

# Aluminations

The Quarterly Newsletter of AlumiPlate, Inc.

Plating With Aluminum

## Focus on Optics

Bad pun, good idea...

AlumiPlate™ aluminum plating has potential high value applications in virtually every industry that uses metals. This has many positive implications for the company and also some challenges.

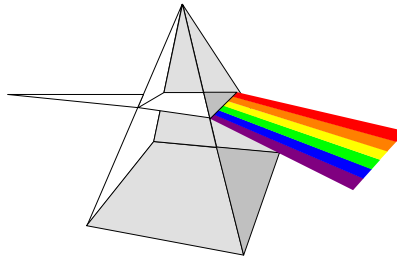
As anyone in business knows, Focus is critical to the success of any company - large or small. As a company grows, *what* you focus on may change but the need to remain focused does not. As we begin our third year, our focus is narrowing. We have been telling you about our target markets and applications in previous issues of *Aluminations*. These are Optics, Critical Service Fastener Systems and Thermal Management. In order to provide the highest value to our customers and their customers, we are narrowing our focus within and among our target markets. This issue, a little more about the Optics market.

"Optics" means different things to different companies. To AlumiPlate, it means plating of our high purity aluminum onto metal aspheric mirrors used in high end optical platforms such as airborne, spaceborne and ground-based infra-red (IR), visible spectrum and multispectral applications.

The optics world is discovering that AlumiPlate™ aluminum is an excellent surface to diamond machine (the process of cutting an amazingly precise surface finish and shape into a material) and can save significant time and money in the manufacture of aspheric and other metal mirrors. AlumiPlate aluminum can be diamond machined to a surface finish of 20-40 Angstroms rms (an Angstrom [Å] is one ten billionth of a meter!). This compares very favorably with other substrate materials - either base materials (such as 6061-T6 aluminum or beryllium) or plated materials (such as electroless nickel) which all require polishing after diamond machining to achieve a <30 Å rms surface finish.

Though absolutely necessary in certain applications, polishing can be a highly variable process that does not lend itself to higher volume, repeatable or better total cost manufacturing. By eliminating or greatly decreasing the need for polishing...

AlumiPlate aluminum can help our optics customers save time and money in the production of high end metal mirrors.



## AlumiPlate to Exhibit at SPIE '97

This year, AlumiPlate will be exhibiting at the **Society of Photo-electronic Instrumentation Engineers** annual meeting in San Diego to be held **July 20-26<sup>th</sup>**. AlumiPlate will have diamond-turned witness samples available for inspection at that time. The SPIE conference brings together leaders in the fields of optics, lasers, opto-mechanical devices and precision electro-optics. It is an excellent show and technical conference enabling us to increase awareness of the AlumiPlate™ aluminum layer, learn about other high value customer applications, and to further educate decision influencers in our target market about the benefits of the AlumiPlate aluminum layer - especially the excellent **diamond machinability** properties (see *Featured Feature p.2*)

**Visit us at SPIE Booth 1350**

## The AlumiBuzz... Applications Update

Our customers and prospects continue to guide us toward the highest value applications for AlumiPlate aluminum. Very good progress is being made including an increasing awareness in the marketplace of the value that AlumiPlate aluminum can add, increased focus on highest value applications, and more penetration of those focus markets....

## Thermal Management

by Sandy Donaldson, VP Marketing  
**AlumiPlate™ Aluminum Enables Anodization of Beryllium and SiC-containing Alloys and Metal Matrix Composites.**

The Armed Forces and private industry are investing heavily in lighter weight, higher performance materials which are used to remove the heat from densely packed printed wiring boards which control everything from guidance systems, target acquisition and tracking, avionics to optronics and communications. What does this have to do with AlumiPlate?

The AlumiPlate<sup>SM</sup> aluminum plating process may facilitate the use of materials such as Copper, Beryllium-Aluminum, AlSiC (Aluminum Silicon Carbide) and other materials that are difficult or impossible to anodize repeatedly. By plating these materials with aluminum, fabricators can now anodize the surface of the parts - giving them a black (*or any other color - black is common because of its absorption and emissivity properties*), wear resistant surface. AlumiPlate aluminum is a very high purity, amorphous aluminum coating which anodizes very uniformly over any substrate. One large defense electronics manufacturer specifies copper heat sinks, plated with AlumiPlate aluminum, and anodized to provide a *dielectric* surface.

A new organization to promote the uses and manufacturability of aluminum metal matrix composites is in its first and formative year. The **ALMMCC (Aluminum Metal Matrix Composite Consortium)** is currently made up of over 12 member organizations from the electronics, materials and aerospace industries as well as government. The group has looked at over 13 technical issues surrounding the producibility and increased use of Al-based MMC's and has placed its initial focus on machining, deformation processing and castability of the new and future Al MMC's.

## Critical Fasteners

**Aluminum plated steel fasteners eliminate galvanic corrosion on Magnesium (Mg) components.** Throughout the aerospace and automotive industries there is an increased push for lighter weight vehicles and **Critical Fasteners (continued)**

the increased use of materials such as Magnesium (Mg) for components such as transfer

cases, gear boxes and others. One of the main problems with the use of magnesium for these components has been the susceptibility of the magnesium to weaken from corrosion - especially galvanic corrosion caused by dissimilar metal (e.g., steel) fasteners. The best way to prevent this galvanic corrosion of magnesium

**As one engineer put it, "The magnesium components do a very good job of sacrificially protecting the steel fasteners".**

caused by ferrous fasteners is to coat those fasteners with a thin, corrosion resistant metallic layer that will not flake or peel and that is nearly as reactive as the Mg that the fasteners are holding together. Testing at one large U.S. automobile manufacturer indicates that **aluminum-plated steel fasteners are the best choice for protecting the Mg parts from galvanic corrosion** caused by proximity of steel components. AlumiPlate aluminum has excellent corrosion resistance properties in chloride (marine applications) and sulfur dioxide-rich atmospheres (e.g.; harsh industrial applications).

