



Laser Markable Materials for Industrial Applications

Presenters:

Andrew Marvin & Sam Wainer

Course Objectives

- **Picking the Right Material:** Decision factors for the industrial customer and the engraving shop.
- **Overview of Materials Available:** Five popular laser markable materials for industrial applications.
- **Techniques:** How to properly mark the various materials with a CO₂ laser.
- **Marketing to the Industrial Customer:** How to find and win industrial customers.

Introduction

Decision Factors

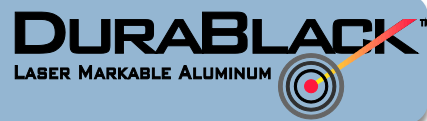
Materials

Laser Techniques

Marketing

Horizons Imaging Systems Group

- Founded in 1946 as a private research company, primarily funded through government grants.
- In the 1970s, the company shifted its focus from research to manufacturing.
- Today: a developer and manufacturer of unique, high-value aluminum based identification products including:



Industrial Experience



Defense



Energy & Utility



Aircraft & Aerospace



Barcode & Supply Chain



Marine & Shipbuilding



Heavy Equipment



Transportation



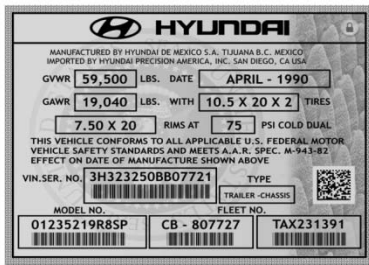
Signage & Design



Plaque/Award

Common Industrial Applications

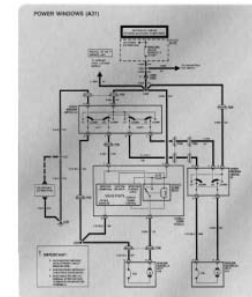
Nameplates & Data Plates



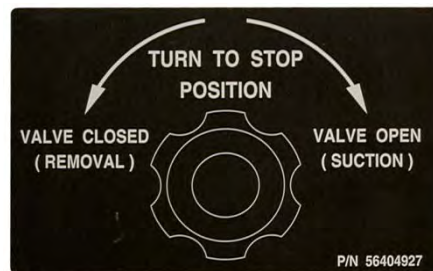
Barcode Labels



On-Equipment Service/Process Schematics



Safety Diagrams/Safety Signage



Architectural Signage



Why Industrial Applications?

□ Why Industrial Applications:

- Higher Profit/Part
- Repeat Business
- Requirement to Follow Specifications



□ Importance of Selecting the Right Material:

- Faded or otherwise illegible graphics can lead to safety hazards, equipment failure and even regulatory fines.
- Industrial customers are usually willing to pay for the assurance that a part will not fail because the cost of failure far outweighs the cost of the part.

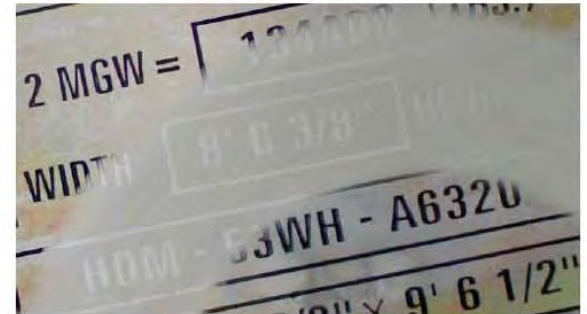
Causes of VIN Plate readability failure.



