DC Bus Capacitor Manufacturing Facility for Electric Drive Vehicles

Peter Blais & Johnny Boan
KEMET Electronics Corporation
johnnyboan@kemet.com
864 963 6413

Project Duration: February 2010 – February 2015

Project ID: ARRAVT028

May, 2012

This presentation does not contain any proprietary, confidential, or otherwise restricted information

Project Overview

- **Objective**
  - The project objective is to build and equip a factory in Simpsonville, SC to manufacture DC bus capacitors as defined by the ARRA Electric Drive Vehicle Battery and Component Manufacturing Initiative (Area of interest 6; Electric Drive Subcomponent Manufacturing Facilities).

- **Addresses Targets**
  - KEMET will prepare manufacturing space within an existing facility in Simpsonville, SC, purchase the necessary capital equipment and hire the necessary personnel within the five year window to be capable of manufacturing DC bus capacitors in volumes necessary to meet or exceed the required 100,000 Electric Drive Vehicles.

- **Uniqueness and Impacts**
  - Increase the available capacity in the USA for DC bus capacitors and therefore reduce the supply chain risk to the EDV manufactures.
  - Development of domestic expertise.
  - Fully operational, this factory will employ up to 113 people.

Project Overview

- **Time Line**
  - Project Start: 2010
  - Project Completion: 2015
  - % complete = ~27%

- **Budget**

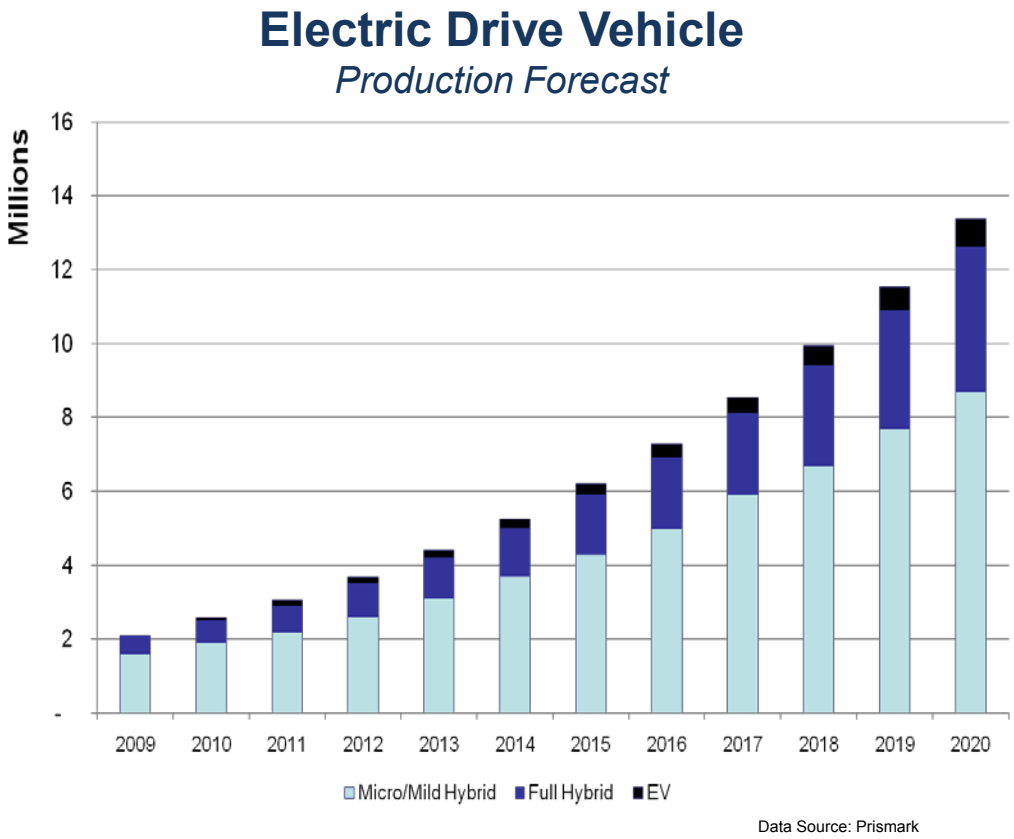
  $34,100,000 investment
  - ✓ ***$15,100,000 DoE Grant (ARRA)***
  - ✓ *South Carolina = $2,500,000*
  - ✓ *KEMET = $16,500,000*

- **Barriers & Risk**

  Market acceptance of HEV and EV technology

Relevance: The Problem

- Continued growth in the number of hybrid electric and full electric vehicles is expected at a rate of ~19% over the next decade.
- These vehicles require DC bus capacitors.
- Currently there is limited:
  - Capacity in the USA for DC bus capacitors and therefore a supply chain risk to the EDV manufactures.
  - Domestic expertise in this field.

