

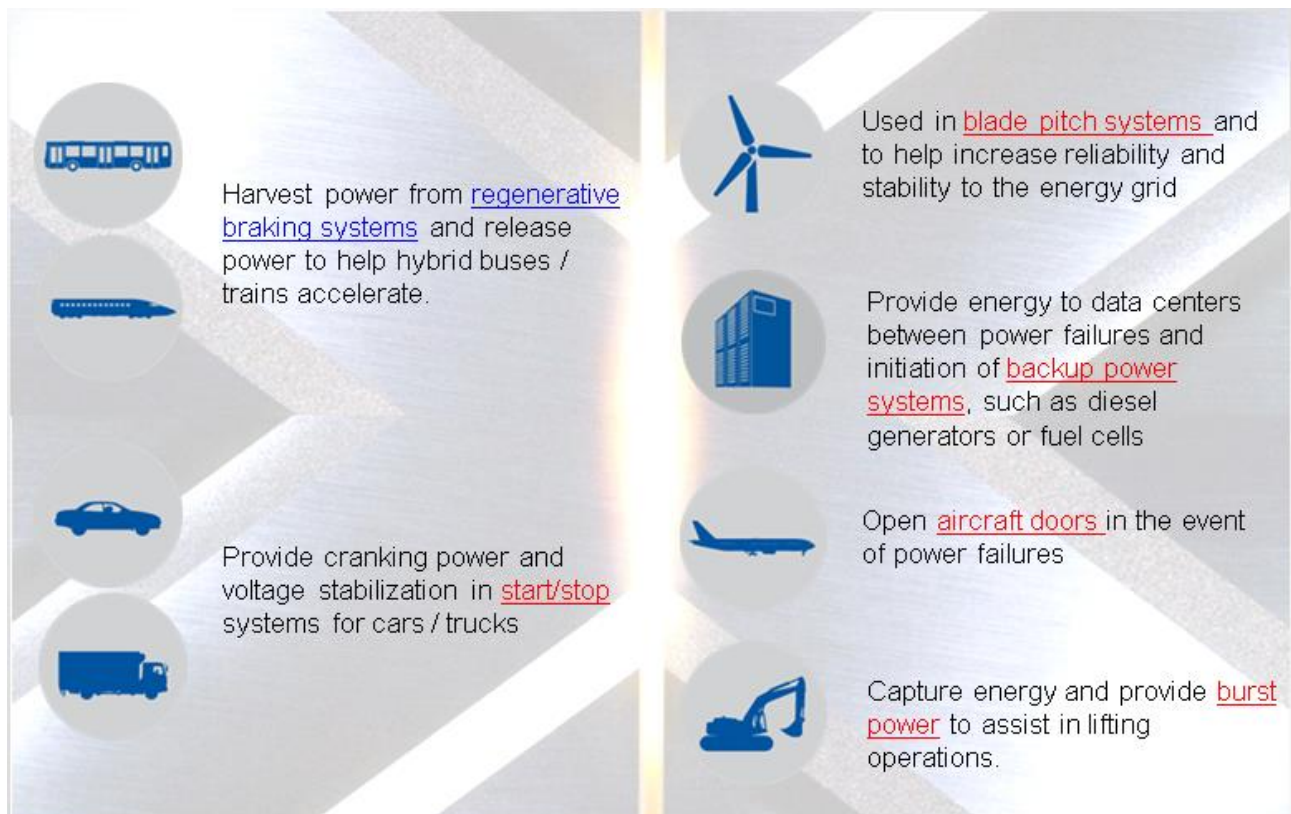
Smart ways to increase peak Power while saving Energy!

So called "Smart Energy Storage" Systems allow users to save Energy and to improve performance in multiple applications in the Industrial, Automotive and Transportation markets. As an example, in a forklift truck the energy during the down movement is typically lost if there is no Smart Energy Storage Systems able to convert and store it ready for the next lifting operation. A common application in a car is to recover the energy available during the breaking phase (usually lost as heat) store it and make it available once the driver pushes the throttle again. Trains and busses have a similar need with busses gaining a bigger advantage due to the stop/start mode of driving

These are some of the examples of energy saving by means of a Smart Energy Storage System. Many people are aware of this concept and here we describe these systems in greater detail.

Energy is often stored in a battery which is charged when some mechanical energy is available and converted to electrical energy. However, batteries are heavy and can be effectively charged with only a limited range of currents. Ultra-Capacitors can be used together with a battery to improve performance of the energy storage system. They enable the battery to be smaller and allows a greater range of charging currents. Supercapacitors are much lighter than a battery so any capacity that can be removed from the battery and allocated to Ultra-Capacitors reduces the weight of the overall system. There is also an additional advantage: thanks to their extremely low internal resistance, Ultra-Capacitors can provide very high transient currents. As a consequence, the overall charge/discharge process is more effective and efficient with Ultra-Capacitors.

Smart Energy Storage Systems using Ultra-Capacitors without a battery are becoming more common, expanding the horizon for applications to include products which require safety or reliability. Application examples are shown below:



Dimac Engineering Laboratory in Biassono MB, Italy started to invest time and resources into Ultra-Capacitor technology in 2004. There are 2 distinct areas of intellectual property, evaluating and characterising ultra-capacitors cells and the know-how to design and build a subsystem (efficient charging and discharging). Dimac has developed Intellectual Property and expertise since 2004 and is now working on many different systems with different customers in different application areas.

Along with the variety of the applications, the level of complexity of the systems has grown. Capacitance, current and energy stored have all increased over the past few years. Continuous product improvement based on previous experience and success and is rapidly widening the scope of new applications.

