COMPARATIVE VACUUM MONITORING (CVM™) TECHNOLOGY

STRUCTURAL MONITORING SYSTEMS

ASX: SMN

CVM™ is a tested and proven technology for in-situ, real time monitoring of metal fatigue and structural faults in metal and composite materials in wide range of industries including aviation, civil infrastructure, transportation, defense and construction.
1. CORPORATE

2. FINANCE

3. CVM™ APPLICATIONS

4. MANUFACTURING AND ENGINEERING

5. COMMERCIAL ACTIVITIES AND PROGRAMS

6. STRATEGIC OUTLOOK

7. DIRECTORY
History shows a need for accurate, reliable, in-situ monitoring of the structural integrity of airplanes, bridges, pipelines and buildings.

The traditional testing for evaluating the condition of structures has been static and retrospective, using hand-held tools enacted on tested materials. These techniques fall into two broad categories: Condition Monitoring (CM) and Non Destructive Testing (NDT).

Once tested, the structure is assumed to be safe until the next inspection. However, much can occur to the structure before the next test.

Aside from this uncertainty, manual testing is a continuous, re-occurring, labor intensive procedure that is subject to human error and misinterpretation.

Early techniques developed to assist manual inspection included magnetic testing and dye penetration. These techniques were focused on surface defects only. Subsequent techniques such as x-rays, eddy currents, and ultrasonics could detect internal flaws in materials.

The need to be continuously monitoring structures became known as Structural Health Monitoring (SHM), and it is in this category that SMS’s Comparative Vacuum Monitoring (CVM™) technology is the forerunner.

In 1999, Structural Monitoring Systems Ltd (SMS) became owner of CVM™ and began operations in Perth, Western Australia to develop and commercialize the technology.


The aviation industry was seen as the perfect application for the CVM™. In the past ten years, SMS has undertaken multiple programs to gain certification for the use of CVM™ as an accepted method of carrying out periodic and continual maintenance.
OVER 20 PATENTS HELD GLOBALLY. JURISDICTIONS INCLUDE THE USA, EU, CHINA AND BRAZIL, PROTECTING ALL ASPECTS AND COMPONENTS OF CVM™

OVER 20 PATENTS PENDING ON NEW INVENTIONS

COMMITMENT TO AGGRESSIVELY DEFEND EXISTING PATENTS, IF APPLICABLE, AND PURSUE NEW INVENTIONS
2008 – First ever-trial production installation on Boeing aircraft structure in association with Boeing, FAA and airline representatives.

2008 – Airbus accepts CVM™ as “Technology Ready” for inclusion in its commercial aircraft maintenance programs, and present CVM™ to Airbus operator’s structural engineering group.

2008 – Bombardier recognizes CVM™ as having role in reducing their aircraft’s maintenance costs.

2008 – Large-scale installation of CVM™ sensors on 3 Embraer Full Scale Fatigue Test aircraft rigs.


2010 – Development and supply of CVM™ sensors and periodic PM200 to Embraer for flight test and evaluation.

2010 – Delivery of first in-flight monitoring system to Embraer S.A.

2011 – New management begins optimizing company’s operations.

2012 - Operations moved to North America and new manufacturing partnership formed with Anodyne Electronics Manufacturing Corp (“AEM”).

2013 – Second in-flight program commenced with Embraer—utilizing sensors on E-Jet series aircraft, with support and technical assistance provided by Sandia.

2014 – Commencement of joint Sandia/Delta Airlines/Boeing program to test CVM™ on Delta operated Boeing 737-NG aircraft, paving the way to FAA approval of technology for use in commercial aircraft.

2014 – SMS and AEM undergo in-depth facility evaluation and audit by a major global aviation OEM to approve SMS as a Preferred Supplier.

2015 – SMS begins process of formalizing key strategic Agreements with Testia GmbH and Sikorsky Aircraft.

2015 – SMS successfully completes all phases of the joint Sandia/Delta/Boeing commercial in-flight program. Pivotal approval meeting with FAA and Boeing scheduled for Dec-2015.
**CORPORATE: MILESTONES**

- **2016** – Sikorsky Helicopter Programme testing was completed very successfully, and the sensors clearly exceeded the requirements for the probability of detection measurements for the chosen Sikorsky test application.

- **2016** – SMS confirmed the completion of 10 successful installs in the NLR/Apache AH-64 attack Military Helicopter In-flight Pilot Programme.

- **2016** – SMS, Sandia and Embraer have collaborated to select representative “hotspot” applications on multiple aircraft types. Currently, three far-reaching, generalised CVM™ Service Bulletin (“SB”) revisions have been written for entire aircraft regions.

