



 **Composite Motors**  
Custom Electric  
Motors &  
Manufacturing Services

**Composite Modules**  
Microelectronics &  
Hermetically Sealed  
Drivers/Devices

**Composite Marine**  
Bilge Pumps

**COMING SOON!**


Locations:  
Brooksville, Florida  
Attleboro, Massachusetts


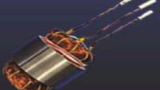
# COMPOSITE MOTORS, INC.

## CORPORATE PRESENTATION



### AS OF

### APRIL 5<sup>TH</sup>, 2023

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## MISSION STATEMENT



**TO BE A PREFERRED SUPPLIER IN THE DESIGN/MANUFACTURE OF CUSTOMIZED PERMANENT MAGNET AC AND DC BRUSHLESS MOTOR ASSEMBLIES, CONTROLLERS AND HERMETIC PACKAGING OF ELECTRONICS FOR HARSH ENVIRONMENTS.**



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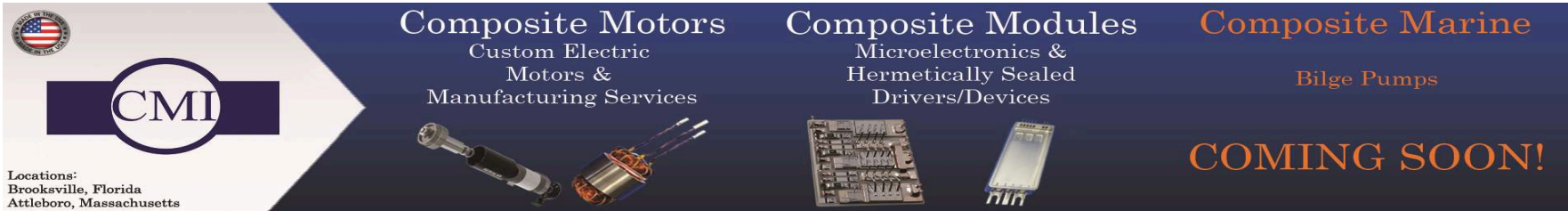
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## VALUE PROPOSITION

**OUR EXTENSIVE IN-HOUSE ENGINEERING AND VERTICALLY INTEGRATED MANUFACTURING CAPABILITIES PROVIDES CUSTOMERS WITH AN END-TO-END SOLUTION THAT INTEGRATES RAPID RESPONSE, COST CONTAINMENT, RELIABILITY AND QUALITY CONTROL TO MEET CRITICAL TIME TO MARKET CHALLENGES.**





## **BUSINESS MODEL**

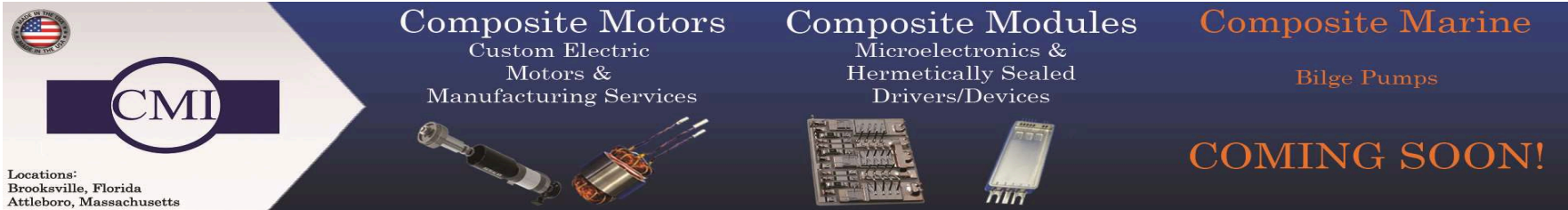
**CMI OFFERS CUSTOMERS THREE DIFFERENT MODELS FOR CUSTOMIZED SUPPORT:**

**1.) BUILD TO PRINT: CMI WILL CONDUCT A COMPREHENSIVE DFM REVIEW REGARDING MANUFACTURABILITY AND INCLUDE RECOMMENDATIONS FROM CONSTRUCTION TO PROCESSES.**

**2.) MODIFIED STANDARD: CMI HAS MULTIPLE PLATFORMS OF STANDARD MOTORS AND CONTROLLERS IN WHICH A CUSTOMER CAN LEVERAGE AND TAYLOR TO THEIR SPECIFIC NEEDS.**

