

The Sabreen Group, Inc.

Total Solutions = Manufacturing Excellence

VECTORJET™ LASER MARKING of PLASTICS

PATENT PENDING TECHNOLOGY

VECTORJET™ Laser Marking is a quantum leap in direct plastics laser marking. The technology is *enabling* and *cost-saving*, designed to achieve exceptional Six-Sigma quality and lean manufacturing methods.

PERFORMANCE

VECTORJET™ Technology achieves unprecedented marking contrast without affecting the physical properties of the base polymer.

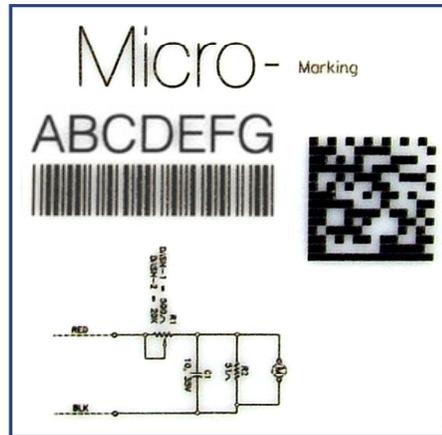
COST EFFECTIVENESS

VECTORJET™ Technology reduces part marking and total equipment systems costs. The VECTORJET™ Total Solution is *less expensive* than conventional laser marking and ink printing.

SABREEN

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- **Patent Pending Technology** - Unprecedented direct laser marking contrast and line edge detail quality (greater than 800 dpi resolution)
- **Micro-Marking** - Capable of 0.020" (0.5mm) and smaller, legible only with magnification
- **Machine Readability** - 100% readable 2D Data Matrix and Barcodes plus ultra-fine fidelity requires less expensive vision equipment
- **Efficiency** - Exceptionally fast marking speed yields increased production
- **Unlimited Graphics** - Alphanumeric text, any font style, logos, schematics, diagrams, etc.

Patent Pending VECTORJET™ Laser Marking is a quantum leap in direct plastics laser marking that is both *enabling* and *cost-saving* for a virtually unlimited number of applications. VECTORJET™ Laser Marking achieves unprecedented contrast, line edge detail, and marking speed on acetal polymers and many other plastics that have traditionally been difficult, if not impossible, to laser mark. Combining advanced material science and state-of-the-art laser technology, this breakthrough invention achieves robust laser marking of plastics that can be successfully used in a far broader range of applications, even those requiring machine vision and micro-marking for unit level product-process security, traceability, and authentication verification.

TICONA Evaluates VECTORJET™ Laser Marking

Using Hostaform® polyacetal natural and white test plaques formulated with selected laser marking additives, TICONA POLYMERS has determined that the VECTORJET™ Technology produces a higher quality "black-on-natural" and "black-on-white" laser mark than standard conventional Nd:YAG laser marking techniques. Improved measurements of

quality include higher contrast, darker mark, and sharper/crisper details and clarity when viewed with the naked human eye or under magnification. Similar quality improvements are observed using Hostaform® polyacetal plaques for "white-on-black" and color "tone-on-tone" laser marking contrast.

Significance of VECTORJET™ Laser Marking

Chemically inert, non-polar plastic polymers possess highly desirable performance properties for a broad range of industrial applications, including automotive and medical. However, it is extremely difficult to print on these types of plastic substrates. Historically, expensive ink printing and surface pretreatment methods fail to provide long-term field product identification or safety warning information, particularly when exposed to chemicals and harsh environmental forces. Indelible VECTORJET™ Laser Marking solves these problems and offers the further capability of coding variable, sequential, and unique identification part information.

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VECTORJET™ TECHNOLOGY BENEFITS

VERSATILITY

VECTORJET™ Technology works in a wide range of polymers and can achieve dark-on-light, light-on-dark, and color laser marking.

APPLICATIONS

Aerospace & Military

UID MIL-STD 130

Automotive

Interior and Underhood

Caps & Closures

Conveyor Chain Belt Handling

Downhole & Harsh Environments

Electronics

Connectors, DIN Relays

Medical & Pharmaceutical

E-Pedigree Laws

Packaging & Security

Unit Level Traceability

Plumbing & Gears

Rod / Stock Shapes

Toys

VECTORJET™ Advantage

Patent Pending Technology

Unprecedented Marking Quality

100% Machine Vision Readable

Cost Savings, Improved Efficiency

VECTORJET™ Technology achieves superior results compared to traditional Nd:YAG laser marking that requires high levels of doping additives and produces less than desired detail and contrast quality. Direct marking VECTORJET™ Technology achieves breakthrough “dark” marking contrast on “light” colored products, as well as “light” contrast on “dark” products and on color “tone-on-tone” products. The result is a far reaching laser marking technology that eliminates virtually all restrictions when selecting product and marking color, reduces costs relative to conventional marking lasers, and enables reliable machine vision readability and micro-marking. VECTORJET™ Technology continues The Sabreen Group’s “Total Solutions Methodology” history of advancing the state-of-the-art in plastics laser marking, thereby providing a wide range of industries the ability to manufacture high quality Six-Sigma products at lower costs utilizing lean manufacturing methods.

Cost Effectiveness of VECTORJET™ Technology

VECTORJET™ Laser Marking reduces part marking and total systems costs, particularly as production volume increases. As compared to conventional Nd:YAG lasers of comparable power or higher, the VECTORJET™ Laser system hardware costs significantly less while providing far superior contrast, quality and speed. Ultra-fine line marking

uniformity and high fidelity contrast also results in less expensive machine vision reading equipment, and less manufacturing scrap due to non-readable codes.

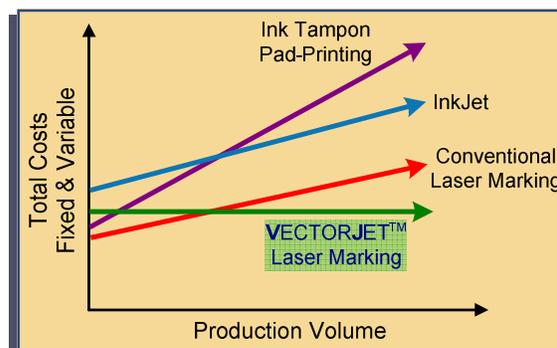
When compared to ink pad-printing, the cost savings associated with VECTORJET™ Technology is even greater because there are no recurring variable costs of expensive inks, tampons (pads), clichés (printing plates), and chemicals. In fact, the one-time right-to-practice license for the VECTORJET™ Technology is less than the recurring variable costs per year for most applications. Moreover, non-digital pad-printing cannot produce indelible marking or unique unit level identification (UID) for product security traceability.

Relative to “drop-on-demand” digital inkjet, there are similar savings. Non-indelible inkjet cannot achieve fine line edge resolution for machine vision, particularly on small parts. Further, the distance from the inkjet printhead base to the part surface must be less than 1.5mm which does not allow clearance in 3-D applications.

VECTORJET™ Laser Technology enables direct unit level marking identification traceability on light-weight, chemically inert plastics, eliminating the problems associated with heavier corrosion-prone metal identification tags and plates that are engraved.

Patent Pending VECTORJET™ Laser Marking Technology is “The Total Solution” for plastics laser marking of any shape or size.

For more information, contact The Sabreen Group toll-free at 1-888-SABREEN (Domestic), 972-250-4664 (International), or send us an email to: vectorjet@sabreen.com



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