**An update on ASTM B-117 Salt Fog tests currently being conducted by a customer: 6,300 hours (and counting) for AlumiPlate™ aluminum plated and chromated bolts.**

AlumiPlate aluminum's corrosion resistance is attained without the introduction of embrittlement. Hydrogen embrittlement concerns are eliminated since no free hydrogen is generated during the non-aqueous AlumiPlate aluminum plating.

## Speaking of Springs...



Aluminum plated steel springs of several kinds are shown - small and large Bellevilles, snap rings as well as several different sizes and shapes of compression springs. Some are chromate conversion coated for additional corrosion protection.

## The AlumiPlate Lair

Business at AlumiPlate, Inc. has been progressing well over the last quarter. Sales, once again reached record levels. The number of customers has increased and repeat business from a good number of them indicates their continuing interest in designing AlumiPlate aluminum into their products. Our

plated aluminum coating is now included in specifications or drawings at nearly a dozen Fortune 500 companies.

More progress has also been made in the operations of the business. Our AlumiPlate Quality System, modeled after ISO 9000, has been audited by four more customers. Internally, we have installed and are in the process of implementing a computer local area network (LAN) and a state-of-the-art order management system.

We have not yet officially begun our efforts to obtain additional financing but will be doing so within the next six months.

## New AlumiPlaters

It has always been our philosophy that great people are the key to any business. The Company now employs 13 people with whom we are all proud to be associated. We are pleased to introduce our latest addition:

**Dr. Juergen Fischer - Consultant.** Dr. Fischer holds a Ph.D. in physical chemistry and chemical technology and joins us from Germany where he assisted in the development of the aluminum plating process at Siemens, the company from which AlumiPlate purchased the technology in 1995. Juergen's 11+ years of experience in the aluminum plating technology is invaluable to AlumiPlate as we scale up our operations.

**Gary Rolek - Consultant.** Gary has a masters degree in developmental psychology. His experience includes human resource and operations leadership and he has served as VP Human Resources at Sanborn Mfg, a \$100 million manufacturing company. Gary serves as an "on-call, as needed" human resources support person for AlumiPlate, Inc.

## Recent Shinings

AlumiPlate has attended, exhibited or delivered technical presentations at these shows in the past few months:

**NACE Corrosion '97** - AlumiPlate exhibited at the Nat. Association of Corrosion Engrs. annual show.

**ISHM** Lonnie Brown, AlumiPlate's president, attended the Internatl Soc. of Hybrid Microelectronics in Birmingham, England, UK.

**CASMI Presentation** - Gus Vallejo (AlumiPlate's inside sales manager) spoke at the meeting of the Chicago Area Spring Mfrs Institute about AlumiPlate aluminum applied on springs.

**Bolting Technology Council** - Bryan Fuhr and Gus Vallejo presented at the BTC Annual Meeting.

**OTC '97** - AlumiPlate attended the Offshore Technology Conference in Houston (along with 60,000 of our closest friends).

**AeroMat '97** - Attended the Aerospace Materials Conference sponsored by ASM, Int'l.

**IFSC 97** - Industrial Fastener Show and Conference- Attended this very important annual show for the Critical Service Fastener industry.

**Alumitech '97** - AlumiPlate attended the Aluminum Association's triennial show and conference in Atlanta.

## Upcoming Events

**SPIE '97 - July 27-31, '97** - AlumiPlate will be exhibiting at the Society of Photo-

electronic Instrumentation Engr's annual optics show and conference in San Diego.

**ASPE '97 - Oct 5-7, '97** - AlumiPlate will attend the Am. Soc. of Precision Engr. Annual meeting and conference.

**OSA '97 - Oct. '97** - AlumiPlate will attend the Optical Society of America's annual optics conference in Long Beach, CA.

## Final Rinse

Immerse yourself in [our new web page](http://www.AlumiPlate.com) at

<http://www.AlumiPlate.com>

Available July, '97

## Featured Feature...

# Diamond Machinability

How does 20 - 40 Å RMS right off a diamond turning machine sound?

AlumiPlate™ electrodeposited aluminum provides excellent diamond machinability. The high purity of the AlumiPlate aluminum means that the aluminum layer shows no intermetallics that can cause comet tails and pitting found in diamond machining of A6061-T6 or other aluminum alloys. The achievable results on any of the high end diamond turning systems exceed the results from diamond machining of electroless nickel.

## Achievable Surface Finish

From Single Point Diamond Machining

AlumiPlate Aluminum	A6061-T6 Aluminum	Electroless Ni
20 - 40 Å (Angstroms) rms	50 - 90 Å rms	50 - 70 Å rms

This result was reported recently by a customer evaluating diamond turning of AlumiPlate™ high purity aluminum plated metal mirrors.



For more information please contact us:

## AlumiPlate, Inc.

Plating With Aluminum  
8960 Springbrook Drive  
Minneapolis, MN 55433

Phone 612.786.3788

Fax 612.786.8518

Toll Free - 1.888.ALUMIPLATE  
email: Sales@AlumiPlate.com

Visit our web page - [www.AlumiPlate.com](http://www.AlumiPlate.com)