

Abstract of the Ph.D. Thesis

"Study regarding the implementation of military vehicles specific test procedures in the virtual environment"

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The first chapter "*Current stage of implementation of military vehicle specific test procedures in the virtual environment. Objectives of the PhD thesis*" summarizes most of the regulations, directives, standards and procedures intended for vehicle testing. It is proposed a classification of them by destination - military and civilian, identifying the need for bringing together the legislation and the necessity to implement the "virtual testing methods". In this respect, the comparative analysis of the producers' view about the virtual environment use in the testing process and the current legislative framework at international level highlights the discrepancy between them and also the steps to follow in the near future. The chapter continues with the presentation of the necessity and the opportunity of this work, with arguments and representative examples from the activities of the Ministry of National Defense. These issues are at the basis of defining, eventually, the originality of the objectives that are to be attained by the PhD thesis.

Chapter 2, entitled "*Military Vehicle Specific Test Procedures*", presents a rigorous analysis of the test procedures to evaluate the vehicle mobility performance in soft soil conditions (AVTP 03-100, TOP 02-2-619A, as well as related procedures), finalized with a series of proposals for revising and completing the standards. At the same time, the limitations of the real test procedures and the existing infrastructure for this domain were illustrated concluding that a viable alternative is the use of specific software.

Chapter 3, "*Models Used to Generate Virtual Environments for Military Vehicle Test Specific Procedures*", takes into consideration the semiempirical models first. An analysis of the possibilities offered by NRMM II and VehDyn 4.0 applications has shown that they respond only to a small extent to the requirements of test procedures. That is why, TruckSim, a 3D software dedicated to the wheeled vehicles, was used to design a new model. The lack of elements describing soft soil has been complemented by the facilities TruckSim offers for integrating new parameters into its own structure. The comparative analysis between the results generated by semiempirical models and the multi-body model indicates an acceptable correlation of them.

Chapter 4, "*Experimental Determination of Military Vehicle Test Procedures*", was targeted both on paved road and soft soil. The beginning of the chapter reveals the measurement system for the mobility parameters, along with the equipment used for soil characterization. The second part includes experimental tests on paved road – acceleration performance, longitudinal grade, drawbar pull. The last part of the chapter present the tests on SM-SC, SP and CH soft soil types. As a novelty for the national military field, the test procedures describe in detail the stages and the results achieved.

Chapter 5, entitled "*Comparative Analysis of the Results of the Virtual and Experimental Models*" offers, through the TruckSim model, an accurate implementation of the test procedures presented in the previous chapter. Also, there are a number of other opportunities offered by the TruckSim model in comparison with NRMM II and VehDyn 4.0. Its benefits for procurement processes are also considered. From an operational point of view, it is provided a methodology to establish the vehicle trafficability for a soft soil path.

The last chapter covers the general conclusions of the thesis, as well as the personal contributions from the researches performed. The chapter ends with the presentation of the opportunities for further researches.