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Reflection of aerodynamic effects on the shape of industrial design products

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Abstract:

Fluids are the natural environment for the life of living organisms, whether terrestrial or marine. Within this framework, all human activity and creativity fall within the scope of the influence of fluid dynamics, with its two branches, hydrodynamics, and aerodynamics. Theoretical knowledge of these sciences and their impact on design has appeared since the first centuries, and their application was evident in including the environmental impact of aerodynamics in architecture. With the invention of the internal combustion engine, which led to the industrial revolution, the applied interest of aerodynamics focused on developing means of transportation. With the growth of the functional capacity of products and the increasing growth of the consumer sector of products considering the pursuit of achieving environmental sustainability, it was imperative for product designers to strive to achieve performance, formal and functional harmony between the product and the surrounding environment in the context of its use. The matter went beyond that principle to an attempt to benefit from environmental effects by including aerodynamic standards in product design to achieve the highest functional performance of products. This research discusses the effects of aerodynamics and their reflection on the formal transformations in product design. Aerodynamic effects vary between force effects such as the Magnus effect, the Coanda effect, the air curtain effect, and the ground effect. Thermal effects such as the stack effect, the Meredith effect, and the air-cooling effect. Including each of them in its context in building the product shape helps enhance the integration and fusion between the external shape of the product and the internal systems, which is reflected in reducing the rate of energy consumption and the efficiency of the functional performance of industrial design products, which is one of the most important elements of achieving balance and environmental sustainability for industrial product design.

Research problem: The research problem is in the weakness of the functional performance of the creative design outputs due to the industrial designer's lack of advanced and experimental creative frameworks specific to the science of business dynamics on the constructive in the field of production. The research problem lies in answering the following question: What is the extent of the effects of dynamics on the technical construction of the industrial product? What is the impact of the technical output of industrial designers and their effects on the functional performance and the presence of creative outputs in product design?

Research objectives: The research aims to: Support students and practitioners of industrial design with an aspect of aerodynamics to improve the quality of design process outputs. Add performance harmony between the mechanism of internal mechanical systems and the formal aesthetics of industrial product design within the framework of efforts to transform the design and production sectors towards environmental and sustainable design.

Importance of research: Enriching industrial design sciences with one of the most important environmental aspects, which is aerodynamics, to achieve environmental sustainability. Improving the quality of the outputs of the industrial product design process and enhancing its functional performance.

Hypothesis Research: The research assumes that: There is a positive significant relationship between the designer's familiarity with the cognitive frameworks related to the effects of aerodynamics and achieving performance harmony between the formal functions of the product and its internal systems, which is reflected in the quality of the final output of the industrial product design process.

Research methodology: The research follows the descriptive approach in presenting the cognitive frameworks related to the effects of aerodynamics and presenting the methods and techniques of benefiting

from them in supporting the innovation and development of new products. The researcher also follows the analytical approach in analyzing the reflection of these effects on the formal composition of the industrial product.

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