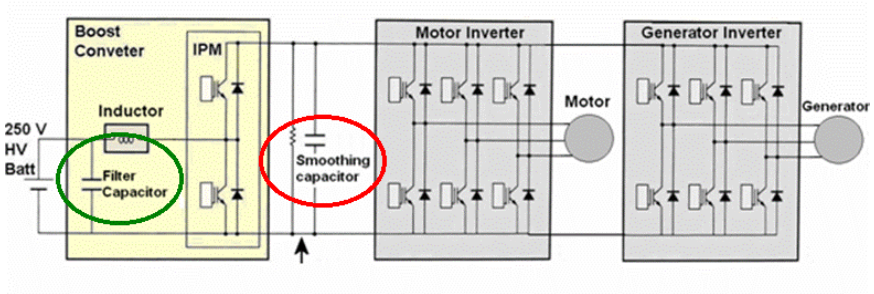


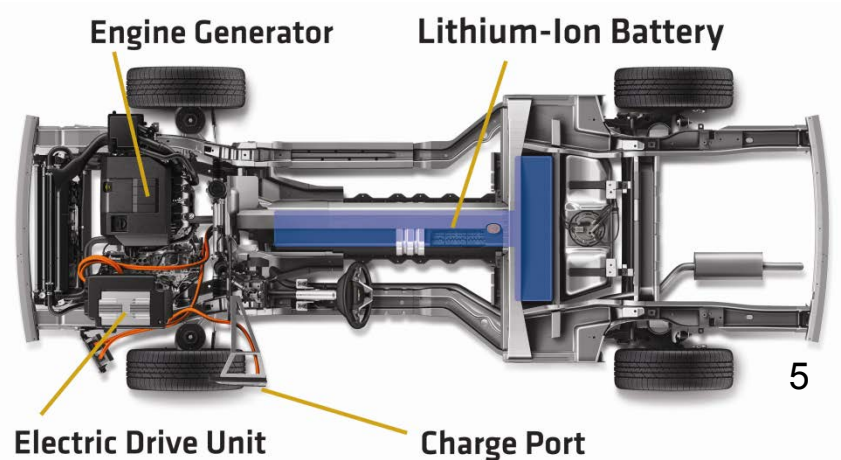
Relevance: Description of Technology

- AC electric motor drives of the type used in Electric Drive Vehicles (EDV) require an energy storage capacitor (the “DC bus capacitor”) at the input to the inverter which powers the motor.

- Based on customer input and research KEMET offers the EDV manufacturers technological solutions that will solve any DC bus capacitor requirement:
  - Soft Wound Film Capacitors
  - Stacked Film Capacitors
  - Aluminum Electrolytic Capacitors.

