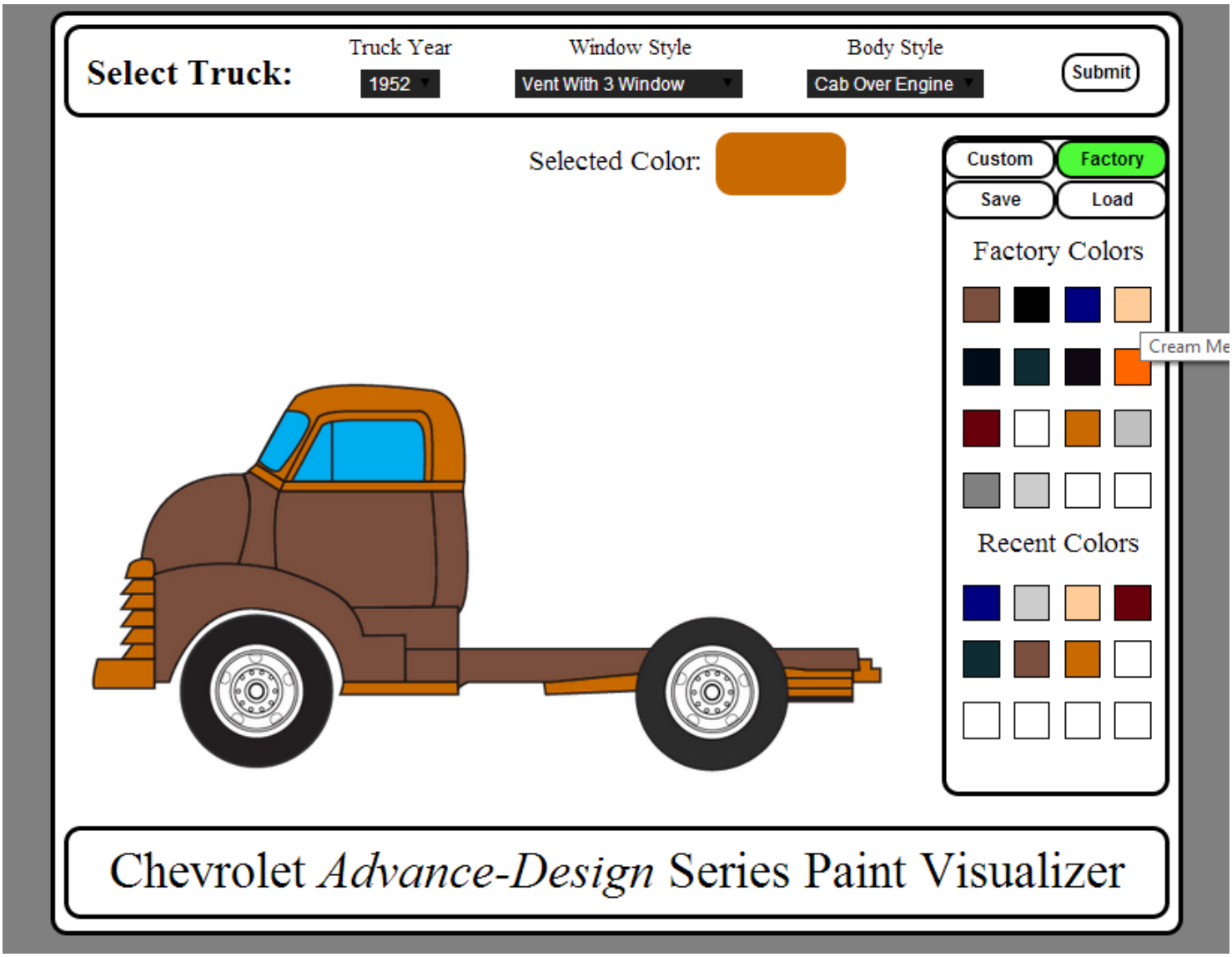

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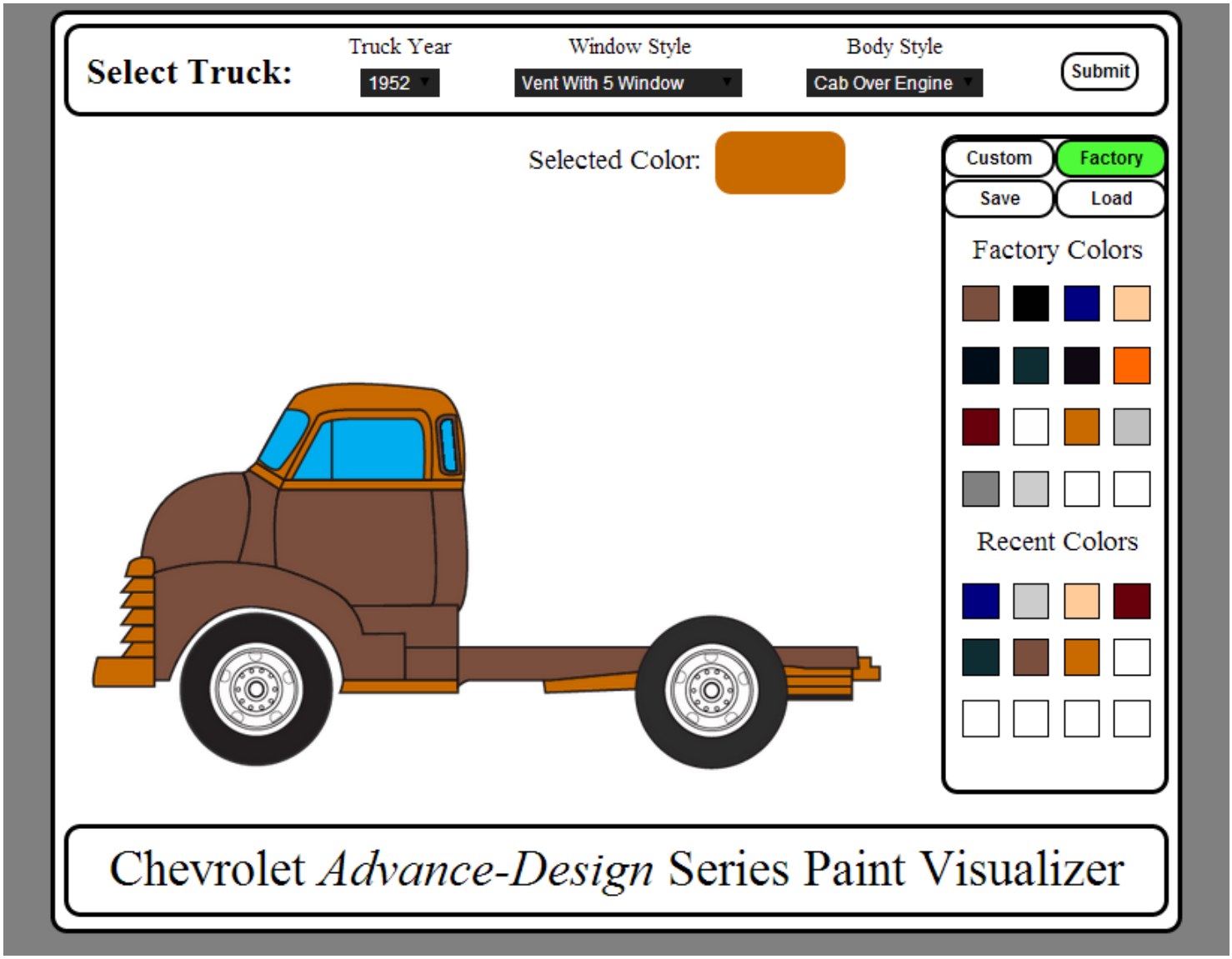
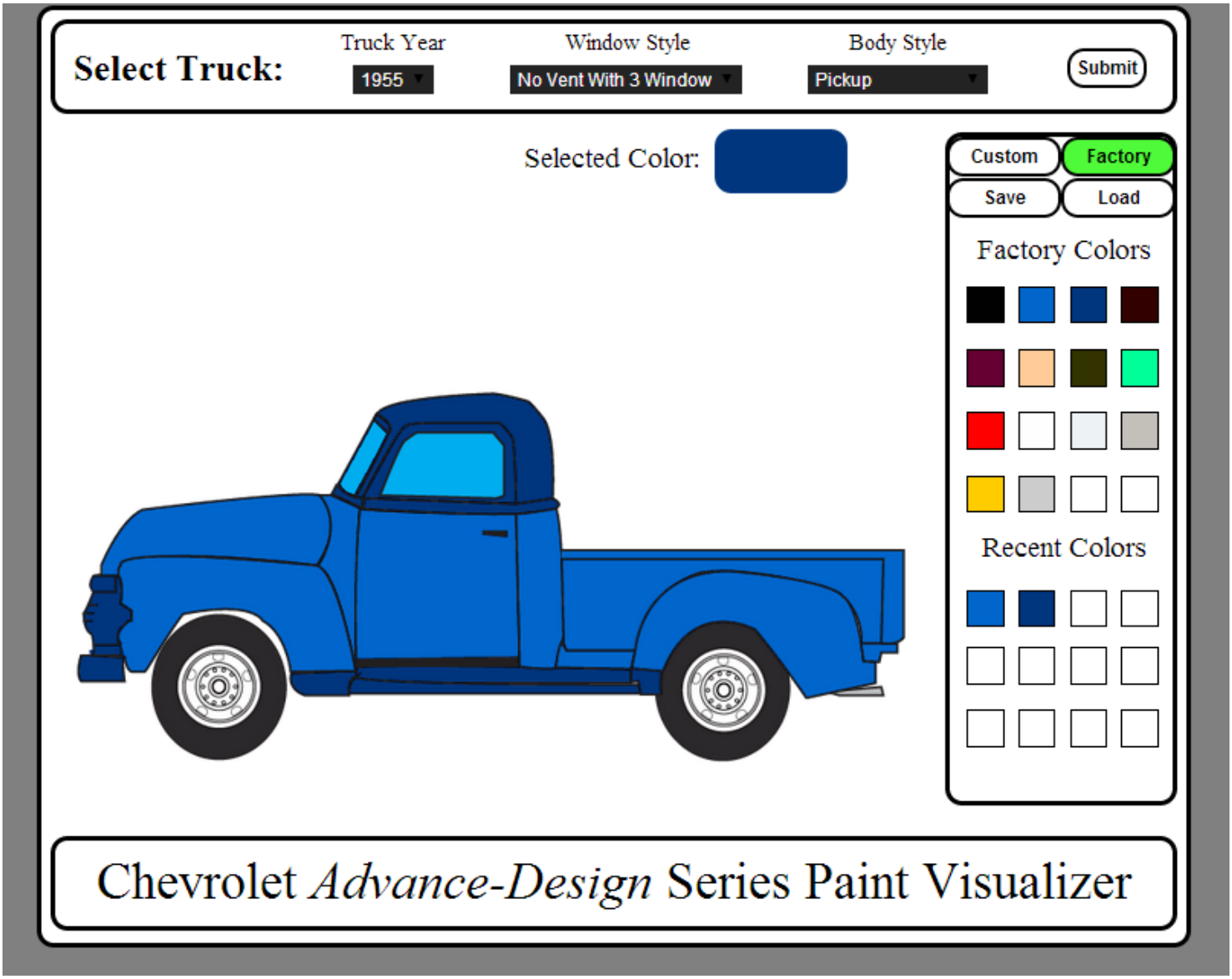
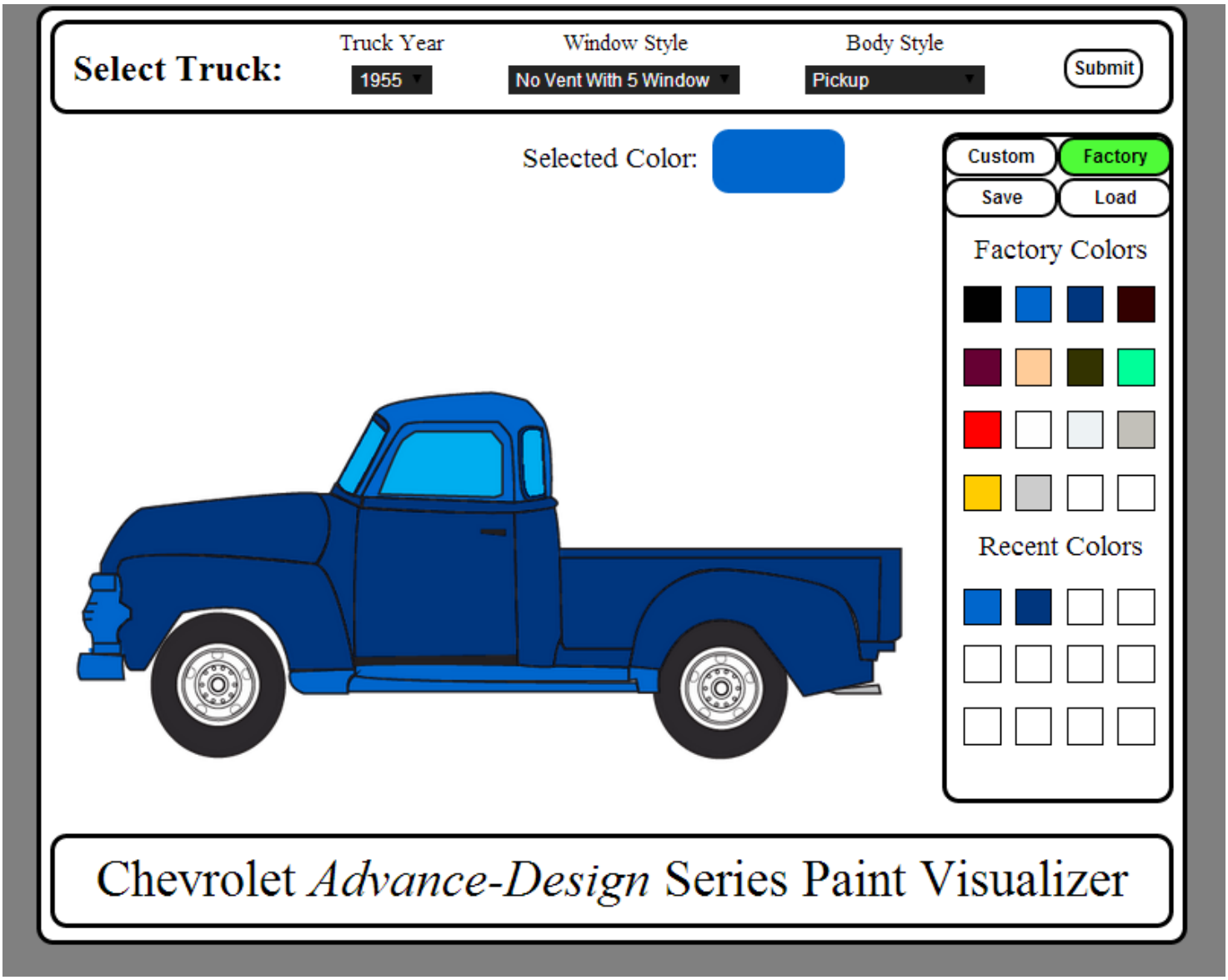


This prototype screen displays the factory controller panel with a 1952 cab over engine (COE) being restored. The 1952 COE has a 5 window cab and a vent window. The controller panel also displays the most recently used colors. *1951-1953 body styles are the same*



This prototype screen displays the factory controller panel with a 1955 pickup being restored. The 1955 pickup truck has a 3 window cab and no vent window. The controller panel also displays the most recently used colors. *1954-1955 body styles are the same*