Weather/Sunlight Degradation and Fading



Road Salt Corrosion Damage



Abrasion Damage

Material Decision Factors

Introduction

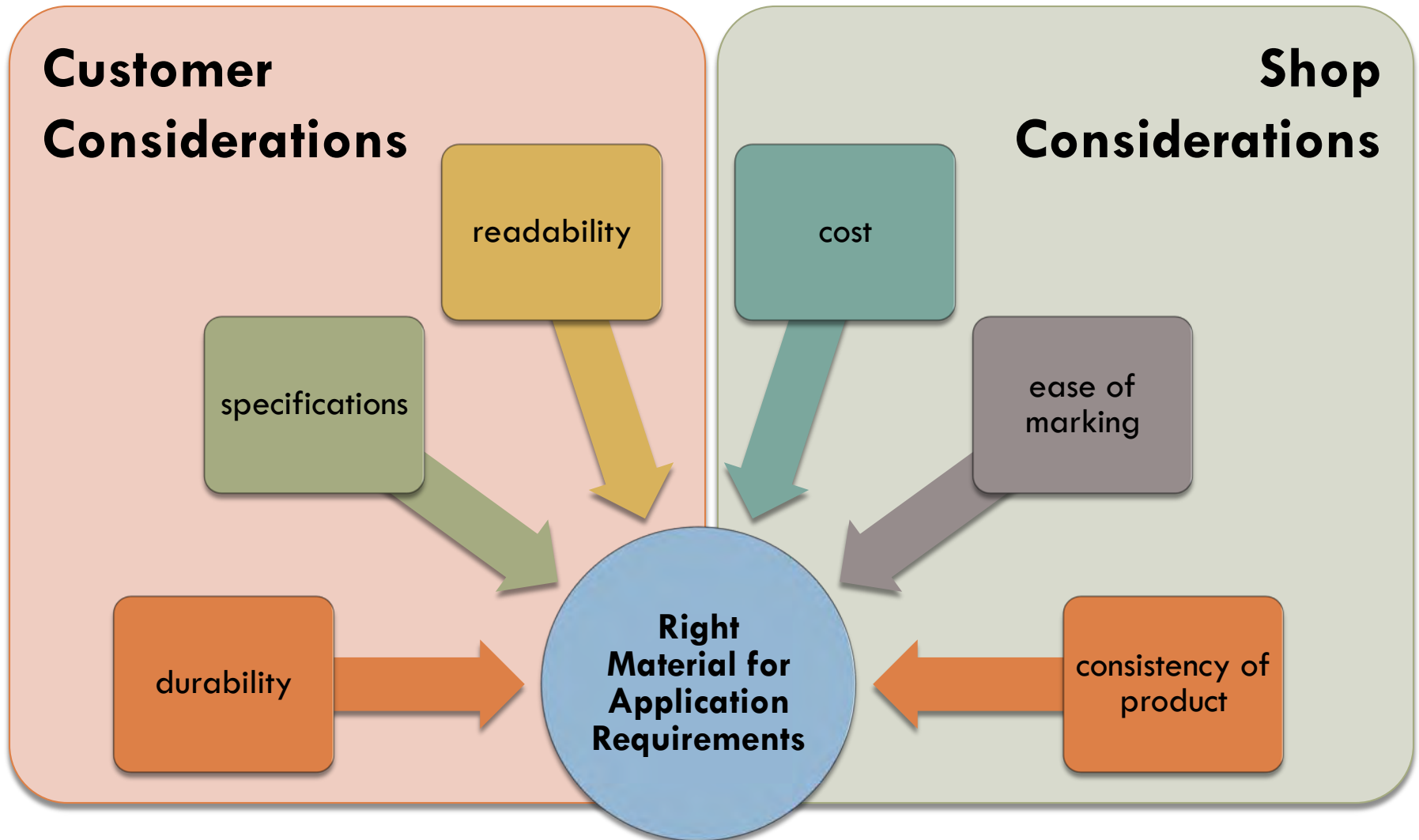
Decision Factors

Materials

Laser Techniques

Marketing

Picking the Right Material Centers Around the Application Requirements





Materials

Introduction

Decision Factors

Materials

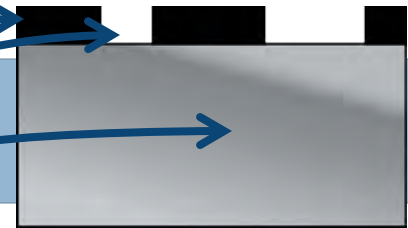
Laser Techniques

Marketing

Types of Materials

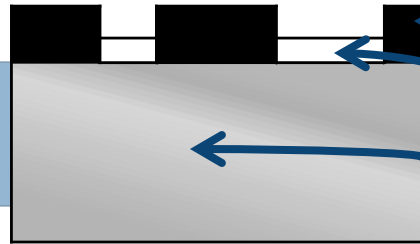
Engravable Metals

Top Layer
Etched Area
Metal Base



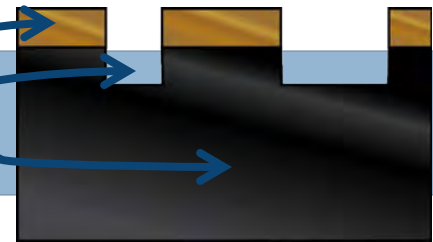
Bleachable Metals

Organic Black Dye
Bleached Mark
Metal



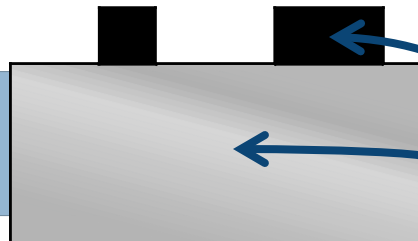
Engravable Plastics/Tape

Metallic Paint
Etched Area
Black Acrylic



Ceramic Bonding Metals

Bonded Ceramic
Metal



Comparison of 5 Industrial Materials

Material/ Manufacturer	Composition	Type	Durability	Specifications	Barcode Readability	Cost Per 12"x 24"	Ease of Marking	Consistency of Product
DuraBlack® <i>Horizons Imaging Systems Group</i>	<i>Multi-Layer Coated Anodized Aluminum</i>	Engravable Metal	Outdoor	MIL-STD-15024F A-A-50271 UL Listed MIL-STD-130	Good	\$low	Good	Good
Black Anodized Aluminum <i>Various</i>	<i>Dyed Anodized Aluminum</i>	Bleachable Metal	Limited Outdoor	MIL-A-8625F	Fair	\$low	Fair	Poor
Laser Markable Acrylic Tapes <i>Tesa/3M</i>	<i>Acrylic Tape</i>	Engravable Tape	Limited Outdoor	UL Listed MIL-STD-130	Good	\$medium	Poor	Good
Ceramic Coatings (CerMark™/ TherMark) <i>Ferro Corporation/ TherMark</i>	<i>Spray or Tape Laser Bonded Ceramic</i>	Ceramic Bonding	Outdoor	MIL-STD-130 NASA STD 6002 AIAG B-4	Fair	\$high	Poor	Fair
