Composites à matrice métallique - plateforme d'innovation

7 juin 2012
Del West is the specialist for racing valvetrain systems
Del West offers a one-stop shop for advanced mechanical systems

Design and manufacture of complex mechanical components and sub-assemblies, combining advanced materials, innovative coatings and precision machining

Product Development → Manufacturing → Coatings → Assembly

State of the art quality service ensuring full traceability
• Del West in a nutshell

• Innovating with Metal Matrix Composites
Definition: A metal matrix composite (MMC) is composite material with at least two constituent parts, one being a metal. The other component may be a ceramic or an organic compound.

Typical Matrices: Aluminum, Magnesium, Cobalt

Most common reinforcement: Silicon Carbide, Alumina, Boron Carbide

Metal Matrix: Aluminum

Ceramic Reinforcement: Alumina ($\text{Al}_2\text{O}_3$)
Our proposition: a one-stop shop for MMC based components

- Sister company of Del West founded in 2008
- **Products:**
  - a new class of ceramic reinforced aluminum metal matrix composites (AlMMC) by using a new reinforcement that consists of proprietary\(^1\) micron size spheres of Al\(_2\)O\(_3\)  
  - Reinforcement: from 5% to 25% of alumina particles  
- vertically integrated for the production of Al MMC ingots
- **Differentiation:**
  - powder metallurgical processing permits the creation of matrix alloy compositions that can't be obtained by conventional melting practice  
  - employment of ceramic spheres in the composite allows this class of materials to be machined with conventional shop carbide tools
- **Offer for MMC products:**
  - A single entry point for customers  
  - Product design & testing  
  - Component machining & coating using gamma technology MMCs

\(^1\) Note: patent pending
Process: Powder Metallurgy Manufacturing

- Spherical Alumina
- Aluminum Powder
- Alloy Constituents

1. Inspection of Raw Materials
2. Blend Raw Materials
3. Compact Blend
4. Vacuum-Hot-Press Billet
5. Conventional Metalworking (extrusion, forging)
Key benefits of MMCs: Improved mechanical properties

**Specific Modulus** [Modulus / Density]

**Specific strength** [Yield / Density]

Other benefits:
- High Fatigue Resistance
- Controlled Expansion Coefficient
- High Wear Resistance
Machining the Gamma Technologies alloys is affordable

![Machinability comparison graph]

- SiC reinforced alloys
- Gamma Tech. alloys

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## MMC: applications

### Current applications

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<thead>
<tr>
<th>Aerospace</th>
<th>Medtech &amp; Watch making</th>
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<tbody>
<tr>
<td>F 16 structural components</td>
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### Racing

<table>
<thead>
<tr>
<th>Chassis: Uprights</th>
<th>Watch making</th>
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<tbody>
<tr>
<td>Engine: Retainers</td>
<td>• Casing components</td>
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<tr>
<td></td>
<td>• Movement parts where low inertia and high stiffness are key</td>
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### Medtech

- Structural external prostheses
- Ancillary components