

## Developing Design Methodology Practices for industrial design ' Students

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### **Abstract:**

Reverse engineering plays a significant role in the industrial design field by assisting industrial companies through identifying competing products within markets and clarifying the strengths and weaknesses, it also helps industrial designers and provides them with necessary knowledge and information about the nature of these products by analyzing their different parts besides the relationship of each part to the other, which helps the designers to develop either enhance their products to increase its ability to compete for other products within markets. Reverse engineering also helps significantly in the process of spreading knowledge and science between different countries by analyzing products and manufacturing methods then to study the geometrical relationship in different parts of the product, which leads to development and modernization in engineering and industrial sciences within these countries were to help them in enhancing their products thus many institutions and research centers start searching about how to develop and update methods and trials of reverse engineering then to take advantage of modern and promising techniques where these countries and institutions may reach out to maximum possible benefit through analyzing these products and revealing their engineering and industrial secrets. Therefore this research aims to shed light on industrial computed tomography (iCT) as it is the most promising technology in the reverse engineering field with its unique features rather than other used techniques. ICT technology is characterized by being non-destructive to the examined and photographed sample. Moreover, it reveals the internal and external engineering details of any shape, color, surface or material regardless of their thickness or density. The mentioned technology also assists engineers and designers in getting a wealth of information of the examined and photographed body by determining the type of material, the shape of the fibers and the areas of stress in that body ....etc. In the research process, the researcher relies upon the descriptive approach to provide accurate scientific research on what that technology is and how to take its advantages in the reverse engineering field besides providing information to industrial designers to recognize the modern and promising methods in the reverse engineering field to serve the filed of industrial product design. **Background of the Research:** Reverse engineering has emerged as a science capable of transforming real parts into models and geometric concepts as opposed to traditional engineering that aims to transform engineering concepts into real models and parts. Therefore, it is the reverse image of engineering, through which many concepts and sciences can be explained by turning a physical image into a digitized, scalable image. As countries and industrial institutions become increasingly interested in reverse engineering science and use it to develop and modernize their products so that they can compete within the markets. Therefore, Research institutions have taken care to develop these techniques used in the field of reverse engineering and take advantage of different technologies and make the most of them, One of these techniques is the CT technology, which was used at the beginning of its emergence in the medical field and then evolved in the industrial field with called computerized artificial tomography (iCT). Computerized artificial tomography (iCT) is one of the applications of computed tomography (CT) in the industrial field, which is used in the imaging and analysis of various industrial products through the use of both X-Ray and technical developments in 3D imaging to obtain a digital image of the product. So, The technique of industrial computer tomography (iCT) is considered one of the most promising techniques in the field of reverse engineering, and many countries and industrial institutions tend to rely on this technology to a large extent, whether in product analysis or in inspection and quality processes. **The Problem of the Research:** The problem of research is not to benefit from the technique of computerized artificial tomography (iCT) in the field of reverse engineering within the Arab Republic of Egypt due to the lack of sufficient information on how it is used and how to use it in converting physical products into digital files. **Aim of the Research:** The research aims to shed light on the importance of computerized artificial tomography (iCT) technology in the field of reverse engineering and how to benefit from it in that field. **Importance:** To clarify the importance of reverse engineering and the role it plays in the development and improvement of products. • Clarify the role of computerized artificial tomography (iCT) in reverse engineering and convert physical products into digital images. • How to take advantage of computerized artificial tomography (iCT) technology in reverse engineering. **Methodology:** The research follows the descriptive approach to accessing information about computerized artificial tomography (iCT)

technology and how to use it in reverse engineering. **Major results:** Reverse engineering aims to help reach results on the processes applied in the design of competing products and work to modify and improve the characteristics of the product to be manufactured and produced. Increased industrial interest in using the technique of industrial computer tomography (iCT) in the field of reverse engineering through examination, analysis, and obtaining of digital, three-dimensional files. CT technology is characterized by its ability to examine, measure and photograph the product, whether external form or internal parts without causing any damage to the product, especially those products with complex shapes or consisting of more than one overlapping part. Through the technique of computerized artificial tomography (iCT) you can obtain a large amount of information about the body to be examined or photographed, such as identifying the quality of the material or substance used, the shape of fiber, the bonding of atoms and identifying areas of high mechanical stress. Computerized artificial tomography (iCT) technology is characterized by its ability to examine any surface, no matter how difficult it may be, as well as its ability to photograph bright and reflective surfaces that optical imaging systems cannot do. Computerized artificial tomography (iCT) technology is characterized by its ability to penetrate surfaces and access internal details even if there is a surface that obscures what is behind it, and the technology is characterized by its ability to measure geometric dimensions with high accuracy, measure the densities of the materials used and determine the internal spaces of the body.

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#### **Keywords:**

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