Metalgraph Plus™/ Texture® <i>Rowmark</i>	<i>Multi-Layer Extruded Acrylic</i>	Engravable Plastic	Outdoor	--	Fair	\$medium	Good	Good

* Based upon specifications provided on manufacturer's website; may not be all inclusive

Laser Engraving Techniques

Introduction

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Laser Techniques

Marketing

Laser Marking Techniques

Power

How much power is the laser producing, percent of total power.

Speed

How fast is the laser traveling, percent of total speed.

DPI

How close each pass is to the previous in the “Y” direction.

Tuning

Typically an advanced setting on Universal Lasers, controls how current sweep of the laser lines up with the previous sweep.



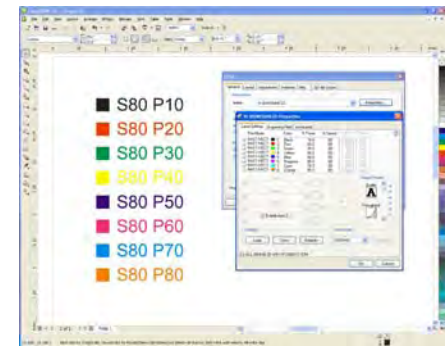
The Lazy dog.



Low DPI
Low DPI
Low DPI



Wrong Tu



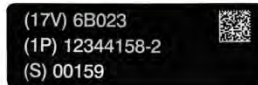
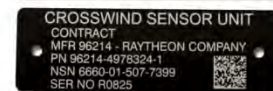
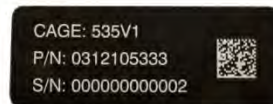
Results - DuraBlack

Ideal Applications:

- Indoor/outdoor signage
- Durable Labels
 - ▣ Resistant to heat, chemical, UV and abrasion

Drawback:

Relatively new product



Results – Black Anodized

Ideal Applications:

- Indoor signage and labels
- Monochrome plaque/award

Drawback:

Inconsistent and UV fade



Results – Acrylic Tape

Ideal Applications:

- ❑ Unique shape requirements
- ❑ Indoor labels
 - ▣ Flexible and can be laser cut

Drawback:

- ❑ Abrasion and heat resistance
- ❑ Limited to 4.72” wide



Results – Ceramic Coatings

Ideal Applications:

- Mark directly on metal surface
- Meets stainless steel requirements
 - ▣ Resistant to heat, chemicals, UV abrasion

Drawback:

- Multi-step with variable results
- High cost



Results – Extruded Plastics

Ideal Applications:

- ❑ Solid color warning signs
- ❑ Indoor/Outdoor signage
 - ▣ Resistant to UV, weather and salt



Drawback:

Abrasion, heat and chemical resistance



Laser Marking Summary

35watt Universal Versa Laser

Material	Manufacturer	Composition	Speed	Power	DPI
DuraBlack®	Horizons Imaging Systems Group	Multi-Layer Coated Anodized Aluminum	50	30	600
Black Anodized Aluminum	Various	Dyed Anodized Aluminum	70	50	600
Laser Markable Acrylic Tapes	Tesa/3M	Acrylic Tape	25	17	600
Ceramic Coatings (CerMark™/ TherMark)	Ferro Corporation/ TherMark	Spray or Tape Laser Bonded Ceramic	35	100	600
Metalgraph Plus™/ LaserMax®	Rowmark/IPI	Multi-Layer Extruded Acrylic	70	30	600



Marketing

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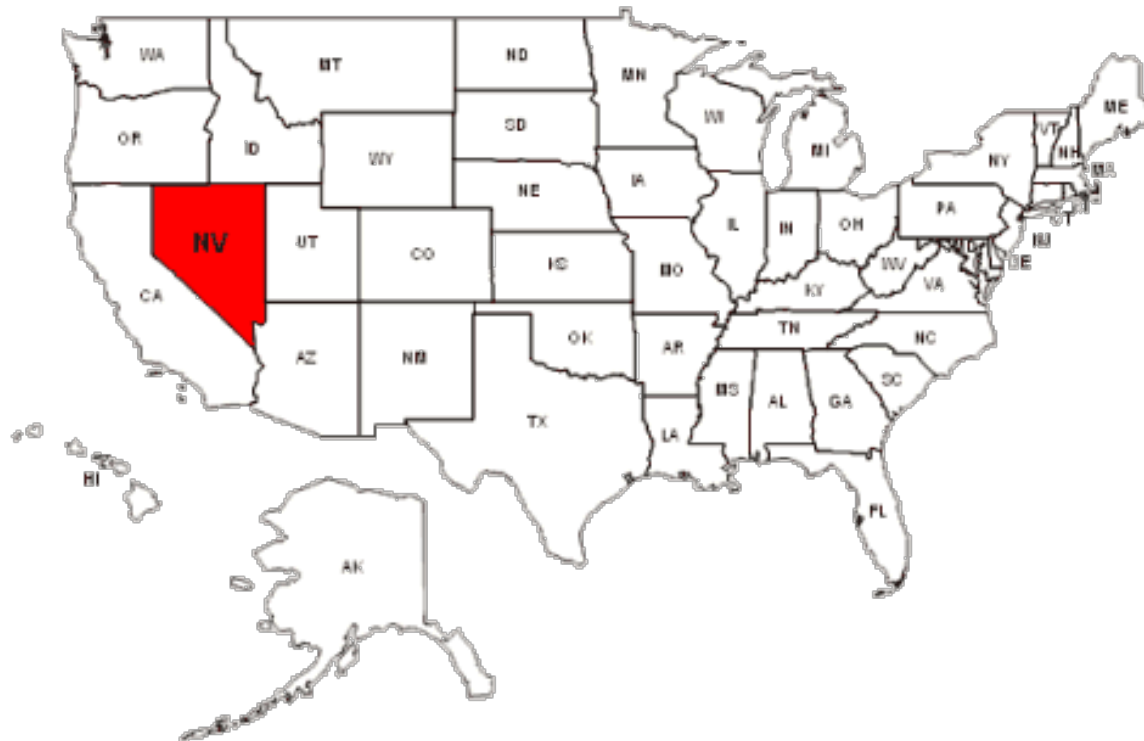
Marketing

How to Find & Win Industrial Customers

- Identify Target(s)
 - By industry/application
 - By geography
 - By supply level (OEM vs. repair shop)
- Communicate Your Capabilities
 - Materials & Specifications? Ability to Certify?
 - Fabrication Capabilities?
 - Extra Services: Graphic Design, Installation, etc.
 - Case Studies/Testimonials?
- Reach Industrial Targets
 - Rifle vs. Shot Gun Approaches
 - Google Search
 - Jigsaw
 - Networking
 - Government Bid Websites: www.fbo.gov, www.gsaadvantage.gov, www.findrfp.com, etc.
- Sales & Account Maintenance
 - Certifications
 - Prototyping
 - Follow up
 - Saving graphics files for repeat orders

