



Using MATLAB to produce motorsport regulation gasoline mixtures

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Introduction

Motorsports fuel regulations are constantly changing. For example, between the F1 2021 and 2022 seasons, where a bio component of 5.75% m/m is required one year then a 10% m/m ethanol content is required the next [1].

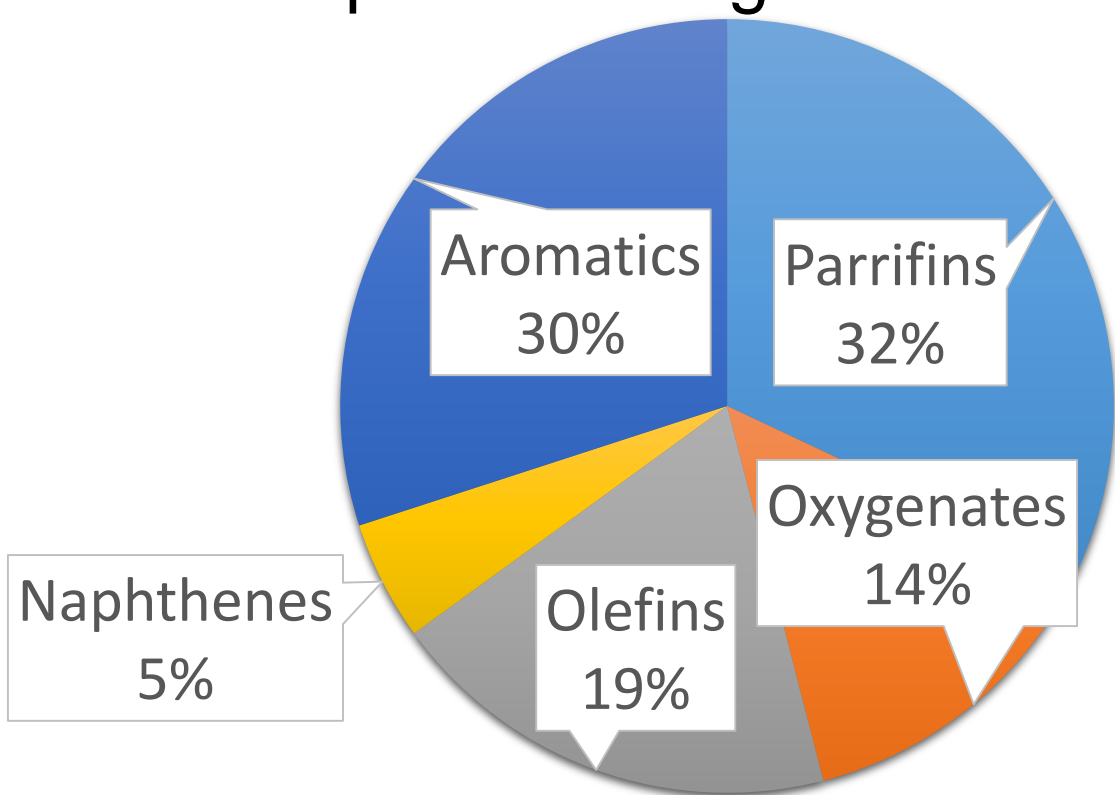
To combat the time exhausted creating new fuel mixtures that fit the regulations, a MATLAB script was developed. The script monitored the regulations that MOTO GP require. As a result the script needed to be capable of outputting the volumes required for each substance within gasoline.

Aims:

- Create a script capable of creating regulation friendly gasoline
- Users should be able to input the hydrocarbons and mole fraction range
- Outputs contain volumes for creating a mixture

Methodology

The composition of gasoline:

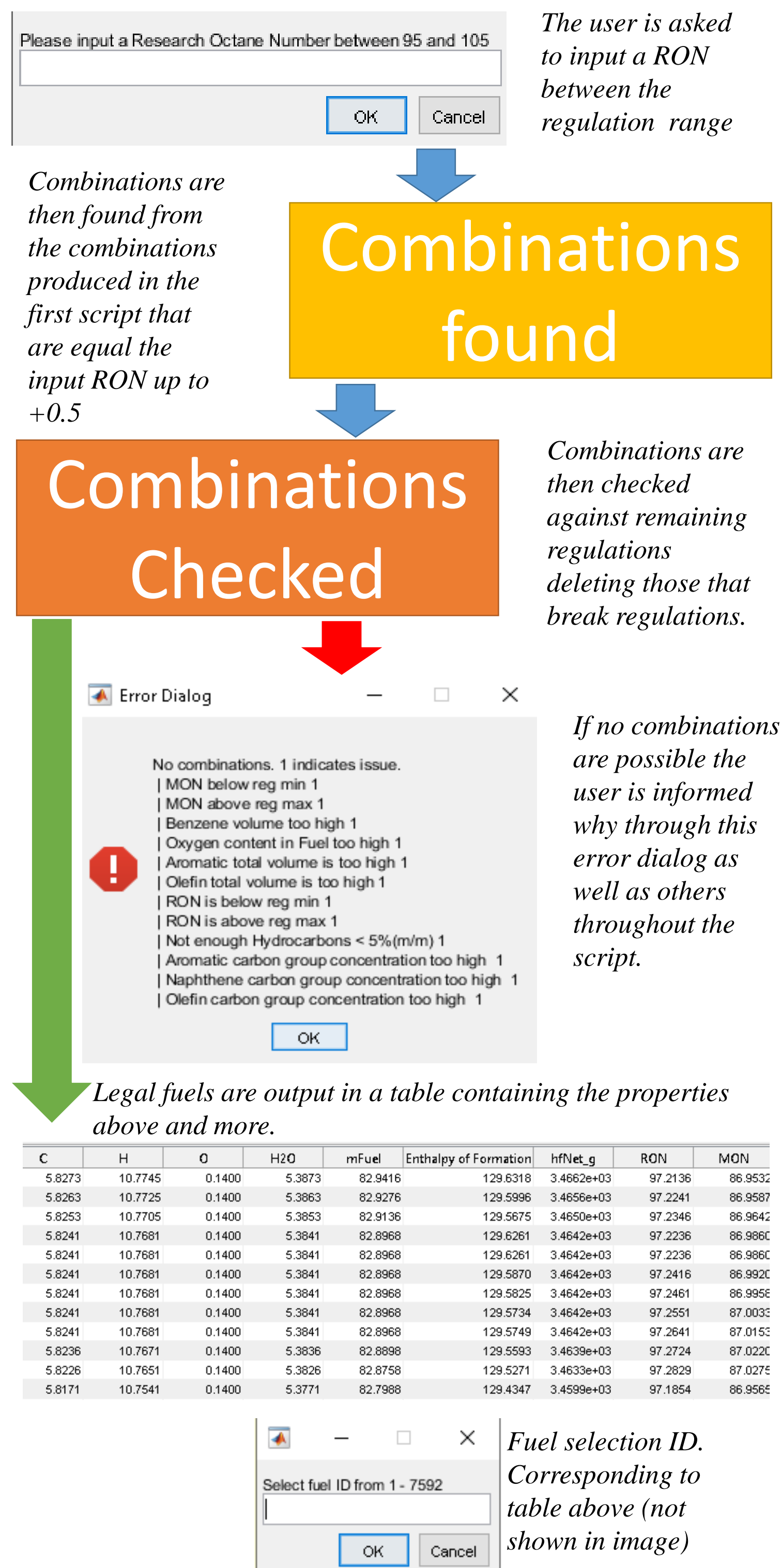


A literature review summarised the above as an appropriate representation of gasoline composition [2][3].