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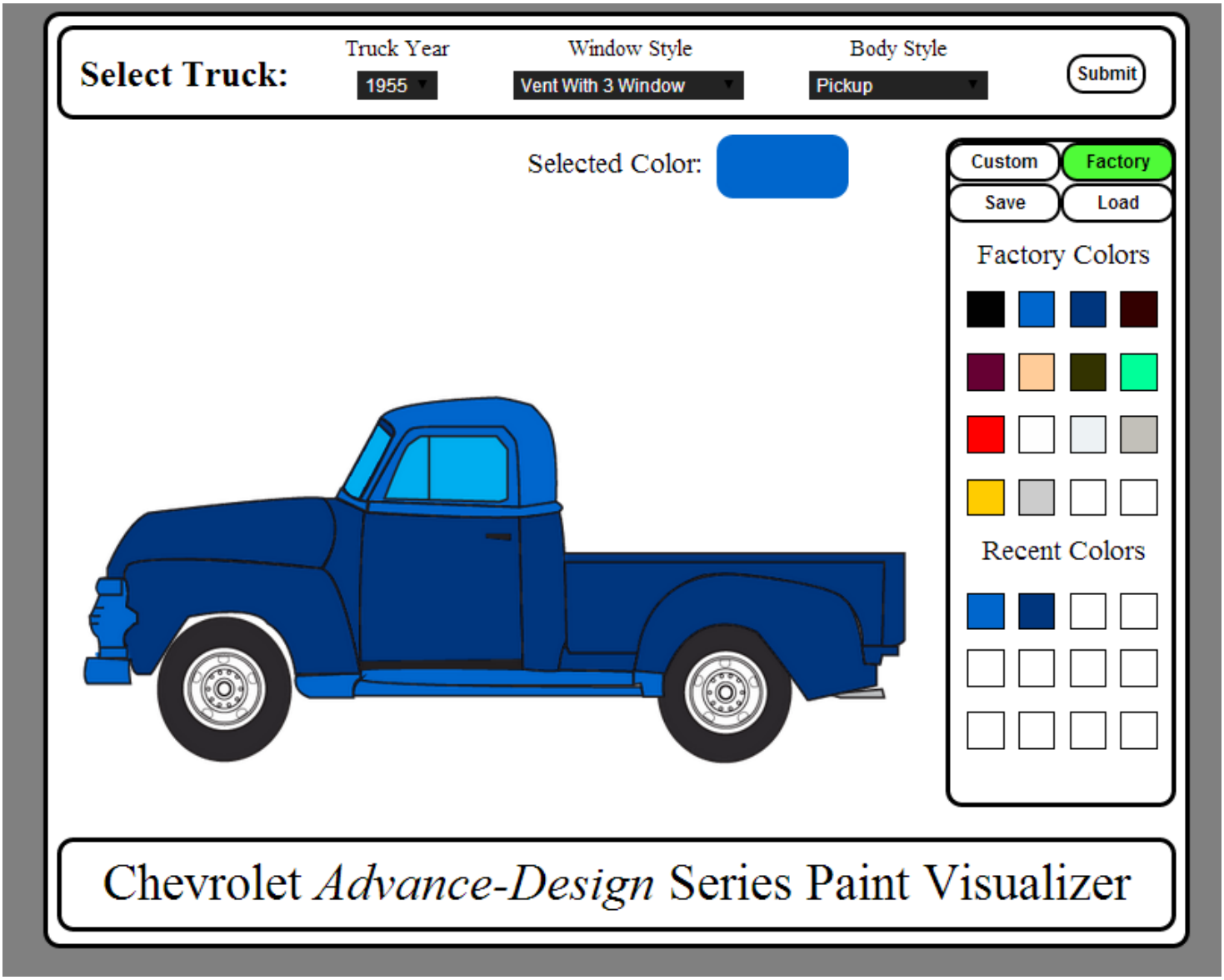
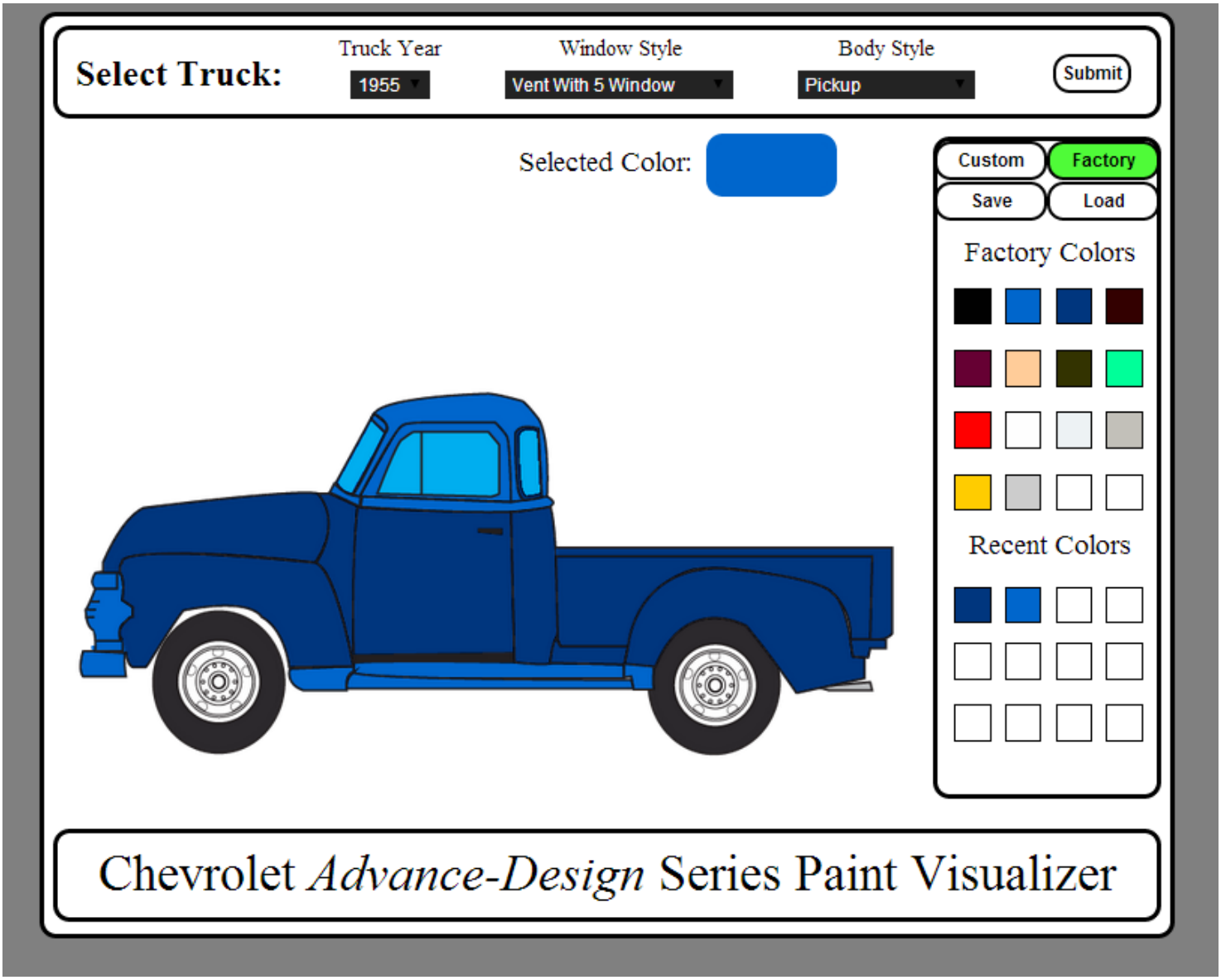

Select Truck:
Truck Year
1955
Window Style
Vent With 3 Window
Body Style
Pickup
Submit
Selected Color:
Custom
Factory
Save
Load
Factory Colors
Recent Colors
Chevrolet Advance-Design Series Paint Visualizer

This prototype screen displays the factory controller panel with a 1955 pickup being restored. The 1955 pickup truck has a 3 window cab and a vent window. The controller panel also displays the most recently used colors. *1954-1955 body styles are the same*



