

A METHOD FOR OPTIMAL DESIGN OF HIGH-TECH PRODUCTS USING CBR AND NEURAL NETWORK

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ABSTRACT. *Experience plays an important role in solving problems. For that reason, case-based reasoning (CBR) has been utilized in various fields including product design. The experience of expert designers is an important aspect of their capability, helping them to solve problems efficiently and effectively. In chemical applications such as photolithography, the manufacturing process is influenced by various variables including product features, materials, and production conditions. Therefore, the nature of the goods manufactured in such processes requires engineers to solve design problems based on past experience rather than theoretical analysis. This paper presents a CBR method for optimal design of high-tech products such as plasma display (PDP) rear panels. We develop an inference engine that can, prior to pilot product testing, reason and predict design results based on past development cases. A design case study using cluster analysis and a radial basis function network to predict design results of the photo-etching process is presented.*

Keywords: Case-based reasoning, Neural network, Design verification

1. Introduction. Recently, reductions in development periods and increasing product complexity have required R&D departments to achieve optimal designs in efficient and effective ways. In order to formulate product designs rapidly and accurately, it is very important to utilize rules, logic, and the empirical know-how of advanced engineers. However, frequent moving and retiring of advanced engineers makes it difficult to use their empirical knowledge at the beginning of product development stage. Another barrier to sharing of corporate design knowledge is organizing of design teams on a per-product-model basis. This results in situations in which problem cases occurring in a specific product's development are repeated in another product's development.

Problems not discovered in the development phase are frequently found after the mass production phase or even after a product's release to the market, which incurs significant losses to the company. Consequently, a method for discovering design defects earlier in product development processes and preventing possible problems later on, is an urgent