**3.) GROUND UP DESIGN: CMI HAS THE EXPERIENCE AND ENGINEERING CAPABILITIES TO DEVELOP A COMPLETE CUSTOMIZED SOLUTION WHEN REQUIRED TO MEET SPECIFIC FUNCTIONAL PERFORMANCE.**


***“CUSTOM” CAN BE TABOO IN THE ELECTRONICS WORLD, AT CMI IT IS OUR BUSINESS TO ELIMNATE COMPROMISE ON DESIGN AND PERFORMANCE***



## COMPANY HISTORY: 56 YEARS AND COUNTING

- ❑ 1966: COMPANY FOUNDED BY ROBERT “BOB” JONES AS JOBURN TOOL
- ❑ 1976: EXPANDED TO INCLUDE THE COMPOSITE TECHNICAL ALLOYS DIVISION
- ❑ 1981: DEVELOPED HERMETICALLY SEALED ENCLOSURES UTILIZING PATENTED MATERIAL SCHEMES
- ❑ 1991: ACQUIRED CABOT ELECTRONICS TO INCREASE PRODUCT PORTFOLIO WITH HIGH POWERED CERAMIC SUBSTRATES; NAME CHANGE TO COMPOSITE TECHNICAL CERAMICS
- ❑ 2000: INTEGRATED COMPOSITE TECHNICAL CERAMICS AND COMPOSITE TECHNICAL ALLOYS TO COMPOSITE MODULES
- ❑ 2001: COMPOSITE MOTORS ESTABLISHED AND CORPORATE HQ RE-LOCATED TO BROOKSVILLE, FL
- ❑ 2002: FIRST MOTOR/DRIVER SHIPMENT FOR HIGH POWERED SURGICAL DEVICES
- ❑ 2006: ACQUIRED SIMS MACHINE TO AUGMENT VERTICAL INTEGRATION CAPABILITIES
- ❑ 2007: DEVELOPED INITIAL AUTOCLAVABLE BRUSHLESS PMDC MOTOR
- ❑ 2022: INTRODUCED NEW POWER PLANE DESIGN FOR HERMETICALLY PACKAGED CONTROLLERS THAT REPLACES HYBRID MICROELECTRONICS





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## COMPOSITE MOTORS: TODAY

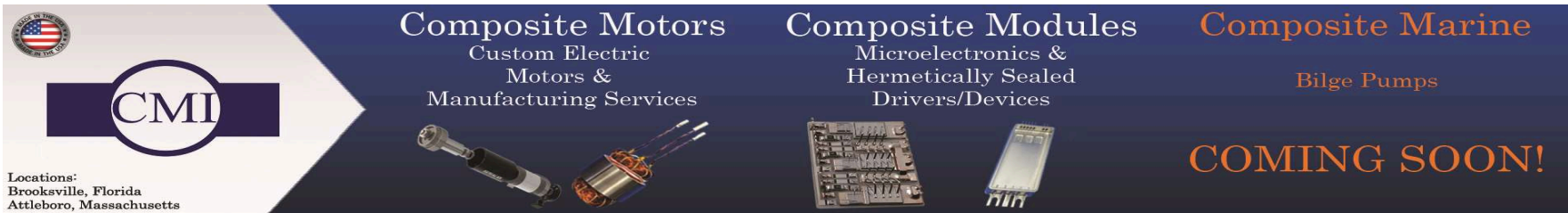
- ❑ 2 LOCATIONS: BROOKSVILLE, FL AND ATTLEBORO, MA
- ❑ 9 TOTAL BUILDINGS (>220,000 SQUARE FEET)
  - BROOKSVILLE: HQ, ENGINEERING AND 7 MANUFACTURING BUILDINGS (MOTORS AND ASSEMBLIES)
  - ATTLEBORO: 1 MANUFACTURING BUILDING (MICROELECTRONICS AND SPECIALTY MATERIALS)
- ❑ 120+ EMPLOYEES
- ❑ ISO9001:2015 CERTIFICATION (EXPIRES IN DEC/2024)

