UNIVERSAL® LASER SYSTEMS

Advanced Laser Technology: Transforming the Future of Material Processing

WHITEPAPER

Introduction

The landscape of high-tech industries is ever-evolving, presenting new challenges and opportunities as market needs and trends shift. In this dynamic environment, companies must find ways to accelerate the time to market for new products, reduce design and manufacturing costs, improve the performance of existing products, and operate more efficiently.

Market demands drive the development of advanced materials and innovative uses of existing ones. These advancements are revolutionizing industries such as transportation, electronics, medical, and energy by enabling the creation of innovative products and solutions for complex problems. However, material innovations also introduce processing challenges.

Processing Considerations for Advanced Materials

Modern advanced materials are engineered for superior performance and often consist of two or more materials with different physical and chemical properties. Applications for these materials require processing methods that are flexible, efficient, and precise, capable of handling complex requirements and geometries while maintaining high quality and productivity.

Various material processing methods exist, but achieving accuracy, repeatability, productivity, and quality without compromising material integrity is crucial to leveraging the benefits of advanced materials. Particularly, meeting these requirements for composite materials can be challenging due to their different properties.

One material processing method poised to address this challenge is laser technology. Laser material processing is non-contact and utilizes laser energy to modify a material's shape or appearance. It is well-established and widely used for converting materials into parts and products across research and development, product design, and production.

However, traditional laser systems available today have limitations, especially for advanced applications and state-of-the-art materials. Using a traditional laser system for these types of applications and materials can cause subpar results or processing inefficiencies. In other cases, processing these materials may not be possible at all. With recent technological advancements, the possibilities for laser material processing are greatly expanding, making it an ideal solution for modern and future material applications.

Next Generation Laser Material Processing

Next-generation laser material processing systems like the *ULTRA X6000* from Universal Laser Systems offer the highest level of material processing flexibility and performance.

With support for multiple wavelengths and an extensive range of power options, along with patented technologies and unique process optimization capabilities, the *ULTRA X6000* has the versatility to process the broadest range of materials in the same system with precision and superior results.

Engineered with a high-accuracy laser beam delivery system with micron-level addressable resolution and repeatability, the *ULTRA X6000* ensures precise beam positioning across the full laser processing field. Sophisticated laser processing algorithms and software controls further enhance its precision, allowing it to meet specific requirements with high performance, exceptional accuracy, and consistency.

The multiple wavelengths and power levels available for the *ULTRA X6000* can be configured in the system to be used separately, sequentially, or simultaneously. With simultaneous use, laser energy from multiple wavelengths is combined into a single coaxial hybrid laser beam utilizing patented MultiWave Hybrid™ technology. The hybrid beam can include any combination and percentage of laser energy from different wavelengths, and all wavelengths are focused onto the same focal plane.

ULTRA X6000

The system's processing flexibility extends with its modular design and tunability. The system can be tailored with process optimization modules and laser processing parameters can be finely tuned to address the specific needs of each application. Laser parameters can be adjusted in very small increments for any configuration of wavelength and power, including that of a hybrid beam. In a hybrid beam, each wavelength's laser parameters can be independently controlled.

The ability to configure the *ULTRA X6000* with the laser wavelength(s) to match a material's absorption characteristics and the appropriate power, along with intricate tuning of laser parameters pushes the boundaries of laser material processing, making it possible to achieve optimal output on the broadest range of materials.

This degree of optimization ensures efficient use of laser energy. It can reduce heat-affected zones, minimize material discoloration or deformation, improve edge quality, enhance visual appearance, and increase throughput depending on the material. With the *ULTRA X6000*, companies can now achieve higher productivity and solve complex problems to meet market demands.

Conclusion

The ever-evolving landscape of high-tech industries necessitates innovative solutions to meet new challenges and capitalize on emerging opportunities. The development and application of advanced materials have become pivotal in driving innovation across various sectors. However, these materials introduce complex processing challenges due to their diverse properties.

Laser technology particularly the advancements introduced by Universal Laser Systems, offers a promising solution to these challenges. Traditional laser systems, while effective for basic applications, fall short when handling state-of-the-art materials that demand higher precision and flexibility. The *ULTRA X6000* laser material processing system addresses these limitations, providing unparalleled flexibility and performance.

The *ULTRA X6000* represents a significant advancement in laser material processing, providing the high-tech industry with tools needed to process existing and advanced materials efficiently and precisely. This system exemplifies the potential of modern laser technology to meet the stringent demands of today's innovative applications, paving the way for future technological advancements.

Universal Laser Systems, Inc.
World Headquarters
7845 East Paradise Lane
Scottsdale, AZ 85260
U.S.A

Universal Laser Systems GmbH
Lerchenfelder Gürtel 43
1160 Vienna, Austria

Universal Laser Systems Japan
The Yokohama Landmark
Tower 21-F
2-2-1-1 Minatomirai, Nishi-ku
Yokohama, Japan

Worldwide Inquiries:
Phone: (800) 859-7033 U.S.
(480) 483-1214 Global
Email: moreinfo@ulsinc.com

www.ulsinc.com

Universal laser systems are protected under one or more U.S. Patents: 7,060,934; 7,415,051; 7,715,454; 7,723,638; 7,947,919; 8,101,883; 8,294,062; 8,599,898; 8,603,217; 9,155,988; 9,263,844; 9,263,845; 9,281,649; 9,346,122; 9,354,630; 9,694,448; 9,737,958; 10,391,345; 10,456,875; 11,198,193. Other U.S. and international patents pending.