

Fast Pulse Control Delivers Superior Grayscale Laser Marking

Challenge

Manufacturers of identification documents, such as passports, credit cards, drivers' licenses, and secure entry permits are using increasingly sophisticated marking protocols. In addition to portrait photographs, this includes tactile features and multiple laser image (MLI) as well as changeable laser image (CLI) technologies to generate images and graphics that are sensitive to viewing angle. To maximize the readability and information quality, manufacturers need a laser marker that delivers high resolution and contrast, but without compromising the marking speed or significantly increasing the cost of marking.

Solution

The PowerLine E Air 25-1064 EM is a laser marker specifically optimized for this application that uses an innovative but simple pulsing mechanism to avoid the traditional limitations of grayscale marking with pulsed lasers.

Grayscale marking is usually based on a photosensitive plastic such as polycarbonate. Here the extent of darkening directly depends on the amount of laser energy applied to each image pixel or point. So by rapidly varying the laser pulse energy as the laser scans across the substrate, a permanent grayscale image is created on the target. In most industrial laser applications, laser pulse energy is varied by fast control of a fast switch called a modulator, inside the laser cavity. But this also changes the power inside the laser which causes small changes in the beam shape and focus, and uncontrolled "first pulse" issues. In grayscale marking, this can reduce contrast and cause fuzzy edges in images and characters. Plus the image quality varies with marking speed.

Instead the PowerLine E Air 25-1064 EM uses the Coherent SmartBitmapID technology incorporating a specialized resonator and an external pulse modulator outside the laser cavity, so the circulating power level inside the laser stays constant. And since all the laser optics are optimized for that exact power level, the laser maintains superior beam quality and pulse stability, independent of speed.

Application Field

Grayscale laser marking on passports, identity cards, and other security products.



Figure 1. This specialized grayscale marker is based on the popular PowerLine series, long used in diverse marking applications and industries.



Figure 2. The PowerLine E Air 25-1064 EM creates grayscale images with superior resolution and contrast.

Benefit

Eliminating the dependence of laser beam shape/focus on the pulsing speed delivers tighter control over grayscale. This translates directly into images with sharper edges and improved contrast. This improves both human and machine readability for both photographs and other biometrics as well as high-density alphanumeric codes and symbols. All without increasing the marking cost.

Contact

Dr. Dietrich Tönnies, Product Line Manager, Munich, Germany
Email: dietrich.toennies@coherent.com