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International Journal on Engineering Applications • Volume 10, Issue 6, Pages 393 - 400 • 2022

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Study of Energy Integration in Chlorobenzene Production Process Using Pinch Technology

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Abstract

In this paper, the industrial application of detailed heat integration in the chlorobenzene production plant has been solved by using the Pinch design method. Designing a Heat Exchanger Network (HEN) through pinch analysis is an effective energy integration technology. In addition, minimizing unit and cost, operability and process control are essential parameters for selecting a suitable HEN design. In this research, the HEN of the existing process has been designed and analyzed using HINT software to minimize energy consumption and cost, thereby achieving maximum energy recovery. The analysis shows that the existing plant has been well integrated, and sound energy-saving effects and minimum energy requirements have been observed through the energy integration between processes. The total energy saving has been 91.80 %, while the energy recovery for heating and cooling have been 86.99 % and 96.23 %, respectively. Based on the economic analysis, the total annual cost of the proposed HEN design has been calculated to be 80912.5 $. © 2022 Praise Worthy Prize S.r.l.-All rights reserved.

Author keywords

Glycerol Conversion; Heat Exchanger Network; Heat Integration; Pinch Analysis; Propylene Glycol Production

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Investigation on e-Commerce Platforms for Tackling e-Business Security Challenge

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DOI: https://doi.org/10.15866/irea.v10i6.20649

Abstract

Securing e-Business from threats and risks has become an urgent necessity nowadays especially with the growth of the cyber-crimes. Enterprises need to provide securely services and gaining the trust of the customers is the bedrock toward achieving any enterprise's objectives and goals. Otherwise, making e-Commerce platforms exposed to the cyber-crimes will affect the e-Business performance and reputation and may destroy the e-Business at all. In this paper, the different e-Commerce security challenges are discussed by presenting the most important vulnerabilities related to the different components of the e-Commerce including the user, the security techniques, the Information Technology environment, and the e-Commerce platform. Then, the best practices that enterprises should follow to ensure a safer e-Business environment are provided. Moreover, different attack detection mechanisms deployed in e-Commerce platforms have been presented. Finally, investigations are conducted on some e-Commerce platforms in order to show how the e-Business still suffers from information disclosure.
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Keywords

Disclosure; e-Commerce; Privacy; Security; Threats

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Numerical Investigation of Mixed Convective Heat Transfer of a Twisted Square Tube

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DOI: https://doi.org/10.15866/irea.v10i6.22252

Abstract

Study of the heat transfer performance of twisted tubes have been limited to forced convective conditions (inertia-dominated flow) without studying the effect of different isothermal wall temperature (buoyancy force). Therefore, this work investigated the flow and heat transfer behavior of a twisted square tube of a varying pitch length at different mixed convective regimes. The model continuity, momentum, and energy equations were solved using the finite volume technique. The numerical model setup was validated using experimental results and a satisfactory result was achieved. The result shows that the twisted square tube performs better than the smooth tube subjected to the same conditions. The heat transfer rate and drag coefficient increase with decreasing twist pitch length. In addition, the result shows that increment of buoyancy force, while inertia force is kept constant leads to a high reduction of drag as compared to increasing inertia force, while buoyancy force is kept constant. Overall, a 15% increase (at Ri=1) is obtained in the drag coefficient and a 13% increase (at Ri=0.5) is obtained in the heat transfer rate in the 100 mm twist pitch length as compared to the 600 mm twist pitch length.
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Keywords

Twisted Square Tube; Twist Pitch Length; Inertia Force; Buoyancy Force; Nusselt Number; Friction Factor

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