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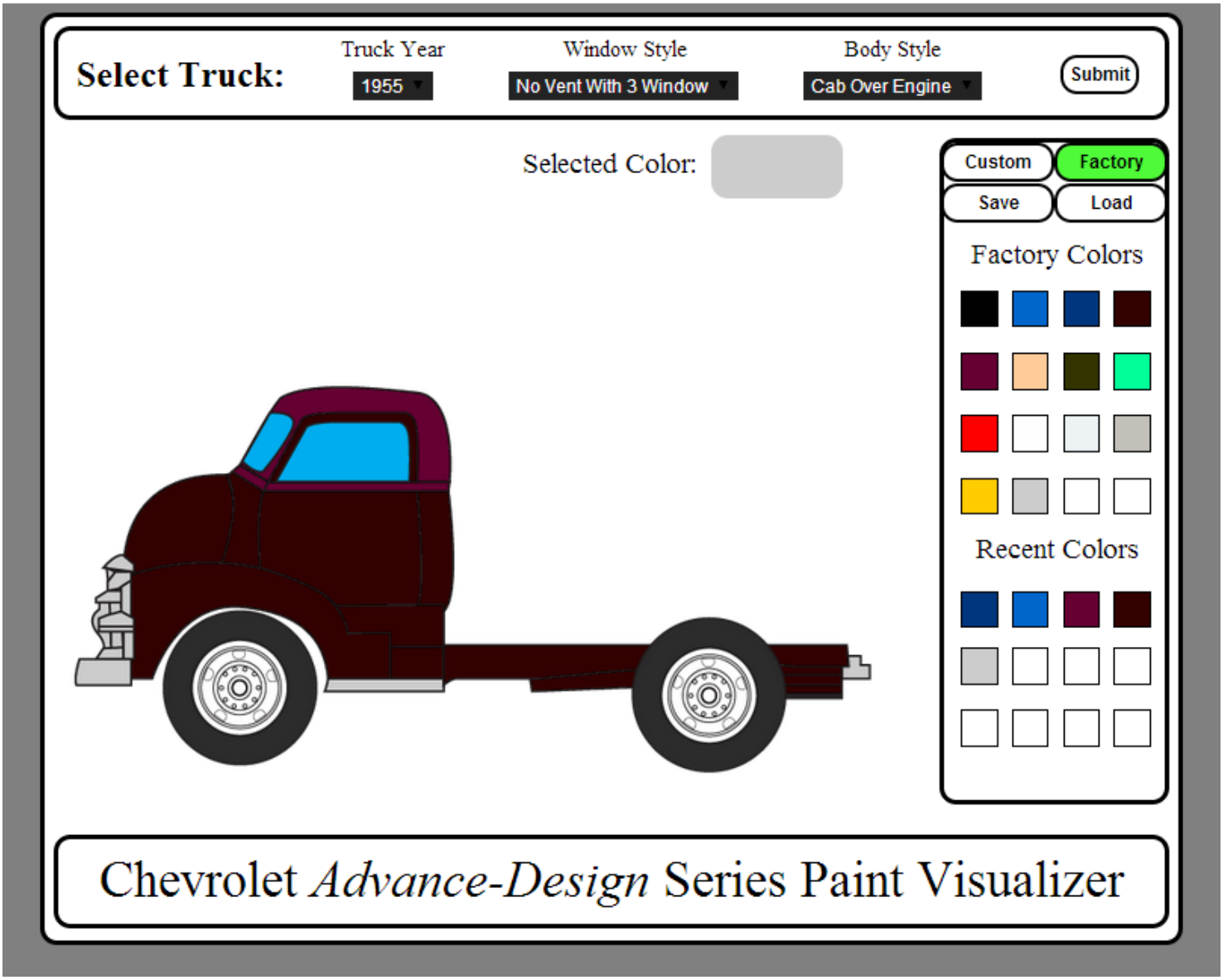

