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Marinvent Background

- Privately-held Canadian Corp.
- Organically funded business since 1983
- Two distinct revenue streams serving two different sets of customers
- Research and Development, IP generation and IP exploitation
- Stellar track record of success (Many awards)
- Certification-related services of all kinds.
- +50 successful certification programs with TCCA and FAA
- CGP and AS9100
Management Team

DR. JOHN MARIS
President & Owner

MR. PHIL COLE
Vice President Business Development

MR. SAM GRAINGER
Vice President Operations
## Awards

<table>
<thead>
<tr>
<th>Award</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canadian American Business Achievement Award</strong></td>
<td>Awarded for leading a joint enterprise demonstrating strong business growth, remarkable innovation, noteworthy contributions to local communities and the capacity to provide their partners with a global advantage.</td>
</tr>
<tr>
<td><strong>Canadian Aeronautics &amp; Space Institute: Trans Canada (McKee) Trophy</strong></td>
<td>Canada’s oldest and most prestigious aeronautical trophy awarded to Marinvent for the Canadian whose achievements were most outstanding in promoting aviation in Canada.</td>
</tr>
<tr>
<td><strong>Aviation Week &amp; Space Technology Laureate</strong></td>
<td>Awarded for &quot;...helping to transition from paper in the cockpit to a digital flight deck.&quot;</td>
</tr>
<tr>
<td><strong>Canadian Business Aviation Association Industry Award</strong></td>
<td>Outstanding contribution to aviation.</td>
</tr>
<tr>
<td><strong>Aerospace Association of Quebec (AQA) Prix de l’Entreprise</strong></td>
<td>Aerospace company of the year</td>
</tr>
<tr>
<td><strong>Canadian Business Aviation Association Industry Award</strong></td>
<td>Awarded for the safety gains achieved through human factors enhancements, systems engineering and flight test services.</td>
</tr>
<tr>
<td><strong>Create the Future Award</strong></td>
<td>APM product winner</td>
</tr>
<tr>
<td><strong>New Zealand Ministry of Defense Award of Excellence to Industry</strong></td>
<td>Marinvent singled out as one of the two most valuable contractors from a pool of more than 800 contractors for contributions to C-130 LEP and P-3K capital programs.</td>
</tr>
<tr>
<td><strong>AIAC James C Floyd Award</strong></td>
<td>Aerospace company of the year</td>
</tr>
<tr>
<td><strong>C2-MTL Annual Aerospace Award</strong></td>
<td>Marinvent’s work on unmanned aerial systems flight test and evaluation with its Piaggio Avanti project singled out as aerospace innovation of the year.</td>
</tr>
<tr>
<td><strong>NASA</strong></td>
<td>Small Business Subcontractor of the Year (TASAR)</td>
</tr>
<tr>
<td><strong>NASA</strong></td>
<td>LaRC 2014 Group Achievement Award</td>
</tr>
<tr>
<td><strong>Canadian Defense Executive of the Year</strong></td>
<td>Dr. John Maris</td>
</tr>
<tr>
<td><strong>Canadian Aviation Hall of Fame</strong></td>
<td>Dr. Maris Inducted</td>
</tr>
<tr>
<td><strong>Canadian Defense Review</strong></td>
<td>Canadian Top 50 Defense Companies 2015 - 2020</td>
</tr>
</tbody>
</table>
Marinvent IP R&D Strategy

- Market Pull Investment
- Marinvent Investment
- Collaborative Investment
## Marinvent Existing IP – Bell Relevance

<table>
<thead>
<tr>
<th>Existing IP</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesis™ - tools for planning, optimization and management of certification and compliance programs</td>
<td>All programs</td>
</tr>
<tr>
<td>APM – Airfoil Performance Monitor</td>
<td>Fixed wing, rotary wing and UAS programs</td>
</tr>
<tr>
<td>DNLD – Dynamic Non-Linear Display</td>
<td>Display products</td>
</tr>
<tr>
<td>Reticle – Tactical Displays</td>
<td>ISR products</td>
</tr>
<tr>
<td>Sensor Fusion – Sensor Arrays</td>
<td>Target detection and tracking products</td>
</tr>
<tr>
<td><strong>Focus for Today</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Early stage R&amp;D</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed Simulation Network</td>
<td>HLA-Based integration of simulated and real vehicles remotely</td>
</tr>
<tr>
<td>Low cost software FMS</td>
<td>Primarily for UAS applications</td>
</tr>
<tr>
<td>Prototype sense and avoid algorithms</td>
<td>UAS and AAM Applications</td>
</tr>
<tr>
<td>Route Optimization and Planning Algorithms</td>
<td>AAM Applications</td>
</tr>
<tr>
<td><strong>Focus for UAS/AAM</strong></td>
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</tbody>
</table>
APM Overview
Airfoil Performance Monitor (APM)