X – BOOST 50 / 55 / 70



Standard module from 50 to 70 farads. Very flexible and suitable for electrical and mechanical integration of storage systems. Supplied to different energy storage values and rated voltages.

FEATURES		
Capacitance	50 – 70	[F]
Voltage	16,2	[V]
Current	30	[A]
Power	0,5	[kW]
Energy Stored	1,8 – 2,5	[Wh]

X – BOOST 100 / 200 / 250 / 330 / 500



Standard module from 100 to 500 farads. Suitable for Start/Stop applications, hybrid vehicles and cranking systems. FFF for automotive purposes:

FEATURES		
Capacitance	100 – 500	[F]
Voltage	16,2	[V]
Current	62 – 147	[A]
Power	1 – 2,4	[kW]
Energy Stored	3,6 – 18,2	[Wh]

DLC BOX

Integrated pack of supercapacitor storage and lead-acid battery. Size equivalent to L1 standard automotive battery.

FEATURES		
Capacitance	100 F + 18Ah	
Voltage	16,2	[V]
Current Peak	1500	[A]
Power Peak	20	[kW]
Energy Stored	3,6 Wh + 18 Ah	

Consulting activity for hybrid forklift drive-train:

- Supercapacitor energy storage sizing and integration – 20F @ 400V
- Power train software development and tuning
- Fuel consumption reduction of ~60%
- Top class performance from lower end machines

Consulting activity for hybrid bus drive-train:

- Supercapacitor energy storage sizing and integration – 40F @ 450V
 - Power and control boxes development
 - Power train software development and tuning
 - Product certifications
-

Consulting activity for hybrid bus drive-train:

- Supercapacitor energy storage sizing and integration – 10,5F @ 750V
 - Power and control boxes development
 - Power train software development and tuning
 - System start up and testing
-

Consulting activity for electric - hybrid commercial vehicle:

- Supercapacitor energy storage sizing and integration – 6/8/10F @ 400V
 - Power and control boxes development
 - Power train software development and tuning
 - Variable capacitance size
 - Electric to Hybrid mode switchable
-



Consulting activity for elevator power supply cabinet:

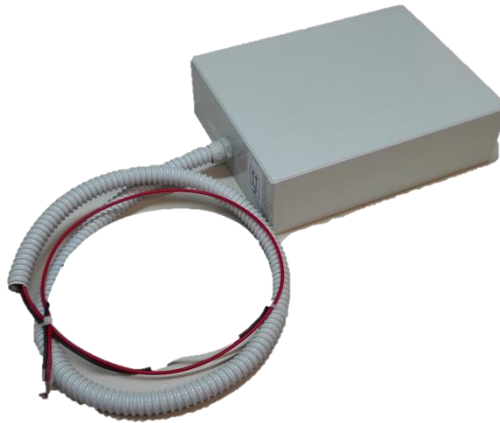
- Supercapacitor energy storage sizing and integration
 - DC/DC converter development
 - Software development and tuning
 - Prototype release and validation
 - Grid connection to single-phase 220V instead of 3-phase 380V
 -
-

Power cabinet for energy saving design and development:

- Supercapacitor energy storage sizing and integration
 - DC/DC converter interface development
 - Software development and tuning
 - 1st sample release and installation
-

Energy storage development for power supply during catenary non-attendance:

- Supercapacitor energy storage sizing and integration
 - EMC filter development and production
 - Test performance, validation and certification
 - Currently produced for the Chinese market
-



Power backup module to provide energy to wind turbine blades in case of power loss from grid. Backup power required: 1,1kW x 9s

FEATURES		
Capacitance	0,42	[F]
Voltage	324	[V]
Current	5	[A]
Power	1,6	[kW]
Energy Stored	6,1	[Wh]



Power backup module to provide energy to wind turbine blades in case of power loss from grid. Backup power required: 2,3kW x 11s

FEATURES		
Capacitance	0,14	[F]
Voltage	810	[V]
Current	5	[A]
Power	4	[kW]
Energy Stored	15,5	[Wh]

Jump Starter for 12V and 24V vehicles. Suitable for cars, commercial vehicles and trucks. Extremely light compared to standard technology starters. Fast charging (5-10s) from vehicle battery, even if discharged.

FEATURES		
Capacitance	500 - 125	[F]
Voltage	13,5 – 27	[V]
Current Peak	12000 - 6000	[A]
Power Peak	160	[kW]
Energy Stored	4,7	[Wh]

Jump Starter for 12V vehicles. Suitable for cars and commercial vehicles. Extremely light compared to standard technology starters. Fast charging (5-10s) from vehicle battery, even if discharged.

FEATURES		
Capacitance	186	[F]
Voltage	13,5	[V]
Current Peak	4500	[A]
Power Peak	60	[kW]
Energy Stored	4,7	[Wh]

Power supply for a hybrid commercial vehicle. Allows battery size reduction by 50% and improvement in terms of weight, consumption and performance

FEATURES		
Capacitance	6	[F]
Voltage	370	[V]
Current Peak	750	[A]
Power Peak	275	[kW]
Energy Stored	115	[Wh]

Power supply for automatic shuttle handling materials in cooled warehouses. No other power supply installed on-board. Fast recharging during load/unload cycles

FEATURES		
Capacitance	50	[F]
Voltage	48,6	[V]
Current	36	[A]
Power	1,8	[kW]
Energy Stored	17,6	[Wh]

Dimac welcomes Customizations, so multiple options not reported above would be available. Contact us at dimacred@dimacred.com for support.

www.dimacred.com

+39 (0)39 2494856