- **2016** – SMS raised $3.7 million through the placement of 2.6 million shares at $1.40 per share to a leading Australian hedge fund with over $1bn under management. This sees SMS fully funded relative to its foreseeable total cash flow requirements for 2016/17.
FINANCE
Year-over-year Stock Performance

Source: ASX. Data as of 20 September 2016.

KEY FIGURES

ASX Ticker: SMN
Shares on Issue: 101,871,470
Market Cap.: $270mm
Price: $2.65

Data as of 20 September 2016.
**Closely Held Shareholder Base:**

- Top 5 shareholders own 40% of outstanding shares;
- Top 10 shareholders own 50% of outstanding shares;
- Top 20 shareholders own 54% of outstanding shares;
- Directors, management and close strategic partners of the Board own over 50% of outstanding shares.

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<td>Total Remaining Holders Balance</td>
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Data as of 31 August 2016
FINANCE: CASH BURN

Annual Static Cash Expenditures

AUD$ In millions

Net Operating Cash Flow and Static Cash Expenditures as Percentage of Market Cap

- **Net Operating Cash Flow**
- **Static Cash Expenditures**

Years: 2006 to 2015

Values: %
FAA MANDATED AD’S TARGETTING METAL “CRACKING”

NOTE: 1- US MARKET ONLY
2- DOES NOT INCLUDE SERVICE BULLETINS (SB) ISSUED BY OEM’S
3- DOES NOT INCLUDE AD’S OR SB’S FOR COMPOSITE MATERIALS
NUMBER OF AD’S FOR METAL “CRACKING” ON SELECTED BOEING AND AIRBUS AIRCRAFT

NOTE:  
1- US MARKET ONLY  
2- DOES NOT INCLUDE SERVICE BULLETINS ISSUED BY OEM’S  
3- DOES NOT INCLUDE ADs OR SERVICE BULLETINS FOR COMPOSITE MATERIALS
REVENUE MODEL

- **FIXED ANNUAL ROYALTY AGREEMENT**
  - UNLIMITED USE OF CVM SENSORS ON ALL AIRCRAFT

- **VARIABLE ANNUAL ROYALTY AGREEMENT**
  - LARGE AND/OR SMALL OPERATORS
  - CVM SOLUTION FOR INDIVIDUAL AD’S AND SERVICE BULLETINS
  - AMOC DRIVEN CVM SOLUTION
    - CAPTURE A PERCENTAGE (10-15%) OF BOTH THE COST OF INSPECTION AND LOST REVENUE

- **OEM MODEL**
  - CVM BUILT INTO NEW AIRCRAFT
  - FIXED AND/OR VARIABLE “ANNUITY” MODEL
CVM™ APPLICATIONS
SMS has well established technical relationships with the world’s largest aircraft manufactures and a number of air forces that understand the CVM™ value proposition and have defined requirements for its use as a substitute for traditional manual structural integrity inspections.

The company is the “First Mover” in aerospace structural monitoring, a market with high margins and high barriers to entry. Competing technologies are being developed, but to date, they have not been as effective or robust as CVM™.

There are significant growth opportunities for the Company’s periodic monitoring system, the PM200, and associated in-situ CVM™ sensors, particularly in the world’s aging military fixed and rotary wing aircraft fleets.

Major aerospace companies regard CVM™ as an important ‘enabling technology’ for the optimization of the structural design of future aircraft. This will lead to opportunities to negotiate license agreements with aircraft and avionics suppliers for the integration of CVM™ sensor and instrumentation into future aircrafts’ structural health monitoring systems.

*Full Scale Airbus A380 Test Program incorporating CVM™*
Worldwide, there are approximately 30,000 commercial aircraft in operation. SMS has concentrated on developing specific CVM™ applications to reduce service costs and downtime in civil and military aircraft maintenance.

The primary, but not only, target sectors for retrofit of CVM™ applications is medium to large fleets of aging (over 15 years old), high-cycle/short-haul, single-aisle aircraft.

The average age of US commercial aircraft is 14-years and US military aircraft is 16-years.

The world’s air fleet is aging

The aging US commercial and military fleet are considered a major issue. In May 2008, the Federal Aviation Administration (“FAA”) expressed concern about maintenance standards for the US commercial fleet and is considering increasing the number of FAA inspectors. This problem is still relevant today.

SMS’s primary objective has been to have CVM™ approved as an alternative means of inspecting aircraft for structural faults. And SMS has invested considerable resources to meet the extensive evaluation, testing and accreditation requirements set out by regulatory bodies.