Sample Research

- Identify Target(s): **Geographic**
- Communicate Your Capabilities: *Machine Plates Online*
- Reach Industrial Targets: *LinkedIn, Jigsaw*
- Sales & Account Maintenance



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- Identify Target(s): *Geographic*
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MACHINE PLATES Online
WE IDENTIFY YOUR MACHINES Online
800-815-7850

Home Name Plates ID Plates Legend Plates Locker Plates Control Panels Stainless Plates Vin and Hull Plates Durablack Plates

Durablack Plates

Durablack is a multi-layer aluminum plate designed for durability and legibility under the worst conditions. The bottom layer is an adhesive followed by a layer of anodized aluminum acting as a substrate for the patented laser-maged layer. The matte black finish is non-reflective for easy readability under all conditions. Durablack is available on 0.005" or 0.020" thick aluminum. Marking can be done with any CO2 laser resulting in a durable, precise image suitable for barcodes or text.

Quick Quote
Which Plates Are You Interested In?
Get a Quote Now

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Durablack Technology

Anodized Aluminum
Performance Adhesive

Durablack was designed in response to findings that laser markings on black anodized aluminum can fade after long exposure to outdoor environments. Rigorous testing simulating outdoor, marine, corrosive and high-heat situations has proven Durablack superior to black anodized aluminum and acrylic tape in its resistance to harsh conditions. Results confirm its ability to withstand sun damage, extreme temperature, abrasion and exposure to chemicals including salt. This ability to resist a wide range of conditions conforms to governmental and military standards and makes Durablack suitable for labeling equipment used in combat and other harsh environments.

Governmental and industrial standards met by Durablack include MIL-STD130N, MIL-STD-15024F, Type L and A-A-50271. It conforms to military item UID criteria for bar codes.

Since the imaging is etched into the material of the plate, maximum durability is achieved upon marking. There is no need for a second protective coat. In situations where large numbers of plates are imaged, this represents a significant savings of time, labor and materials.

Marking can be done quickly on-site, so vehicles and equipment do not need to be returned to a shop for labeling.

DURABLACK
LASER MARKABLE ALUMINUM

DURABLACK
LASER MARKABLE ALUMINUM

TECHNICAL BRIEF
May 17 2012

DURABLACK® PASSES DURABILITY PERFORMANCE TESTING

DURABLACK OUTPERFORMS LASER MARKABLE BLACK ANODIZED ALUMINUM AND ACRYLIC LABELS IN SEVERAL SIMULATED OPERATING ENVIRONMENTS

ABSTRACT

Durablack, a new CO₂ laser markable aluminum, meets the performance requirements of MIL-STD-130, A-A-50271 and MIL-DTL-15024F for resistance to abrasion, high-temperature, weather, salt-spray and fluid exposure. The tests, which compare Durablack to black anodized aluminum, laser-markable acrylics and photosensitive anodized aluminum (Metalphoto®), simulate outdoor, marine, abrasive, fluid/chemical and high-temperature operating environments. While Metalphoto was found to be the most durable material overall, Durablack exhibited environmental performance that surpassed other substrates including black anodized aluminum and laser markable acrylics.

MOTIVATION

The usage of laser markable black anodized aluminum has increased with the growing adoption of CO₂ marking lasers.¹ Although black anodized aluminum can be marked effectively with a CO₂ laser, field experience and laboratory tests show that black anodized aluminum will fade outdoors – leading to label failure. In response to such reported failures, Horizons ISG developed Durablack®: a CO₂ laser markable material that can withstand harsh industrial and military operating environments without the post-attachment application of a protective topcoat.

Durablack is CO₂ laser markable aluminum that is engineered for on-demand marking in outdoor, marine, abrasive, chemical/fluid and high-temperature operating environments. Durablack is composed of a multi-level coating upon an aluminum base layer. Its integrated abrasion resistant coating reduces the need to apply a secondary protective topcoat. Available in both 0.005" and 0.020" thicknesses, Durablack can be attached to either curved or flat surfaces with adhesive, rivets or screws. Durablack is imaged with any CO₂ marking laser to produce a durable, high-resolution barcode or human-readable image.