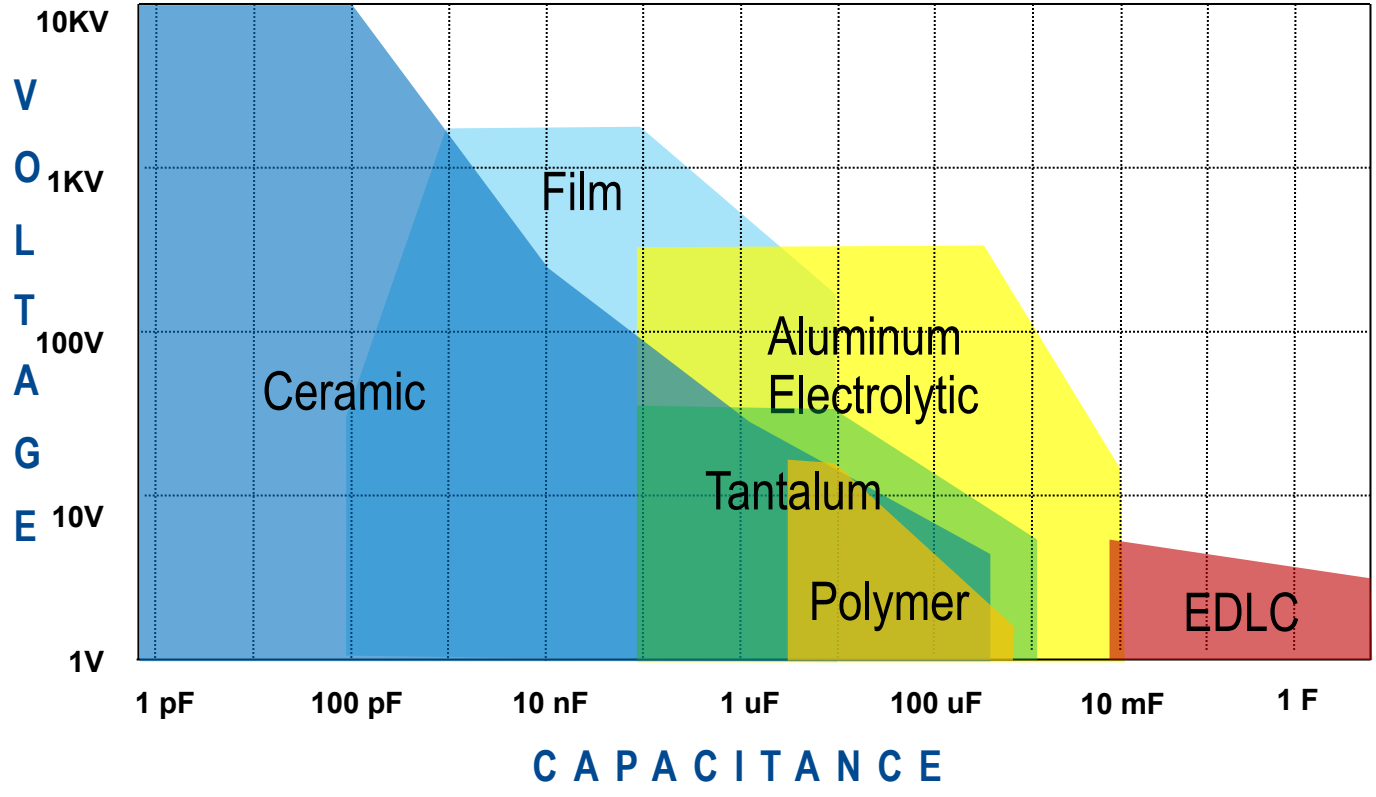
- The South Carolina factory will focus on Soft Wound Film Capacitors based on customer requirements.





