

# Innovations essay

Business



Concept The contemporary design world of critical automotive and aircraft design industry has undergone significant transformation in the recent past. This is especially attributed to the constantly changing technological approaches that are currently in application in major settings. The current evolution witnessed in the industry is traceable to changing consumer tastes, demand for better fuel efficiency, and the need to explore other available energy options that are considered cheaper in the long run.

This has led to major breakthroughs courtesy of the explorative and experimental pursuits by the concerned engineers in the respective industries. Breakthroughs in Automotive and Aircraft Design The development of the multidisciplinary design and optimization, which is also known as the simulation-based design, completely transformed the traditional aircraft design concepts. The conceptual framework of the idea primarily involves the combination of modeling, design, and simulations fundamentals into a single view (Kroo, 1996). The Boeing 777, for instance, is one of the key industrial witnesses to this major transformation. “ It has been noted that the 777 was designed, test flown, and repaired before a single component was manufactured” (Kroo, 1996).

This consequently led to a major reduction in the initial costs normally accrued during actual testing of the final product. The main goals for simulation-based design is to enable the incorporation of cross-functional and multidisciplinary essentials and objectives in the early stages of the entire design process through the application of tools like computational prototypes and subsequent optimization in order to bring out a fundamental difference (Kroo, 1996). The concept of rapid prototyping provides the

manufacturer the opportunity of manufacturing or producing the vehicle parts in potentially different locations leading a significant reduction on the ultimate resultant production per unit costs. The traditional methods whereby the parts are primarily inserted into injection molding tool has consequently led to the limiting factors especially with regard to customization of previously installed and geometrically tested variables. This concept has been pursued in many formula one teams and manufacturers involved in the production of specialist vehicles consequently affecting the production of medium and low custom vehicle manufacture in terms of volume (Foresight Vehicle, 2004). Some of the vehicle components, which have been found to be especially suitable for rapid prototyping, include vehicle interior components since they are relatively involving to manufacture.

(Foresight Vehicle, 2004) Example of a rapid prototyping component manufacture, the NACES ejection seat typical in the formula one racing cars. Ordinarily, structural properties are found in two key design varieties, which are in essence global design variables and local design variables. The common practice is to utilize the local variables dimensions to produce the intermediate structural designs while the structural designs for global alternatives are essentially used as the representative design variables. Through significant research, it has been possible to integrate some of the local and global alternatives by exploiting key fundamentals provided the similarities in terms of limitations of both systems. This was essentially enabled through the significant exploitation of the ultimate resultant decisional and computations efficiencies (Chung, Kim, & Lee, 2007).

This has therefore led to the subsequent provision for the decomposition of both of these components in order to produce key designs having less influence from the resulting inefficiencies, which consequently leads to the optimization of the final designs. Research initiatives have established the fact that transient tyre characteristics are capable of resulting in a profound effect upon vehicle handling with regard to operational ability of the anti-lock braking system, which relies upon the principle of wheel oscillations due to changes in observed brake pressure on the wheel (Jaiswal et al, 2010). This is because of the fact that for a long time establishing the relationship between linear handling dynamics and resultant tyre behavior has been subject to a lot of difficulty. Through research, it has been established that simple tyre models have significant difficulty in coping with the non-linear factors resulting when braking or cornering resulting in greater braking distances (Jaiswal et al, 2010). Various design approaches have been pursued by various scientists with an aim of creating a befitting design, which will conform to the aforementioned characteristics in the anti-locking braking system requirements. Owen and Bernard proposed the relaxation strength concept; Ellis pursued the first order equation so as to establish time varying lateral deflection design; Loeb et al on the other hand employed a similar model to Ellis; while Clover applied both longitudinal and lateral design fundamentals (Jaiswal et al, 2010).

All these proposed designs have been essentially in transforming the anti-locking braking phenomenon in the current vehicle models making the system more efficient compared to its predecessor. The combat airplane design has also undergone significant design evolution since the inception of

the premier designs. The eras have progressively undergone transformation in terms of revolution and subsequent refinement. For instance, the plane revolution era of 1909 to 1916 and its subsequent refinement from 1916 to 1931, similarly, the stealth era of 1981 to 1990 and its subsequent refinement from 1990 to present (Lorell, 2003). Design fundamentals in the combat plane industry have majorly focused upon technological innovations with regard to power plant developments. Some of the factor influencing a change in the critical design fundamentals include change in industry perceptions and demand, the resultant maturity and subsequent applicability of the of the proposed new components, and other significant and potential changes in the government-buyer performance and critical system needs, requirements and efficiency (Lorell, 2003).