- Worldwide Patented Technology, wholly Canadian
- Provides realtime margin to stall for any airfoil under any conditions and throughout the flight envelope
- Eliminates UAS loss as a result of icing or other airfoil contamination
- Works for wings and tails (including v-tails)
- Works with existing de-icing systems to reduce power consumption and use (extends range and payload)
- Already being tested on UAS from major vendor
- Potential to significantly improve mission survivability in all climates
- Already delivered in both manned and unmaned projects
- Particularly pertinent to Canadian DND (RPAS, RCN-ISTAR, AAM & complex aerodynamics applications)
- Very high CCV
What is APM

- Existing Angle-Of-Attack (AOA) and ice detector technologies allow numerous aircraft accidents due to iced or contaminated airfoils.
- Marinvent’s Patented APM is an airflow monitoring technology that accurately assesses the “stress” on an airfoil at the airfoil surface itself by measuring the airflow turbulence intensity, which directly correlates to the airfoil’s proximity to stall.

- The APM system is the only system that measures the state of the airflow over any airfoil surface in all phases of flight and in all weather conditions.
- APM tells the pilot or avionics systems the margin remaining to the stall for that airfoil even when it is iced, contaminated or degraded.
APM Features

• APM directly measures aerodynamic performance at the source
  – The lifting surface of the airfoil (wing, tail, etc.)
• Measures airflow turbulence intensity (“R”) resulting from boundary layer tripping / separation
• Provides aircrew, UAS operators, de-icing systems and avionics systems with vital information that is currently not available to them
• Provides margin to stalls that occur for any reason
  – Exceeding stall angle of attack
  – Contamination at leading edge or lifting surface
  – Mach buffet

Contaminated wing stalls at lower AoA than a clean wing

APM allows pilot to see impending stall and effect recovery
APM Features

- Shows location of stall so pilot can take the appropriate action to recover
  - Allows critical decisions to be made fast that can significantly improve safety & survivability
- Allows the vehicle to be flown in most efficient manner at all times and under all contamination / weather conditions
  - By “flying close to R”
- Allows for optimization of use of anti-ice and de-icing systems
  - Use only when actually necessary
  - Clear indication of when ice has been removed
APM Benefits

- APM provides critical, real time, information to allow aircrew and UAS operators to make the best stall recovery decisions and to avoid accidents:
  - Advanced warning of impending stall conditions
  - Useful information about the actual contamination conditions at the airfoil surfaces

- Leads directly to increased safety & survivability in all weather conditions and throughout the flight envelope
  - Has the potential to almost eliminate these types of accidents/losses by providing significantly earlier warning

Works throughout the flight envelope
APM Recent Results & Applicability

- NRC-BCIP Program (Now Completed)
  - Wind Tunnel and Flight Tests
- Most Recent Icing Wind Tunnel Tests on MALE UAS
- Flight Tests on that UAS due imminently
- What have we discovered so far re: use with de-icing system

- Applicability to:
  - RPAS
  - RCN ISTAR and any other CAF UAS platform
  - All RCAF platforms
  - All unmanned platforms

- Uses:
  - Extended safe use in adverse weather
  - Extended range and payload
  - Maintenance and fuel use optimization
  - Realtime R measurement for complex aerodynamic shapes on all air vehicles
APM Availability

- Several different versions available, depending on use case
  - Wired/Wireless
  - Heated/Unheated
  - Including Accelerometer/No Accelerometer
  - Certified/Testing only
  - Range of sizes (depends on airfoil type)
  - Integrates with avionics/Own display
Video
MR. ALISTAIR CHAPMAN
Marketing Director
Alistair.chapman@marinvent.com