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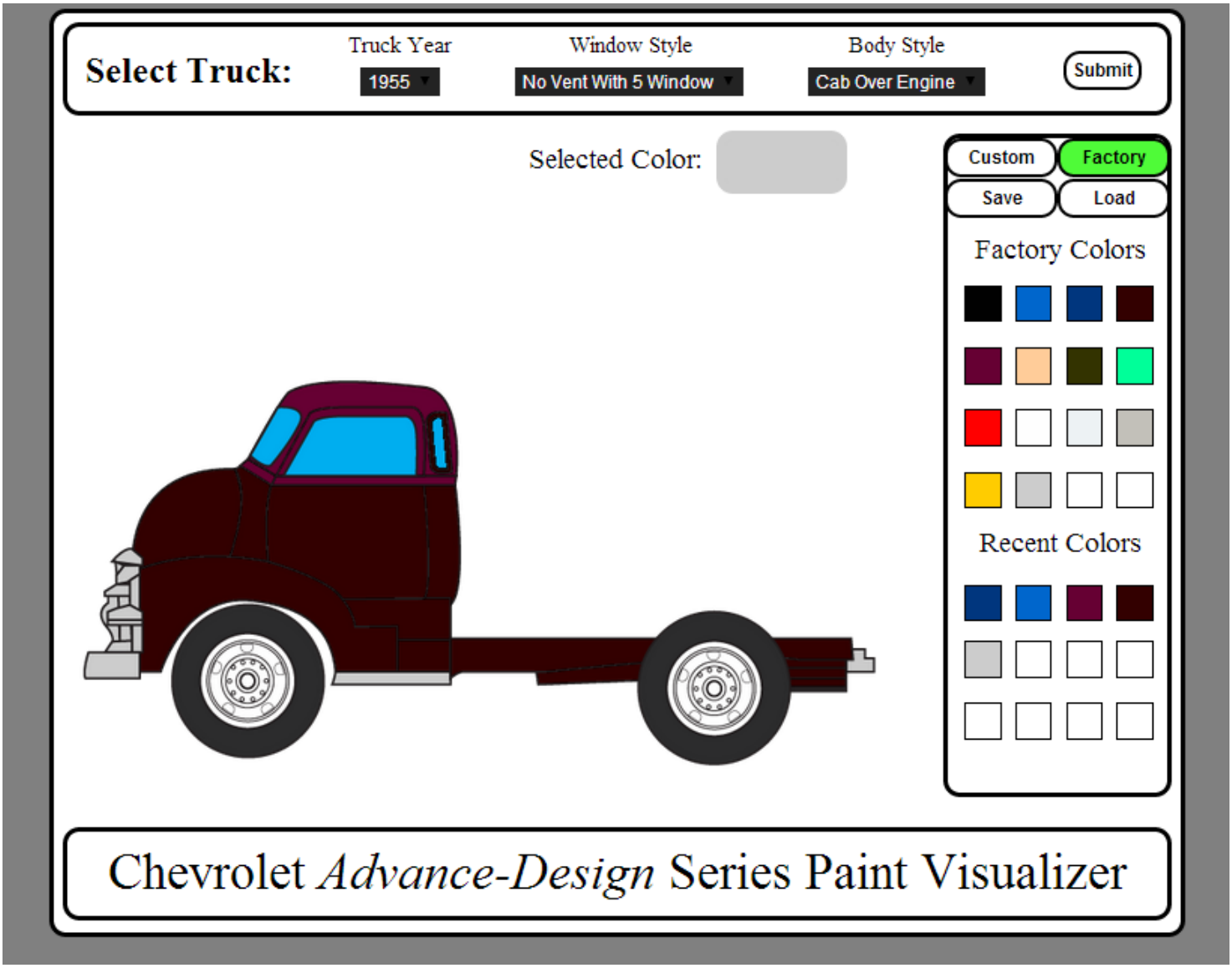
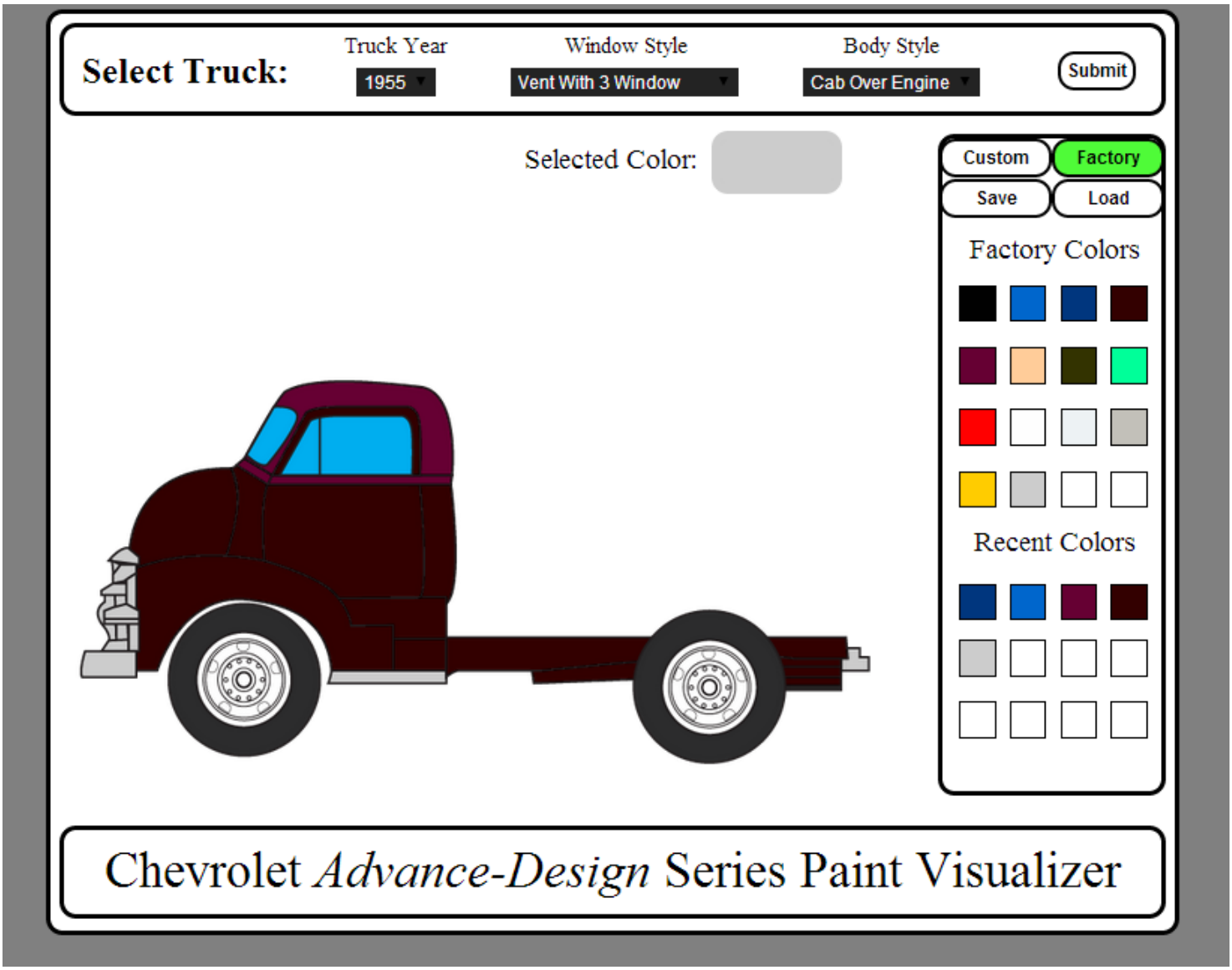
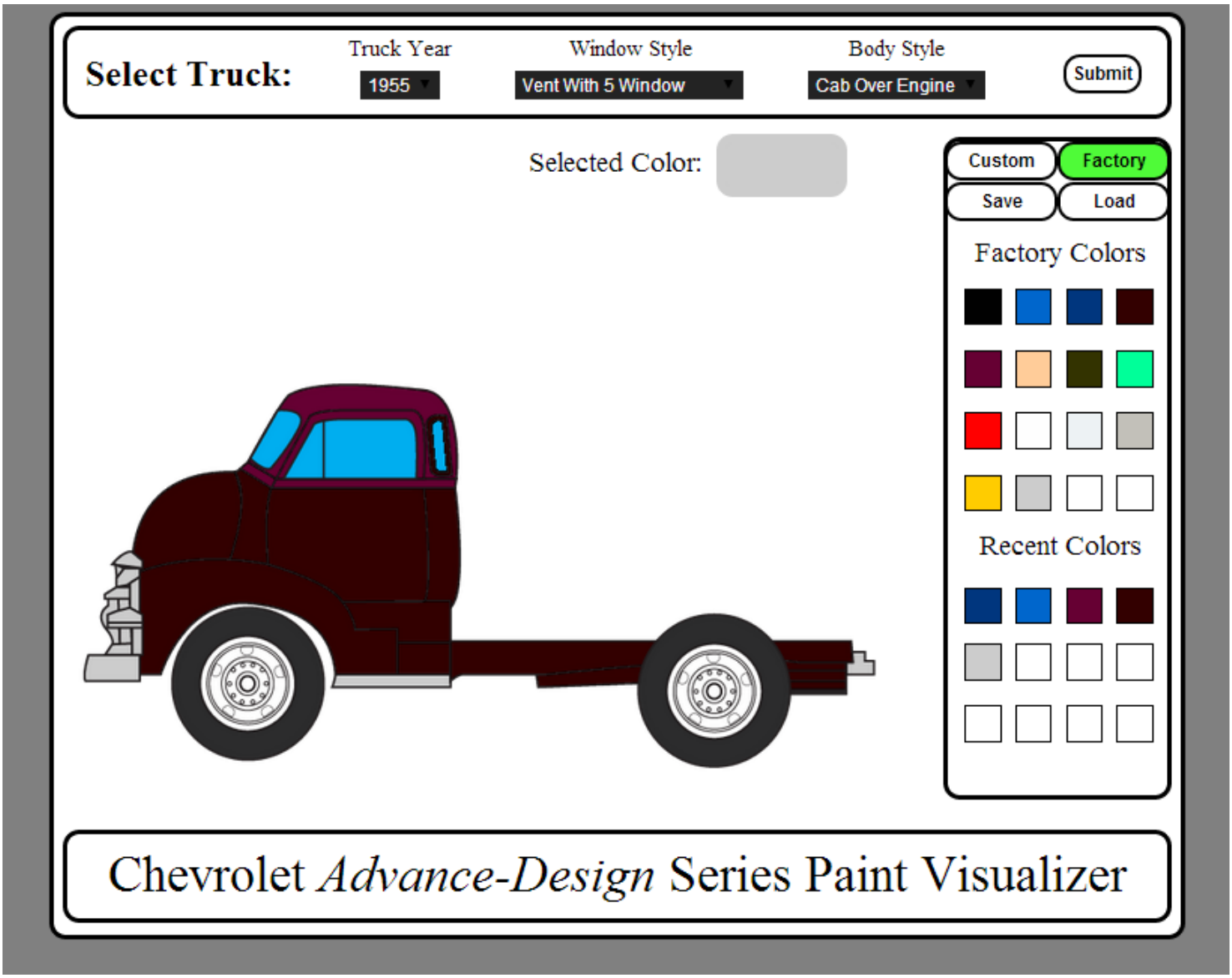


This prototype screen displays the factory controller panel with a 1955 cab over engine (COE) being restored. The 1955 COE has a 5 window cab and no vent window. The controller panel also displays the most recently used colors. *1954-1955 body styles are the same*

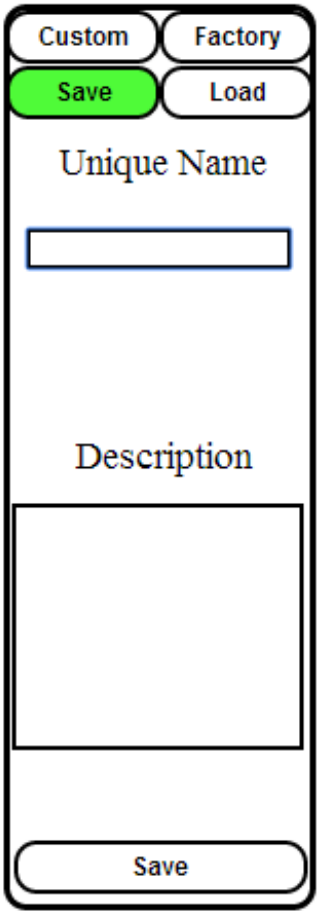


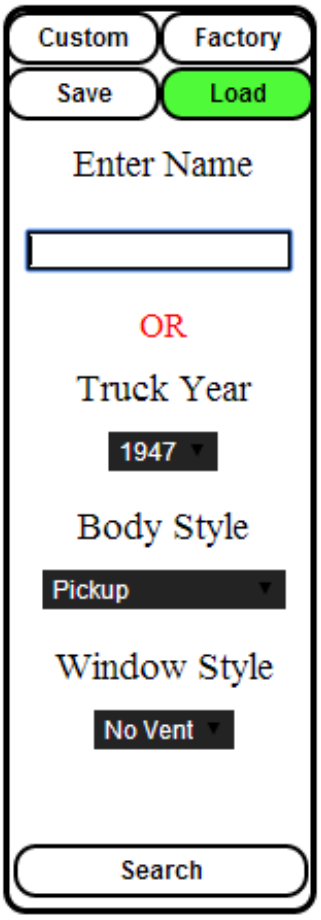
This prototype screen displays the factory controller panel with a 1955 cab over engine (COE) being restored. The 1955 COE has a 3 window cab and a vent window. The controller panel also displays the most recently used colors. *1954-1955 body styles are the same*



This prototype screen displays the factory controller panel with a 1955 cab over engine (COE) being restored. The 1955 COE has a 5 window cab and a vent window. The controller panel also displays the most recently used colors. *1954-1955 body styles are the same*

3.1.4 Save and Load Controller Panels





Below are the load and save controller panels:

Save **Load**

3.2 Logical Data Dictionary

Key

Data Name: The name of the data entity being stored, whether it be in a database or not.