### BROOKSVILLE, FL-HQ



### ATTLEBORO, MA CAMPUS

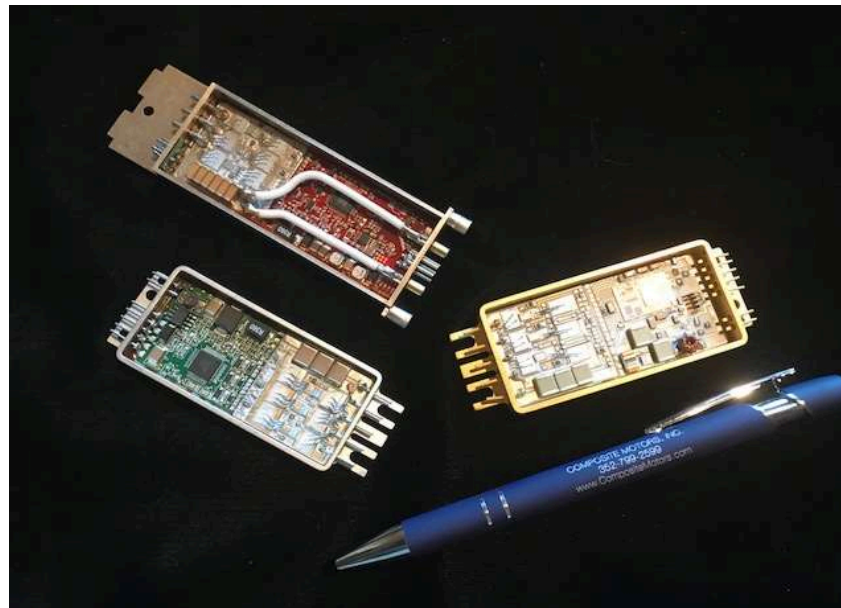





## CAPABILITIES OVERVIEW: HERMETICALLY SEALED MOTOR CONTROLLERS

### DC CONTROLLERS:

- ❖ HERMETICITY/LEAK RATE:  $10^{-7}$   
(MIL-STD 883/METHOD 1014/MODIFIED)
- ❖ SENSORED (TRIGGER AND MOTOR HALLS)
- ❖ NOMINAL VOLTAGE RANGE: 9.0-24.0 VDC
- ❖ CURRENT RANGE: 20A-80A
- ❖ PASSIVELY COOLED
- ❖ COMMUNICATION: MOTOR AND HOST (BATTERY OR CONSOLE)









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## CAPABILITIES OVERVIEW

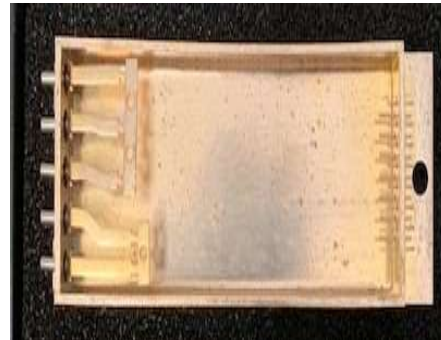
### SPECIALTY MATERIAL PROCESSING: HERMETIC PACKAGING