The performance testing done by Horizons Incorporated was designed to compare several common label materials across a standardized battery of test conditions. Tests were modeled after those established by the U.S. Department of

Defense under MIL-STD-810G (material performance) and MIL-STD-130 (identification of high value and/or mission critical assets through the UID program).

EXPERIMENTAL DESIGN

Five operating environments were simulated in the laboratory:

OPERATING ENVIRONMENT	TEST CONDITIONS	SUCCESS CRITERIA
Weather Exposure	Q-Sun XE-3/H5 UV chamber as per ASTM G155	2,500 hrs
Abrasion	Tabor Abraser, CS17 with 1kg wheel load as per ASTM G195	4,000 cycles
High-Temperature	Air Oven as per ASTM D573	700°F for one hour
Marine/Saltwater Spray	Salt Spray Chamber as per ASTM B117	30 days
Chemical/Fluid Exposure	Submission in fluids as per MIL-STD-810G	96 hrs

The test image below was imprinted on all materials evaluated. The laser markable acrylics were mounted on 0.020" aluminum.

TEST SAMPLE

© Society of Photo-Optical Instrumentation Engineers (SPIE) Professional January 2012, CO₂ Laser by DeMaris, Anthony J. and Hennessey, Jr., Thomas V. (<http://pro.spiedigitallibrary.org>)
2-D Item Image Identification (I2D) is a part of the compliance process mandated by the United States Department of Defense. I2D requires that all DoD assets that have an acquisition cost of over \$5,000, are mission essential, are controlled inventory, are serially controlled or are consumables have a unique identifier permanently marked that survives the life of the asset. See <http://www.acq.osd.mil/dppip/uid/index.html> for more information.

Horizons Incorporated
ISG Imaging Systems Group

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Sample Research

- Identify Target(s): *Geographic*
- Communicate Your Capabilities: *Machine Plates Online*
- Reach Industrial Targets: **LinkedIn, Jigsaw**
- Sales & Account Maintenance

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Company Directory > electrical and electronic manufacturing > Las Vegas - electrical and electronic manufacturing

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Catapult Global	Crestron Electronics
Aurora LED Systems	GreenLight Solid State
Suntricity Corp	VendEver LLC
QKT-GoTek, Inc.	Power Efficiency Corporation
Pelco	Pololu Corporation
Kalco Lighting	Evolve Guest Controls
Allied Wire & Cable	K2 Energy Solutions
JCM Global	American High Voltage
Bulbtronics Inc	BlueSky Grow Lights, LLC
DIAMOND LIFE LIGHTING GROUP	Apsm Systems
Diligent Minds LLC	Competitive Components Inc

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Company Search Results

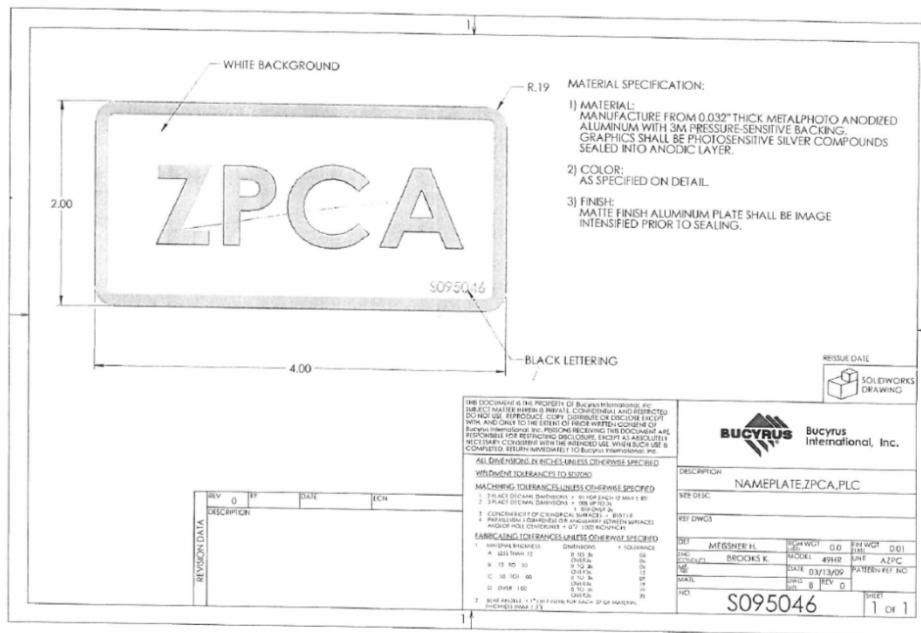
There are 408 results. See your search terms. Other options: Revise Search, Save Search