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<th>NUMBER OF</th>
<th>AIRCRAFT</th>
<th>AGE 10+YEARS</th>
<th>AGE 20+YEARS</th>
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<td>MAJOR US AIRLINES</td>
<td>3,696</td>
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<td>US AIR FORCE</td>
<td>4,421</td>
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Trials, Installations, Sales

- RAAF
- RAF
- Chinese Air Force
- Israeli Air Force
- US Army, Marines, USAF, USN
- Netherlands Air Force
- Polish Air Force
- South African Air Force
- Finish Air Force
- Singaporean Air Force
MANUFACTURING AND ENGINEERING
In 2012, SMS partnered with Anodyne Electronics Manufacturing Corp. (“AEM”), based out of Kelowna, Canada, whereby AEM acts as SMS’s key operational division, bearing the exclusive responsibility for manufacturing, engineering, calibrating and repairing SMS’s products.

AEM Corp commenced operations in the fall of 2009, when Northern Airborne Technology (NAT, now part of Cobham) elected to close manufacturing operations in Canada, creating an opportunity for a new, 100% privately held company to emerge.

On initial start-up, AEM Corp commenced with an demonstrable amount of skill, experience and capability for turning customer's concepts into world-class products.

AEM Corp is vertically integrated, providing maximum oversight on quality and delivery commitments, with a management team that brings more than 150 years of manufacturing and avionics experience to the company.
MANUFACTURING AND ENGINEERING: AEM EXECUTIVES

- **Dave Veitch**
  *President and Principal Shareholder*
  25 years experience with NAT, various roles, cumulating as Vice President of Production.

- **Ray Lewis**
  *VP Business Development and Minority Shareholder*
  26 years experience with NAT/Cobham, various roles, cumulating as Director International Business Development.

- **Trevor Lynch-Staunton P.Eng.**
  *SMS Project Manager*
  16 years experience in High Tech product development, with numerous TC, FAA, and FCC compliance projects.
- Transport Canada Approved Manufacturer and Maintenance Organization.
- EASA Part 145 European Maintenance Approval.
- ISO9001/AS9100C registered.
- Facility has expanded to 32,000 sq ft. (3,000 sq metres).

- AEM Corp has 700+ Dealers worldwide, providing sales, service and installation of AEM products.

- Distributor network provides easy access-to and delivery-of AEM products.

- Agent/Representative network find and assist with business opportunities in new territories.
AEM R&D Staff

- 16 Designers and CAD personnel, many of whom have 15 years + of direct avionics experience.

SMS dedicated staff

- Trevor Lynch-Staunton, **Project Manager**
- Henry Kroker, **Senior Designer** (re-located from SMS Australia)
  - 10 years working on CVM technology
- Brian Shaigec, **Designer**
- Darin Ingram, **Laboratory Technician**
Custom laminated FEP CVM™ sensors are designed and manufactured by AEM Corp.
Periodic testing and real time lab testing equipment
MANUFACTURING AND ENGINEERING: 
CVM™ SENSOR EVOLUTION, CONT’D

- New tubing interface.
- Machined Header
- Robust attachment

- Environmentally tested
- Improved reliability
MANUFACTURING AND ENGINEERING:  
CVM™ FUTURE DEVELOPMENTS

- Re-design of PM200 periodic monitoring instrument.
- Scaling of sensor production to accommodate demand.
- Improve bonding methods in sensor manufacturing.
- Reduce installation time and complexity with new connectors and installation methods.
• Functional and environmental testing was conducted in R&D to determine robustness of circular pneumatic connectors
• Knurling has been removed from back-shell. This will reduce unintentional damage
• Previously hand built, heat shrunk, tubing bundles are now twisted by machine and the outer jacket extruded, creating a strong shield.
• Monolithic Sensor manufacturing method is being developed in association with local university and a national adhesive specialist group.
• This new method will allow for a clean manufacturing process, along with a scaleable, higher throughput.
• New master molds could be generated within hours to provide custom sensor designs.
• Based on current carbon fiber vacuum bagging methods.
### DO-160G Environmental

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MANUFACTURING AND ENGINEERING: QUALIFICATION PROCEDURES, CONT’D

FUNCTIONAL AND ENVIRONMENTAL
COMMERCIAL ACTIVITIES AND PROGRAMS
• Overseen by FAA’s Airworthiness Assurance Center at Sandia National Laboratories

• Program will formally pave the path to mainstream commercial acceptance and adoption of CVM™

• CVM™ being tested on multiple Boeing 737-NG aircraft operated by Delta Airlines. Other programs on fixed-wing and rotor-craft will follow in the near future

• Upon Program’s completion, SMS will formally achieve regulatory approval for CVM™ installation on all commercial aircraft operating in the United States and regulated by the FAA
COMMERCIAL ACTIVITIES AND PROGRAMS: DELTA TEST PROGRAM, CONT’D

- Installations on seven Boeing 737-700/800 series aircraft have been completed.