- ❖ CLADDING
- ❖ BRAZING
- ❖ PLATING-CERAMICS
- ❖ WIRE BONDING
- ❖ SPECIALIZED SUBSTRATES

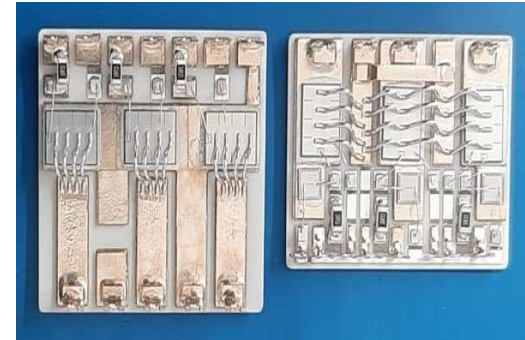
#### CLADDING



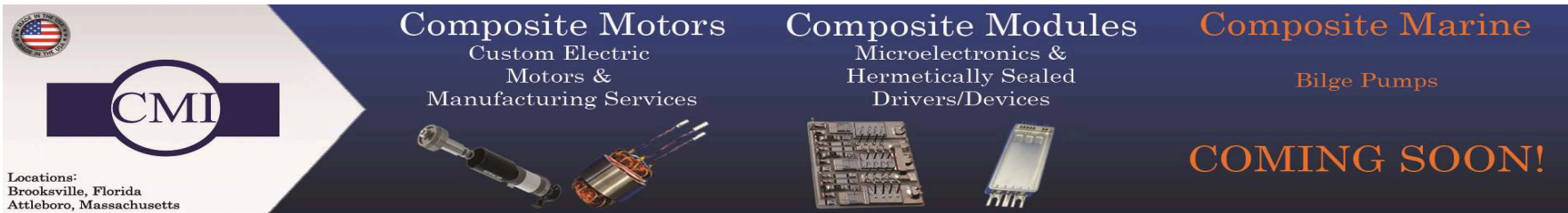
#### BRAZED ENCLOSURE



#### HYBRID MICRO ELECTRONICS: WIRE BONDING/POWER PLANE





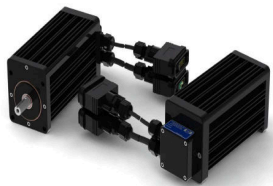


## CAPABILITIES OVERVIEW: ELECTRIC MOTORS

### PERMANENT MAGNET/BRUSHLESS MOTORS (AC AND DC)

- ❖ **AUTOCLAVABLE (SENSORED DESIGN)**
- ❖ **DESIGNED FOR HARSH ENVIRONMENTS: IP/68, HI/LO TEMPERATURE**
- ❖ **HIGH POWER: UP TO 10 K/W**
- ❖ **FRAMELESS AND ENCLOSED**
- ❖ **LARGE SIZES: >8" DIAMETER**
- ❖ **ACCESSORIES: INCLUDES PLANETARY GEARBOXES**

**INTEGRATED PMDC  
MOTOR AND  
GEARBOX (IP/68)**



**OVER-MOLDED  
MOTOR WITH  
INTEGRATED DRIVER  
(IP68)**



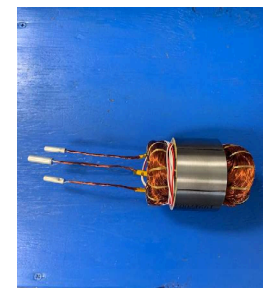
**ROTOR**




**OVER-MOLDED  
MOTOR  
ASSEMBLY**



**FRAMELESS  
MOTOR**





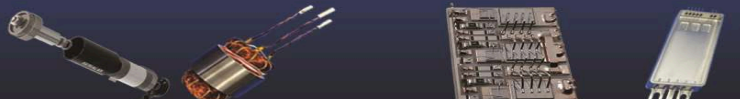
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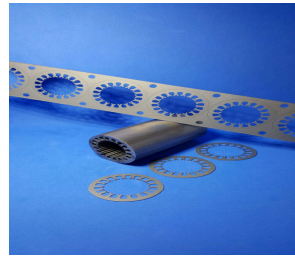


# TRADITIONAL MATERIAL PROCESSING

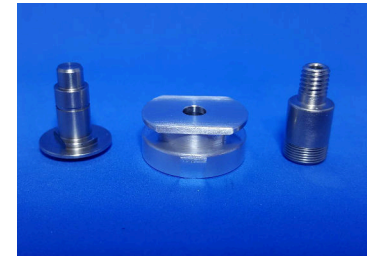
**MILLING  
OPERATION**



**WIRE EDM/  
PROGRESSIVE DIE**



**SCREW MACHINE**



**PLASTICS INJECTION  
MOLDING/OVER MOLD**



**SURFACE MOUNT  
PCBA**





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# CAPABILITIES OVERVIEW

## DESIGN ENGINEERING- PRODUCT DEVELOPMENT TOOLS

### CUSTOM MOTOR DESIGN SOFTWARE

- CAD: SolidWorks
- FEA: SolidWorks Premium
- Simulation: Siemens MotorSolve
  - IM Module
  - BLDC Module
  - DCM Module
  - SRM Module

### CUSTOM CONTROLLER DESIGN

- PCB LAYOUT DESIGN
- PCBA SCHEMATIC DESIGN
- COMPONENT SELECTION
- FIRMWARE
- SOFTWARE

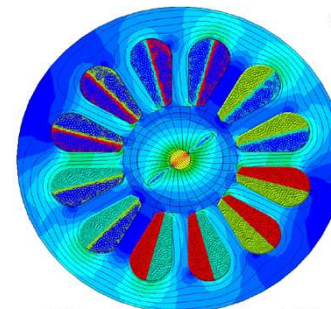
**3D CAD Model of  
DC Brushless Motor**