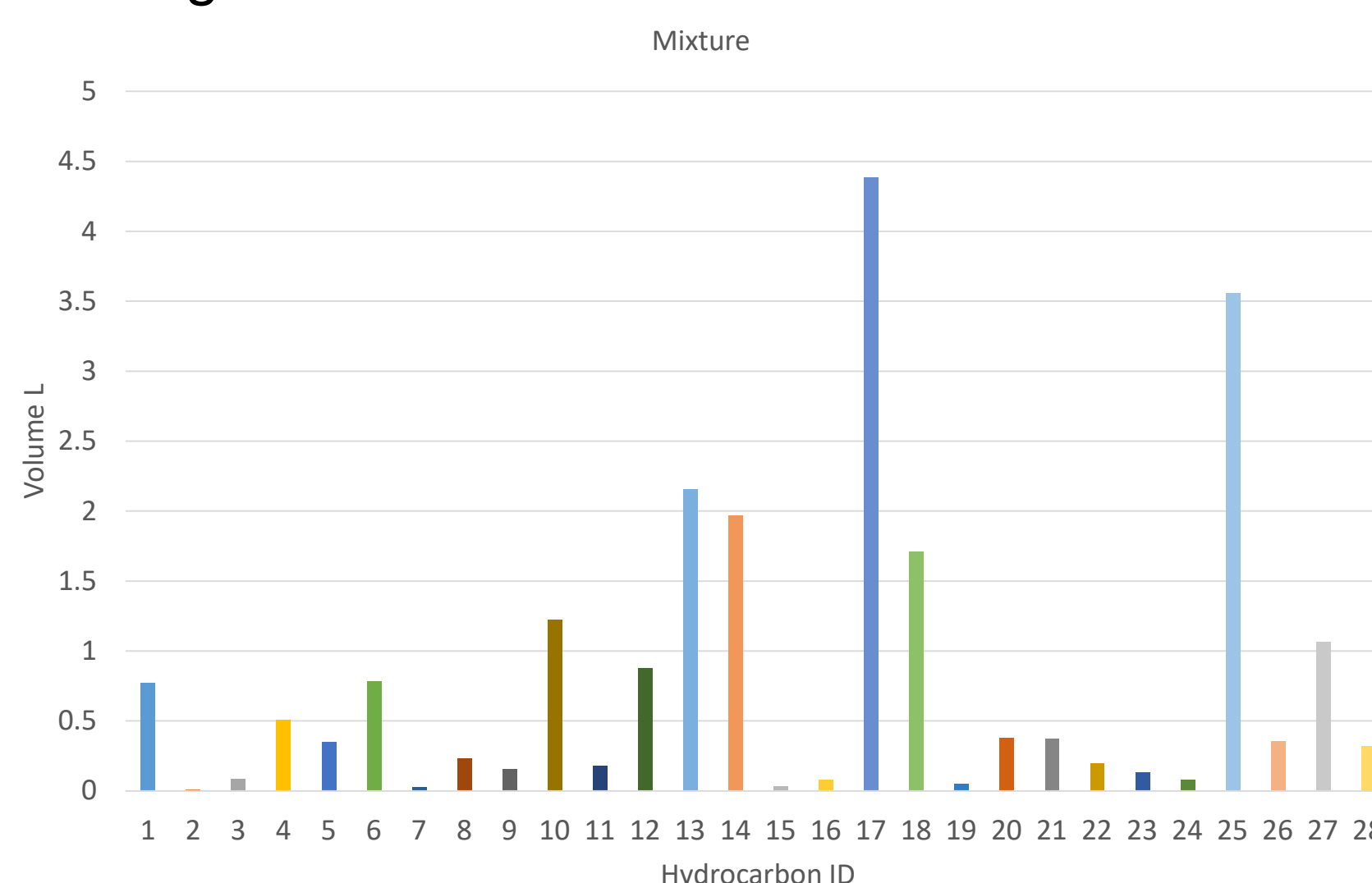
Gasoline components were collected and split off into their respective component groups, and assigned a mole fraction range for the group. A script was then ran for every possible combination, separating the combinations that totalled 100%.

The main script then follows the

following process.



Once a fuel is selected the script then outputs the volume of each hydrocarbon needed to mix the gasoline.



The script was tested on each regulation individually by forcing regulation breaks. This was to verify whether the script correctly identified issues and reported them to the user.

Results

When no regulations were broken, the scripts ran successfully and produced mixtures. For all regulations, forcing illegal component proportions resulted in the script being terminated and the user presented with an error. The error accurately reported the fault. All tests were therefore a success.

Conclusion

To conclude, the project was deemed a success as the script was capable of producing MOTO GP regulation friendly gasoline mixtures. The components of gasoline were selected by the user along with their mole fraction ranges.

In the event that no fuel mixtures were output, the script was able to correctly identify the issue and display information about the regulation breach to the user in an error message.

Finally, the script was able to produce the volume in litres of each hydrocarbon required to create a mixture of a set volume. By default, this is set to 22 liters to match the tank capacity of a MOTO GP motorcycle.

References

- FIM, 2020. 2020 FIM GP World Championship Regulations. [Online] Available at: <http://www.fim-live.com/en/sport/regulations-and-documents/grand-prix/> [Accessed 19 04 2020].
- Groote, S. D., 2006. Fuel. [Online] Available at: <https://www.f1technical.net/articles/19> [Accessed 20 04 2020].
- Lee, C. et al., 2017. Autoignition characteristics of oxygenated gasolines. *Combustion and Flame*, Volume 186, pp. 114 - 128.