Applicable to: The screens that this data entity will apply to.

Data Type: The type of data for a data entity.

Data Size: The size of the data in terms of it's data type.

Description: A description of what data this entity is storing.

Acceptable Input: What must be inputted by a user in order for the system to accept the data.

Good Example of Input: An example of data that would be accepted by the system.

Notes: Additional important information about the data.

*Data Types Available (may also be used as the type of 1-dimentional or 2-dimentional arrays):

int: An 32-bit two's compliment integer(it has a minimum value of -2,147,483,648 and a maximum value of 2,147,483,647)

char: A single 16-bit Unicode character(it has a minimum value of '\u0000' and a maximum value of '\uffff')

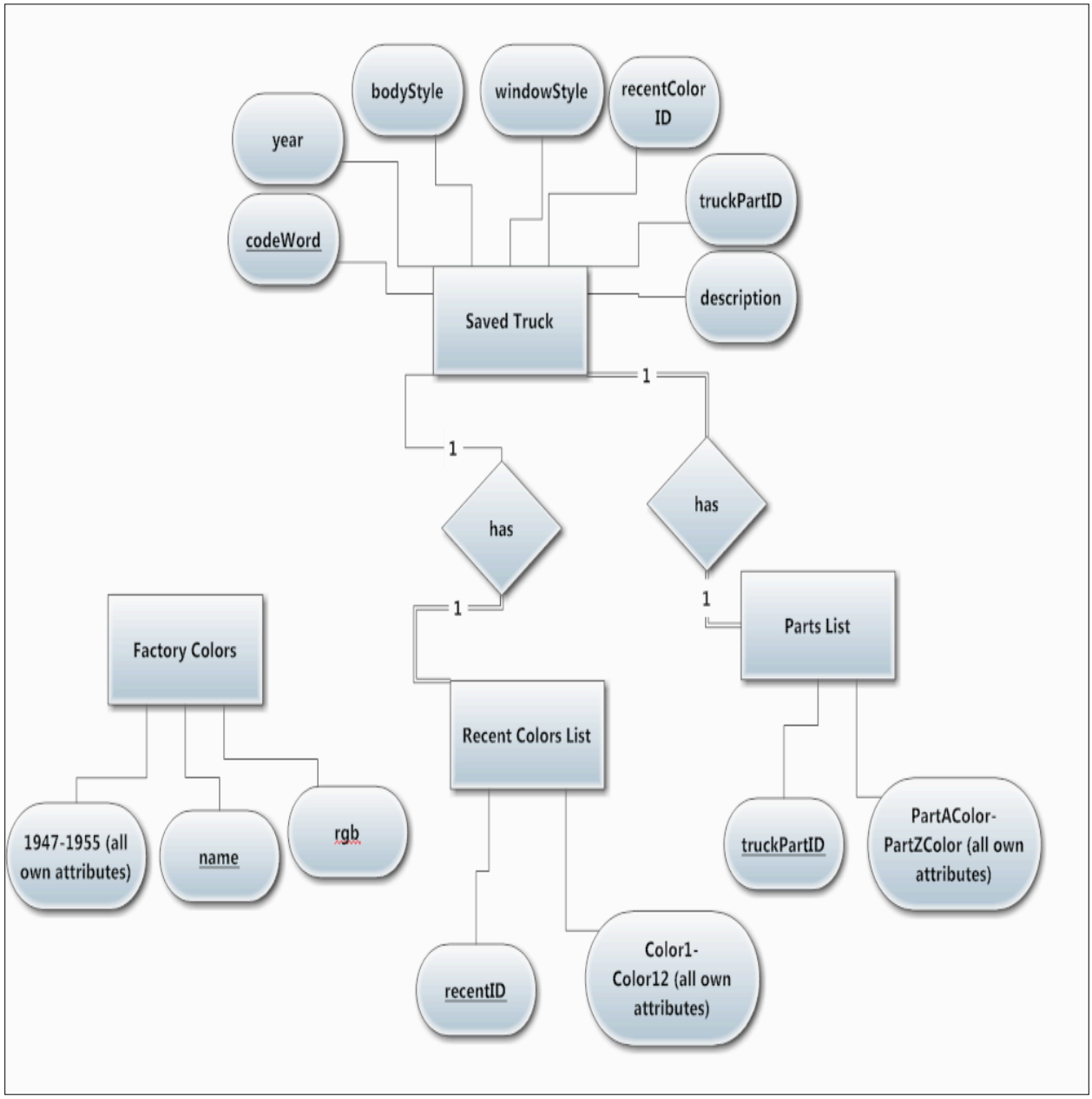
Data Name	Applicable to	Data Type	Data Size	Description	Acceptable Input	Good Example of Input	Notes
truckName	Save Truck, Load Library	Char	1-20 Characters	The name used to save the truck for future use (editing or viewing)	ASCII Chars from Decimal 32 to Decimal 126 inclusive, allowed	TRuck233	Must be unique and can not be null.
color	Change Color	Char	3-30 Characters	The name used for each factory color.	ASCII Chars from Decimal 32 to Decimal 126 inclusive, allowed	Red	Must be unique and can not be null.

Data Name	Applicable to	Data Type	Data Size	Description	Acceptable Input	Good Example of Input	Notes
redValue	Change Color, Save Truck	Byte	3 digit number	The value that will represent how much red will be used in a certain color.	Any integer ranging from 0 to 255	120	It doesn't have to be unique. It can not be null.
greenValue	Change Color, Save Truck	Byte	3 digit number	The value that will represent how much green will be used in a certain color.	Any integer ranging from 0 to 255	120	It doesn't have to be unique. It can not be null.
blueValue	Change Color, Save Truck	Byte	3 digit number	The value that will represent how much blue will be used in a certain color.	Any integer ranging from 0 to 255	120	It doesn't have to be unique. It can not be null.
partName	Change Color, Save Truck	Char	3-15 Characters	A specific part that is on each truck. Each truck will have all of the same parts but we will need to store which part has which color for when we save the truck	ASCII Chars from Decimal 32 to Decimal 126 inclusive, allowed	Fender	It doesn't have to be unique. It can not be null.
year	Change Color, Save Truck, Change View, Select Year	Int	4 digit number	Year of the truck	Any integer ranging from 1947-1955	1948	It doesn't have to be unique. It can not be null.
cabStyle	Save Truck, Change View, Change Year	Char	1-15 Characters	Cab Style of the truck. Different years may have different selections of CAB styles	ASCII Chars from Decimal 32 to Decimal 126 inclusive, allowed	Crew Cab	It doesn't have to be unique. It can not be null.
windowStyle	Save Truck, Change View, Change Year	Char	1-15 Characters	Window Style of the truck. Different years may have different selections of Window styles	ASCII Chars from Decimal 32 to Decimal 126 inclusive, allowed	Traditional	It doesn't have to be unique. It can not be null.

3.3 Logical Format of Data Files and Databases

3.3.1 ERDs

An ER Diagram is an entity-relationship model that abstractly describes a database. The following image is the ER Diagram for CADS Paint Visualizer.