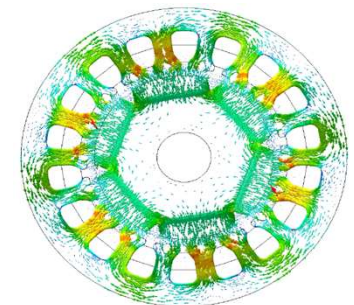
**Simulation:  
Performance Analysis**




**Simulation: Instantaneous  
Contour Fields**



**Simulation:  
Instantaneous Vector  
Fields**







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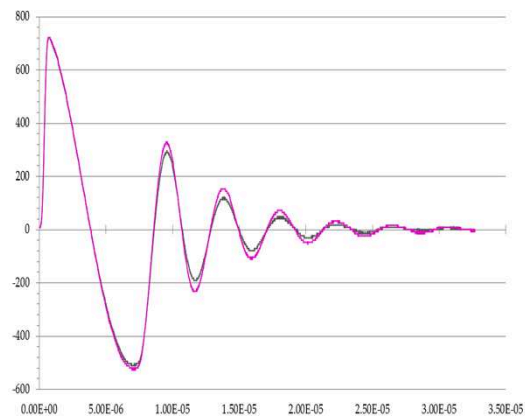
# ENGINEERING DESIGN VERIFICATION TESTING LAB INCLUDING REVERSE ENGINEERING/PERFORMANCE CHARACTERIZATION

- ❖ MOTOR/CONTROLLER FUNCTIONAL TEST
- ❖ CUSTOM DESIGNED DYNO ROOM
- ❖ ACOUSTICS ROOM
- ❖ PROTOTYPE MANUFACTURING

**Prototype Winding  
Equipment**

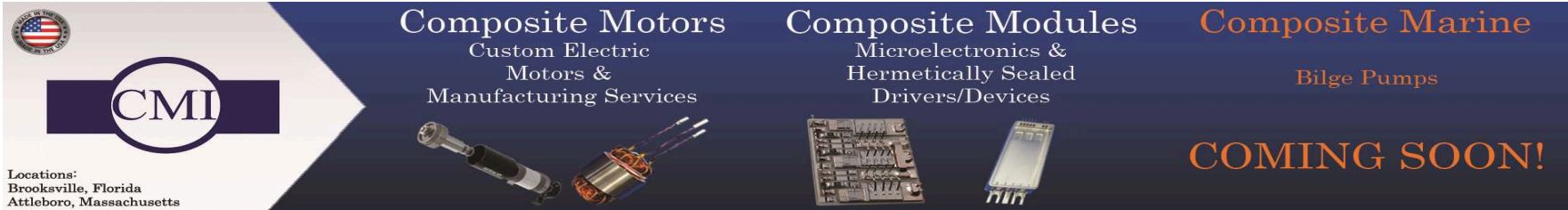


**Waveform Analysis**



**Motor Characterization Test  
Equipment**





## **TECHNOLOGYS AND PATENTS**

### **STATOR**

**6,889,420 METHOD FOR MAKING A STATOR FOR AN ELECTRIC MACHINE**

### **ROTOR**

**7,608,963 CRIMPED ROTOR FOR AN ELECTRIC BRUSHLESS DIRECT CURRENT MOTOR**

### **WINDING**

**8,028,396 AUTOMATIC WIRE WINDING OF INSIDE BRUSHLESS STATOR**

### **COMPOSITE MATERIALS**

**6,538,356 ELECTRIC MACHINE USING COMPOSITE BLADE STRUCTURE**

**CA 2,351,812 ELECTRIC MACHINE USING COMPOSITE BLADE STRUCTURE, CANADA**

**EP 1168574 ELECTRIC MACHINE USING COMPOSITE BLADE STRUCTURE, EUROPE**

**JP 4471538 ELECTRIC MACHINE USING COMPLEX BLADE STRUCTURE , JAPAN**





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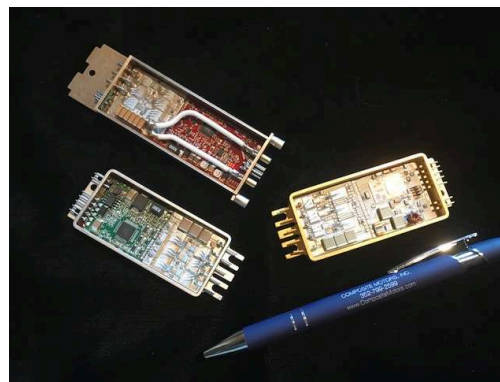
## **MOTION AND CONTROL SOLUTIONS STANDARD PRODUCTS**