Relevance: Description of Technology

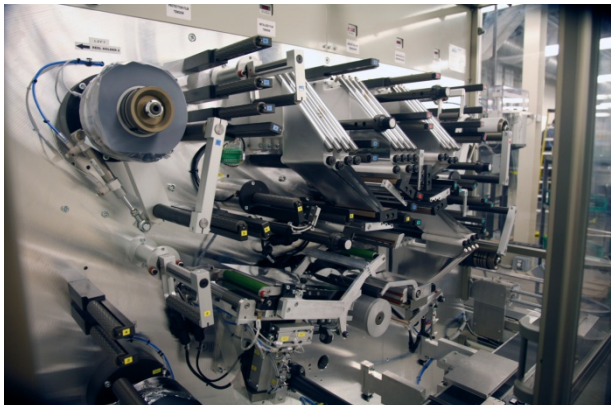
97% of AUTO Dielectric Solutions



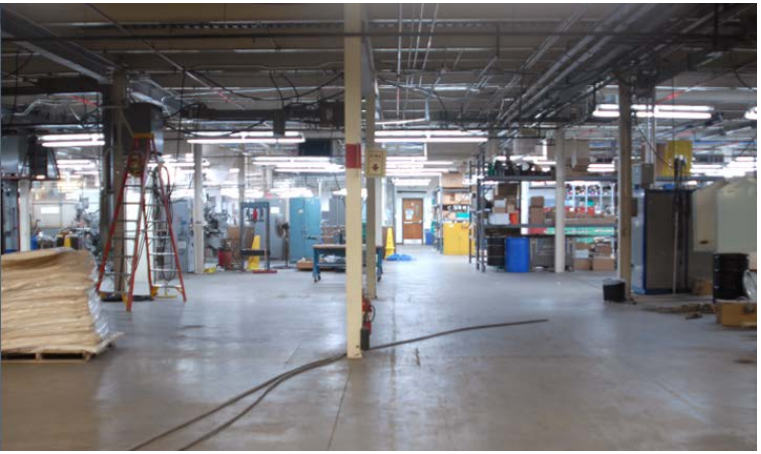
Technology Driver : More capacitance in smaller package for less cost

