

附件四、技術說明表



熱泵輔助塔堆疊

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簡歷:

國立臺灣大學化學工程學系 教授 (2006~Now)

<http://www.che.ntu.edu.tw/che/?p=399>

市場及需求:

石化產業以及化學工業

技術摘要(含成果):

蒸餾是化學工業不可或缺的環節,但同時也是高能耗製程;一種常見的節能策略是塔堆疊,即利用高壓塔冷凝器的熱量為低壓塔的再沸器提供動力。然而,高壓操作通常會降低分離效率,並且需要昂貴的高品位蒸汽,這給實際應用帶來了許多挑戰;為了克服這些難題,本文提出了一種新型的塔堆疊系統,該系統整合了蒸汽再壓縮熱泵。利用提升熱能利用率,該系統降低了對高品位蒸汽的依賴,並減少了整體能耗;案例研究結果表明,這種熱泵輔助配置在能源效率和經濟性方面均優於隔板塔,因此,該系統在工業應用上具有更強的競爭力。

優勢:

本發明可有效解決塔堆疊在高溫及高壓操作下所衍生之問題。由於其在操作彈性及工業方面更具優勢,因此具備工業應用之可能性。

競爭產品:

無

專利現況:

無

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Heat-pump-assisted column stacking

PI: Prof. Jeffrey D. Ward

Department of Chemical Engineering, National Taiwan University.

Experience:

Professor in the department of Chemical Engineering, National Taiwan University (2006~Now)
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Market Needs:

Petrochemical Industry, Chemical Industry

Our Technology:

Distillation is essential yet highly energy-intensive in chemical industries. A common energy-saving strategy is column stacking, where the high-pressure column's condenser heat powers the low-pressure column's reboiler. However, high-pressure operation often reduces separation efficiency and requires expensive high-grade steam, complicating practical implementation. To overcome these hurdles, a novel column-stacking system integrated with a vapor recompression heat pump is proposed. By upgrading thermal energy, this system reduces dependence on high-grade steam and decreases overall energy loads. Case study results demonstrate that this heat-pump-assisted configuration outperforms dividing-wall columns in both energy efficiency and economic performance. Consequently, it offers superior competitiveness for industrial applications.

Strength:

This invention effectively solves the problems arising from the operation of stacked columns under high temperature and high pressure. Due to its greater operational flexibility and industrial advantages, it has many possible practical industrial applications.

Competing Products:

None

Intellectual Properties:

None

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