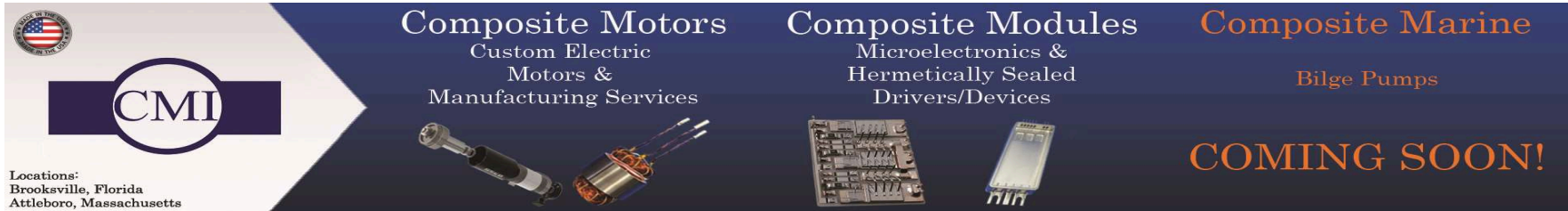
**SOLUTION PLATFORM:**

**CUSTOMIZABLE TO SPECIFIC DESIGN REQUIREMENTS/CONSTRAINTS**

### **1.) MOTOR CONTROLLER: 8112 PLATFORM**

- **HERMETICALLY SEALED: MIL-STD 810/METHOD 1014 (MODIFIED)**
- **OPERATING VOLTAGE RANGE: 8-24VDC**
- **POWER DISSIPATION: 350W**
- **PASSIVELY COOLED**
- **SIZE: 3.5" (L) X 1.25" (W) X 0.40 (H)**
- **REQUIRES SEPARATE TRIGGER HALL ASSEMBLY**





## MOTION AND CONTROL SOLUTIONS STANDARD PRODUCTS

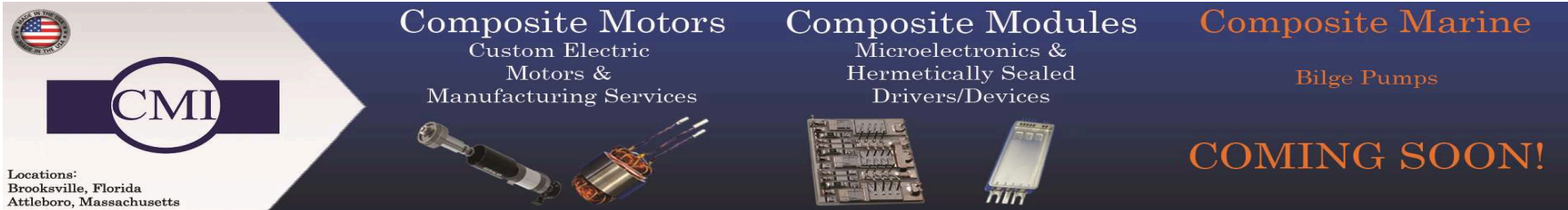
### SOLUTION PLATFORM:

CUSTOMIZABLE TO SPECIFIC DESIGN REQUIREMENTS/CONSTRAINTS

### 2.) DC BRUSHLESS MOTOR: 6090 PLATFORM (SENSORED)

- AUTOCLAVABLE DESIGN
- SIZE: <1.00"-3.00" DIAMETER
- OPERATING VOLTAGE RANGE: 6-24VDC
- RPM: 12,500
- STALL TORQUE: 0.5 N/M
- TORQUE: 30 OZ-IN (CONTINUOUS)





## MOTION AND CONTROL SOLUTIONS STANDARD PRODUCTS


### SOLUTION PLATFORM:

CUSTOMIZABLE TO SPECIFIC DESIGN REQUIREMENTS/CONSTRAINTS

### 3.) DC BRUSHLESS MOTOR + GEARBOX: 8048 PLATFORM (SENSORED)

- AUTOCLAVABLE DESIGN
- SIZE: <1.00"-3.00" DIAMETER
- OPERATING VOLTAGE RANGE: 6-24VDC
- TORQUE: 30 OZ-IN (CONTINUOUS)
- NO LOAD SPEED: 29,000 RPM
- GEAR REDUCER: 1 SPEED  
AND UP TO 3 STAGE
- STALL TORQUE: 4.3-17.7 N/M





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## MAJOR MARKETS AND CUSTOMERS

### MEDICAL DEVICES

**CMI IS CURRENTLY SUPPLYING MOTORS AND CONTROLLERS TO LEADING OEM MANUFACTURERS IN THE MEDICAL DEVICE INDUSTRY**




### INDUSTRIAL/ INSTRUMENTATION



### MILITARY/ AEROSPACE




  
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# THANK YOU!