3.3.2 Relational Schema

From the ER Diagram, a relational schema can be made. The relational schema is another way to describe a database.

savedTruck(codeword, year bodyStyle, windowStyle, recentColorID **FK to recentColors**, truckPartID **FK to parts**, description)

parts(truckPartID, PartAColor, PartBColor, PartCColor, PartDColor, PartEColor, PartFColor, PartGColor, PartHColor, PartIColor, PartJColor, PartKColor, PartLColor, PartMColor, PartNColor, PartOColor, PartPColor, PartQColor, PartRColor, PartSColor, PartTColor, PartUColor, PartVColor, PartWColor, PartXColor, PartYColor, PartZColor,)

recentColors(recentID, Color1, Color2, Color3, Color4, Color5, Color6, Color7, Color8, Color9, Color10, Color11, Color12,)

factoryColors(year, name, rgb, model)

4. Architectural Design Specification

4.1 Development and Production Environments

Development Environment

Software Engineering Lab's Window's Computer:
Model: Dell OptiPlex 760
Operating System: Windows Vista Enterprise
Processor: Intel Core 2 Duo 2.93 GHz
RAM: 4GB
HDD: 300GB

Software Engineering Lab's Macintosh Computer
Model: iMac 5.1
Operating System: Mac OS X
Processor: Intel Core i5 2.5 GHz
RAM: 4GB (1333 MHz DDR3)
Graphics: AMD Radeon HD 6750M 512MB
HDD: 500GB

Software
Adobe Dreamweaver, Google Chrome, Internet Explorer, Mozilla Firefox, MySQL, Notepad ++

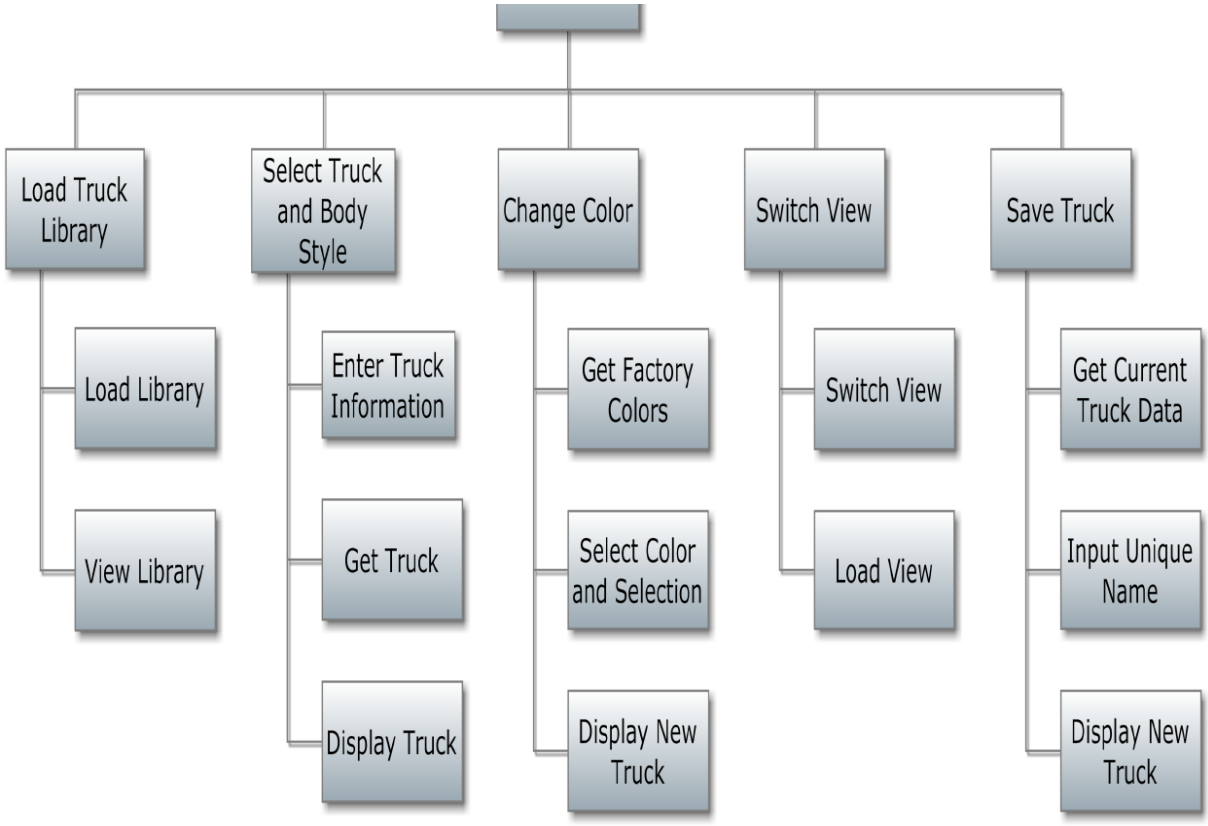
YDOS will also be using personal laptops throughout the development of CADS Paint Visualizer.

Production Environment

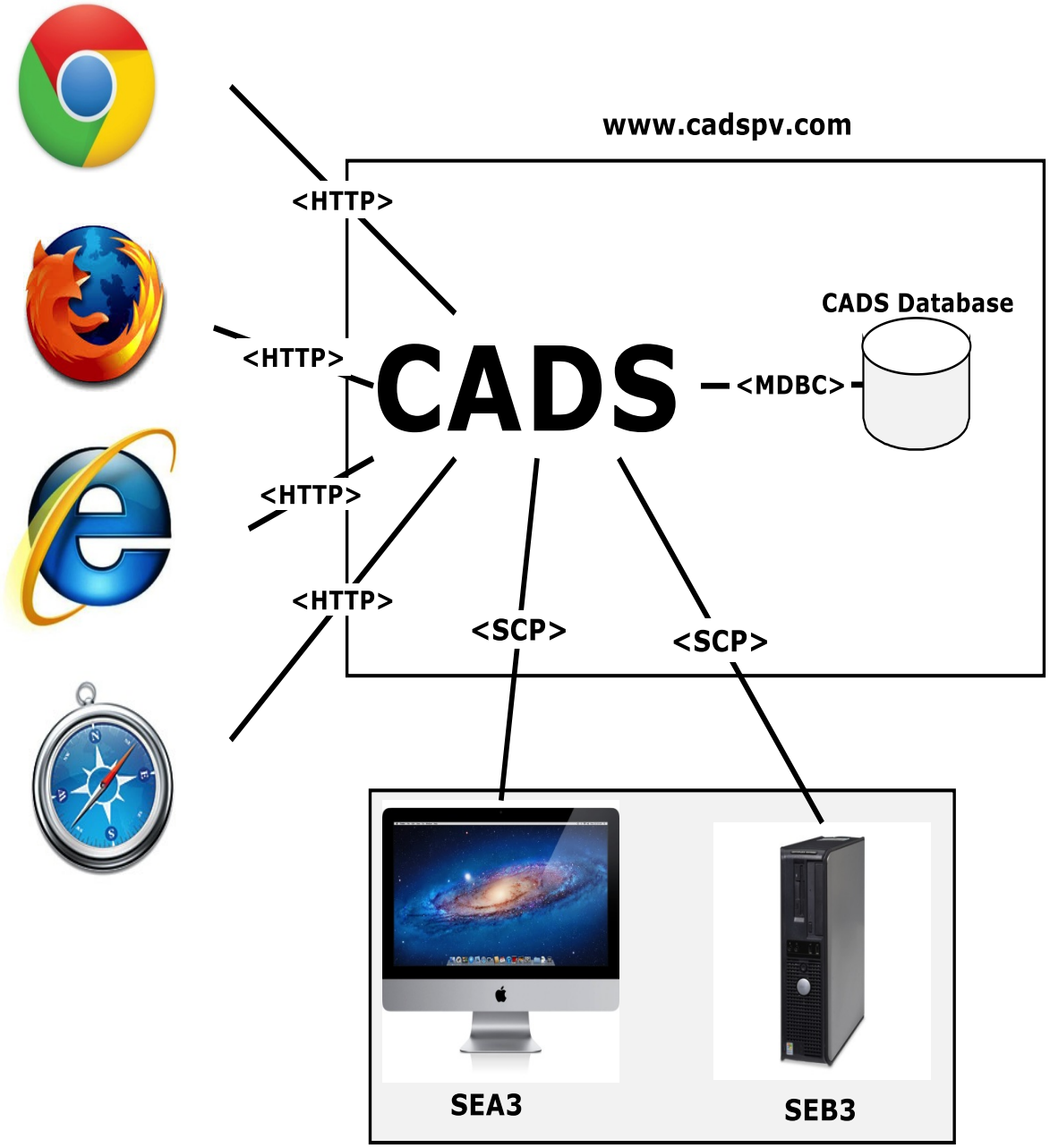
CADS Paint Visualizer is a web application that will run on an Apache web server hosted by Webhosting Pad, or any other server requested by the client, Dr. Timoth Lederman.

