

High Performance Drying and Thermal Processing within Seconds

Kai K. O. Bär

Abstract

The **adphosNIR**[®]-technology, a company own widely patented heating and drying technology, allows extreme fast heating up to several hundred Kelvin per second as well as almost instantaneous drying and curing processes. Therefore with the **adphosNIR**-technology processes can be extreme accelerated by a factor in some cases up to 1,000. Speed is critical in any industry, line speed dictates process efficiency and heating/drying dictates line speed. The faster the thermal process, the greater the throughput – and the higher the profit! In this article, the physical fundamentals of the **adphosNIR**-technology will be outlined and the wide application potential presented.

Keywords : AdphosNIR, Infrared systems, Fast drying, heating and curing, Surface treatment

1. Introduction

Speed is critical in any industry. The line speed dictates process efficiency – and heating, drying and/or curing dictates line speed of thermal processes. The faster the thermal process, the greater the throughput – and the higher the profit. In this article a new innovative technique, known as **adphosNIR**, a Near Infrared thermal processing is presented. Developed and widely patented by a leading German technology company **adphos Innovative Technologies GmbH**.

The new **adphosNIR**-technology is improving the field of surface treatment by substantially re-

ducing process. Applying technology that has grown out of the European Space Program's research, the system provides almost instant curing of waterborne, solventborne and powder coating, requiring minimal, if any changes in standard commercial formulations. The technology involves high energy sources that radiate near the infrared spectrum (more than 90% of the energy emitted is below 2 μm). The achieved density is double that of high-performance induction systems and at least four to six times greater than the maximum densities reached with conventional shortwave infrared systems. Through these and other benefits, the system enables high process efficiencies and system reliability.

2. Technology Fundamentals

The near-infrared part of the shortwave spectrum

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Kai K. O. Bär



Fig. 10 Plastic bumpers

also possible for three-dimensional surfaces like bumpers, where the process times can be reduced (from 40~45 minutes to <60 s only, see Fig. 10). But precise adphosNIR modules, routed and robotically controlled, are necessary to achieve the required consistent surface temperature over the entire surface of the component.

4. Conclusion and What makes adphosNIR so special?

The adphos range of adphosNIR thermal processes and technology involve far more than a near infrared, high-intensity thermal source.

An optimised ultra high-speed drying/curing process consists of a defined and carefully controlled thermal profile, a defined and controlled heat-intensity profile, a solvent evaporation rate and fume-exhaust profile as well as a thermal-air/gas-flow profile.

adphosNIR system technology must be tailored to the specified application conditions. For customers seeking a suitable and competitive solution to their production process needs, factors such as high systems efficiency, ease of operation, high reliability and ease of maintenance, as well as effective monitoring and error diagnosis, are of critical importance.

With more than 1,000 successful production systems installed over the past decade, adphos has more than adequately demonstrated the special capabilities (and in many respects unique system/process potential) of its adphosNIR technology. Ultra high-speed drying/curing solutions are not achieved by the mere substitution of existing components (including IR-based replacements).

A change to adphosNIR curing requires modification of the existing equipments. But the result is a radical advance that yields huge gains in speed, efficiency and profitability. Time is money: the adphosNIR technique saves both.

要 旨

超近赤外線による高速乾燥および熱処理

広範囲にわたって adphos 社が特許を有する adphosNIR (超近赤外線) テクノロジーは、1秒あたり数百ケルビンの超高速な加熱と、瞬時の乾燥およびキュアリングを可能にする技術である。製造工程によるが、乾燥/キュアリング工程を1,000倍まで高めることができる。

スピードはいかなる産業においても重要な要素であり、生産効率率はラインスピードによって決まるが、ラインスピードは加熱/乾燥速度に依存する。即ち、熱処理のスピードが速いほど、処理能力と利益率が向上することを意味する。

本資料では、adphosNIR の物理的な基本原理を概説し、幅広い応用範囲を紹介する。