Show 200 1 - 200 of 408 Page 1 | 2 | 3 Next- Export Companies

Name	Contacts	City	State	Country	Updated
Sierra Nevada Corporation	331	Sparks	NV	United States	01/22/13
NV Energy Inc	327	Las Vegas	NV	United States	01/12/13
Southwest Gas Corporation	314	Las Vegas	NV	United States	11/09/12
Las Vegas Valley Water District	203	Las Vegas	NV	United States	11/29/12
American Pacific Corporation	119	Las Vegas	NV	United States	08/27/12
McCarran International Airport	116	Las Vegas	NV	United States	06/29/12
Jensen Precast	80	Sparks	NV	United States	01/11/13
Southern Nevada Water Authority	76	Las Vegas	NV	United States	11/21/12
AMERCO	68	Reno	NV	United States	08/23/12
Ormat Technologies, Inc.	64	Reno	NV	United States	01/16/13
Bentley Nevada	55	Minden	NV	United States	08/29/12
Imprints Wholesale	54	Las Vegas	NV	United States	03/06/12
Twl Global Inc	53	Las Vegas	NV	United States	12/11/12
Caltrol Inc	46	Las Vegas	NV	United States	10/01/12
Cashman Equipment Company	43	Henderson	NV	United States	01/09/13
Gaming Partners International Corp.	41	Las Vegas	NV	United States	04/25/12
Altairano Corp.	37	Reno	NV	United States	10/12/12

Sample Research

- Identify Target(s): *Geographic*
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- Sales & Account Maintenance**



SP

Certificate of Compliance

Certificate Number: 11 79189-6

Revision: _____ Date Issued: January 23, 1997

Issued To: Cable Master Electric Wire & Cable Co. Ltd.
46, Lane 344
Chung Hu St., Ying Ko Chen
Taipei Hsien, Taiwan
Attention: Mr. Rick Wu

The products listed below are eligible to bear the CSA Mark.
*NOTE: The "NRTL/C" indicator may appear adjacent to the CSA Mark.

Issued By: U. Weisz, P. Eng.
Toronto, ON, Canada

Signature: _____

CLASS

CLASS 5731 B1 - CABLE - Communications
CLASS 5731 B1 - CABLE - Communications - CERTIFIED TO U.S. STANDARDS

PRODUCTS

Communications Cables, Type CM, with polypropylene (PP) insulation, optional shield, PVC jacket, rated 75°C

APPLICABLE REQUIREMENTS

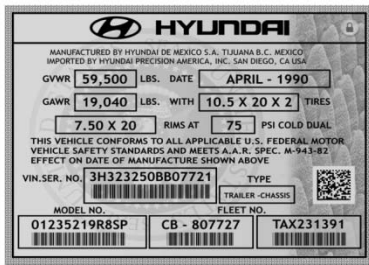
CAN/CSA-C22.2 No.	214-94	Communications Cables
UL Std No.	444	Communication Cables

*The "NRTL/C" indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ASTM, and IEC Standards in the U.S. and Canada. "NRTL" is a Nationally Recognized Testing Laboratory, as a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories which have been recognized as performing certification to U.S. Standards.

1001-007 Canadian Standards Association Offices: Montreal, Toronto, Edmonton, Vancouver, Tokyo, Hong Kong

Thank You.

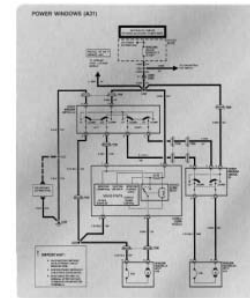
Nameplates & Data Plates



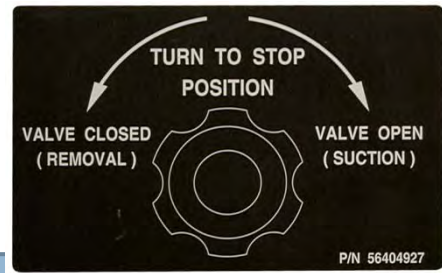
Barcode Labels



On-Equipment Service/ Process Schematics



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