4.2 Structure Diagram

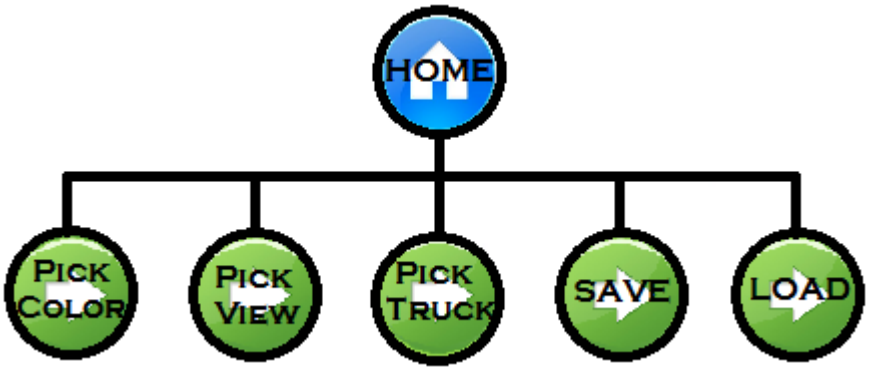
This structure diagram shows the breakdown of CADS Paint Visualizer to the most basic level.



4.3 UML Deployment Diagrams



4.4 Website Map



4.5 Data Flow Diagrams

Data flow diagrams show the flow of data throughout a system, and how that data is moved and transformed from one process to another. The data flow diagrams for CADS Paint Visualizer are contained in a document titled “Data Flow Diagrams.”

5. Testing Requirements

5.1 Test Plan

The test plan specifies all requirements that CADS Paint Visualizer must contain, and properly run, as specified by the client. CADS Paint Visualizer must meet all requirements in order to be accepted by the client, Dr. Timoth Lederman. The test plan for CADS Paint Visualizer is contained in a document titled “System Testing Document.”

6. Glossary of Terms

Apache – Web server software

Cab- The enclosed compartment that houses and protects the driver.

CADS – Chevrolet Advance Design Series Paint Visualizer

COE(Cab over Engine)- The cab of the truck sits above the front axle.

Controller Panel – The panel in which the user can interact with out system and use it to change the colors of the different parts of the truck, along with saving or loading the truck.

Customizer – The user that wants to customize the truck in a way that was not original of the factory made trucks (customized colors).

Custom Controller Panel – The panel that will be used by the customizer user. It will have a color wheel and recent colors.

Data Flow Diagram – Shows where data is coming and going. (input or output)

Detailed Design Document – The stage of development in which the project design is set up for production. The user interfaces will look more like the finished product.

ER Diagram- Shows the entities(tables) and their attributes(columns) along with the relationships and cardinality of the tables to one another.

Factory Controller Panel- The panel in which the restorer user can access the factory colors along with different cab and window styles.

Functional Requirement- The requirements set by the user that state what the system needs to consist of.

Logical Data Dictionary- Shows the different types of data that will be storing and retrieving with our system.

MySQL – a database management system

Non-functional Requirement- Things required by the user that don't involve the behaviors of the application itself.

PHP – PHP: Hypertext Preprocessor, A server side scripting language.

Relational Schema- Lists each table, and shows any constraints and foreign keys)

Restorer- A user that wants to use the factory colors and styles.

Structure Diagram- Shows what needs to be present in the system being modeled.

Testing Plan- A set of tests that will need to be conducted in order to make sure our application is working properly.

UML - Unified modeling language

UML Deployment Diagram- Shows what will be needed to launch the application (hardware and software).

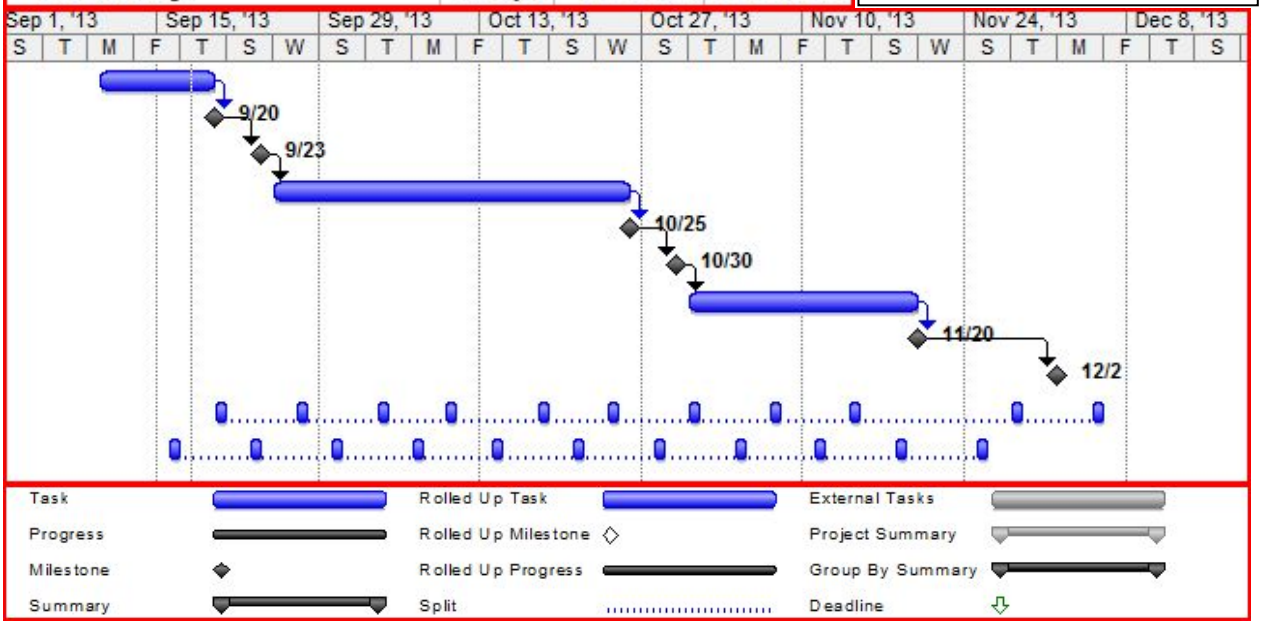
Use/User Case- defines interactions between a user and our system.

Vent Window- The quarter glass section of the window that is a smaller section in the front part of the window.

Website Map- Shows the locations of each page in the website and how users can navigate from page to page.

7. Project Timeline

Software Plan	8 days?	Tue 9/10/13	Thu 9/19/13
Software Plan Documents Due	0 days	Fri 9/20/13	Fri 9/20/13
Software Plan Presentation	0 days	Mon 9/23/13	Mon 9/23/13
Requirements Specification	23 days?	Wed 9/25/13	Fri 10/25/13
Requirements Specification Documents	0 days	Fri 10/25/13	Fri 10/25/13
Requirements Specification Presentation	0 days	Wed 10/30/13	Wed 10/30/13
Peliminary Design	14 days?	Thu 10/31/13	Tue 11/19/13
Peliminary Design Documents Due	0 days	Wed 11/20/13	Wed 11/20/13
Peliminary Design Presentation	0 days	Mon 12/2/13	Mon 12/2/13
Client Meetings	11 days?	Fri 9/20/13	Thu 12/5/13
Team Meeetings	11 days?	Mon 9/16/13	Mon 11/25/13

Your Dream, Our Solution

Client:
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