A Feasibility Study on Innovative Reinforced Modular Frames for Automotive Applications

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Abstract.

The Vehicle frames is the main structural component of a vehiclecan be considered . It is tthe main stiffening component being, at the same time, functional hubs offor all the differentother components that allow the complete assembly of the vehicle. ItsFrames main purpose is tomain goal is to absorb the static and dynamic loads to which theacting on the vehicle, is subjected, ensuring the necessary passengers' safety.

In this paper a feasibility investigationstudy on an of a innovative modular frame concept is presented. An attempt has been made to

In particular, the focus was set on the designing of a a modular frame frameby, using additive manufactured connection joints produced with additive manufacturing. Actually, The construction of a modular tubular frame starts a trend never seen before. Sstandard frame structures are composedmanufactured by by weldinged tubular separated tubes, making access to some internal areas of the vehicle very difficult where not impossible. Consequently, some maintenance operations become also challenging. The modular configuration solves these maintenance problems enabling, at the same time, to start thinking about multi-purposes vehicle configurations, which can be switched by simply changing the modules connected to a central cell.

Moreover, importing the idea from the world of aeronautics, the use of collaborating rReinforced panels have been, also, integrated into the modular frame, which contribute to able to increase the ttorsional stiffnessstiffness with of the structure with no compromise to its oan ovverall mass has been consideredreduction.

The concept of a modular frame with collaborating reinforced panels, has been preliminary demonstrated

The construction of a modular tubular frame starts a trend never seen before. Standard frame structures are composed by welded tubular tubes.

With this standard approach, as the frame is a one-piece component, the access to the various locations is very complex. Consequently, maintenance operations are also challenging. The modular configuration solves these problems and also enables to start thinking about machines that can be used for more than one purpose, simply by changing the modules connected to a central cell.

Bby means of numerical simulations within the Abaqus FEM environment. of tCertification torsional loads have been applied orsional analysis conducted with the commercial software Abaqus, to the modular reinforced frame and the obtained numerical results contributed to the work demonstrates that the realization of a modular frame that fulfils the load requirementsprove the feasibility and the effectiveness of the proposed design is possible.