- 10 Wing Box fittings monitored per aircraft for a total of 70 sensors installed in this program.
COMMERCIAL ACTIVITIES AND PROGRAMS:
DELTA TEST PROGRAM, CONT’D

- Monitoring of sensors is now in the third, and potentially final, round.
- FAA was on site and witnessed the installation phase, and provided oversight for the program.
- Future milestones are FAA Type Certificate and acceptance as an AMOC for the 737-NG. Following this milestone, SMS will have the capability to be granted multiple AMOCs on multiple aircraft types in the future.
STRATEGIC OUTLOOK
• Position SMS as an “IP Silo” that owns and controls multiple multi-jurisdiction patents that demonstrate real tangible value.
• Continue to aggressively maintain optimal operational discipline and operate the Company with minimum fixed overhead until SMS is sustainably revenue positive.
• Recognize and exploit the commercial opportunities in civil and military aerospace, and, simultaneously, pursue multiple opportunities in other industries:
  • Operators:
    • establish multiple STCs and AMOCs;
    • design and implement licensing agreements permitting full use of CVM™ technology via extension of licensing rights etc.
  • OEMs:
    • enter into supplier agreements to fit/retrofit CVM™ to fixed wing and rotorcraft aircraft types with identified “hot spot” issues.
  • Major non-OEMs:
    • enter into Tier 1 supplier relationships;
    • outsource marketing and distribution of CVM into other industry sectors.
    • outsource full engineering/manufacturing of all CVM components at appropriate juncture.
DIRECTORY
DIRECTORY: EXECUTIVE PERSONNEL

Toby Chandler
Managing Director
1999 Avenue Of the Stars Suite 1100
Century City, CA 90067
United States
Tel: +1 424 253 1277

Michael Reveley
COO/CFO, Director

Dave Veitch
Non Executive Director
#15-1925 Kirschner Road
Kelowna, BC V1Y 4N7
Canada
Tel: +1 250 763 1088

Sam Wright
Company Secretary
Suite 39, 1 Freshwater Parade
Claremont WA 6010
Australia
Tel: +61 8 6364 0899

Andrew Chilcott
Non Executive Director
Toby Chandler
Managing Director | Perth/Los Angeles

Toby Chandler is the SMS's Managing Director, and oversees the Company's global strategy and business development efforts. He is also charged with optimizing the Company's financing, capital and corporate structure requirements.

During his banking career, Mr. Chandler was a Managing Director with Morgan Stanley Inc. in New York, where he ran one of the Bank's specialist hedge fund coverage desks.

Mr. Chandler has also held several other senior bank positions, including Managing Director and Head of Global Fixed Income Distribution at HSBC Securities (USA) NA, New York; Executive Director positions with Morgan Stanley Inc. and Morgan Stanley International plc, London, as head of Emerging Markets and Global Fixed Income Distribution; and Vice President with Citigroup NA, New York and Citigroup Australia.

Michael Reveley
COO/CFO, Exec Director | Los Angeles

Mr. Reveley was a Managing Director of GovDesk, LLC, which provided capital introduction services to small-cap companies. Previously, Mr. Reveley was CEO of SEAL Capital Ltd., a global macro hedge fund. Before forming SEAL Capital, Mr. Reveley was CIO at the private equity and hedge fund firm Seagate Global Advisors.

During his banking career, Mr. Reveley was Director of Syndicate and Derivatives Group at SBC Warburg in London and New York, and vice-president at First Interstate Bank, where he co-managed a $20B derivatives portfolio.

“The opportunity now exists to take the development work achieved by SMS to the next level and to realize the real potential of CVM™”
Dave Veitch
Non Executive Director | Kelowna

Mr. Veitch is President and founder of Anodyne Electronics Manufacturing Corp. AEM Corp designs, manufacturers and markets its own line of aviation communication equipment. It also utilizes its expertise in these areas under contract with several OEMs.

Before founding AEM Corp, he worked with Northern Airborne Technology Ltd., where his career progressed from manufacturing to Operations Manager.

Andrew Chilcott
Non Executive Director | Perth

Mr. Chilcott has an extensive aerospace background, having held engineering and marketing positions at Rolls-Royce Aero-Engines and sales positions with Airbus and Structural Monitoring Systems. Mr. Chilcott was heavily involved in raising international awareness of CVM technology.

Mr. Chilcott earned his BSs in Mechanical Engineering and Energy Studies from Cardiff University.

Sam Wright
Company Secretary | Perth

Mr. Wright has extensive experience in relation to public company responsibilities, including ASX & ASIC compliance, control and implementation of corporate governance, statutory financial reporting and shareholder relations. He is presently Company Secretary for ASX listed companies, PharmAust Limited & Buxton Resources Limited. He is a member of the Australian Institute of Company Directors, the Financial Services Institute of Australia, and the Chartered Secretaries of Australia.