Relevance: Description of Technology

Project's Products & Equipment



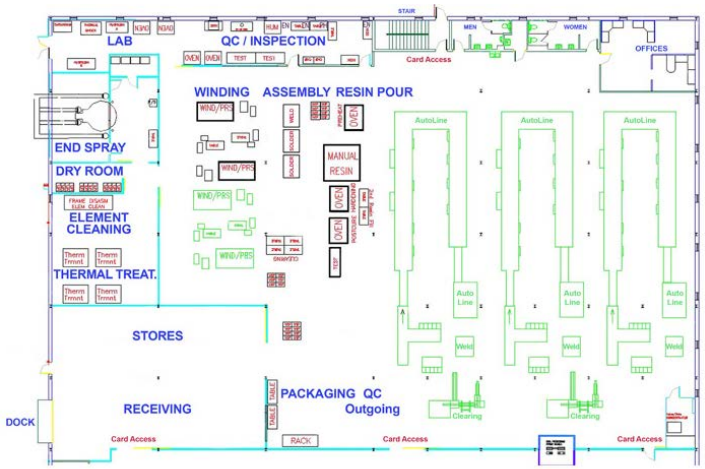
Progress



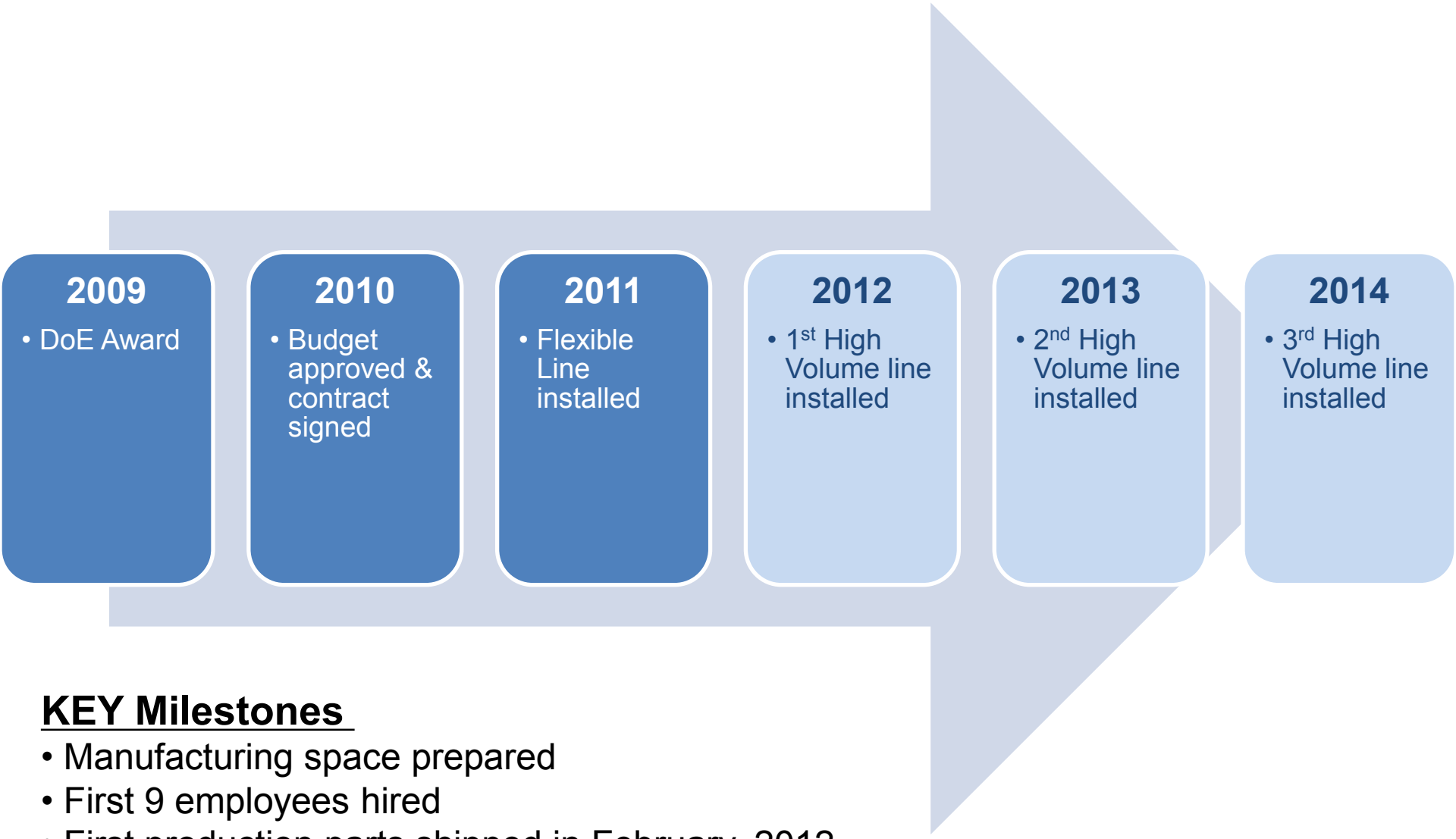
February 4, 2011

Today

At Completion



Progress & Looking Ahead



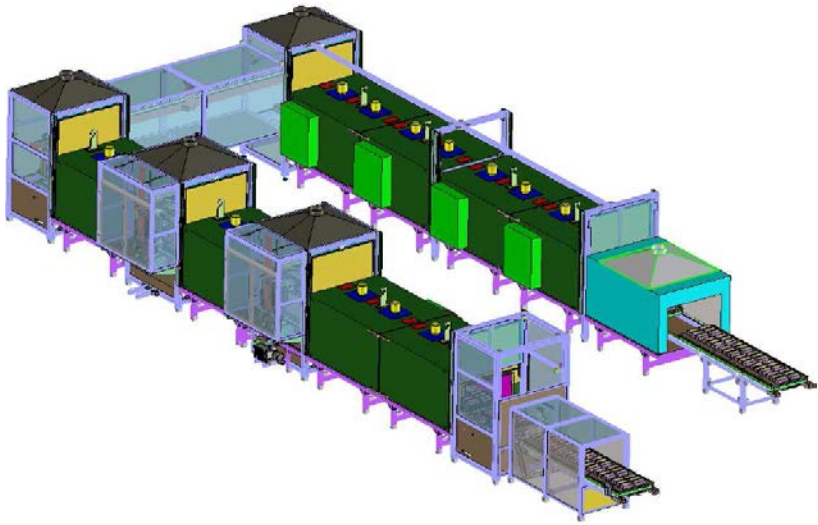
KEY Milestones

- Manufacturing space prepared
- First 9 employees hired
- First production parts shipped in February, 2012
- Multiple qualification projects in process

Summary: Looking Ahead

Approach, Challenges & Highlights

- **Approach**
  - Manage capital investment timing based on market demand
- **Challenges**
  - Evolution of EV designs
  - Global Economy
  - Market Acceptance of EDV
  - Price of Oil
- **Highlights**
  - High Volume Manufacturing line installation
    - 2012
    - 2013
    - 2014
  - Customer qualifications
  - ISO/TS 16949



Walking the Talk

“Greening of Greenville”

Summary

- KEMET will build and equip a factory in Simpsonville, SC to manufacture DC bus capacitors for 100,000 Electric Drive Vehicles.
- The factory has made its first shipment of DC bus capacitors. When at capacity fully utilized will support up to113 new jobs.
- Level of Market and Customer interest is high
- Currently ~29% of project is completed.