E-mobility

Shaping the future of power electronics
developping the universal EV charger
A premium power electronics manufacturer

A privileged partnership

Taking power efficiency further

Rapid prototyping capabilities
A premium power electronics manufacturer

From the early age to the international leap...

WATT & WELL aims to be the premium power electronics manufacturer for innovators in the field of oil&gas, e-mobility, aerospace and industrial applications. To **support designers of technological systems face to the strongest constraints**, WATT & WELL designs, qualifies and manufactures turnkey products using techniques that are reliable in the most demanding industries.

The technical teams partnership with R&D centers to manage projects including both hardware solutions (power converters, drivers, inverters) and software solutions (algorithms, embedded software, communication, graphical interface).

WATT & WELL know-how combines the mastery of severe environments (HiTemp, HiRel, vibration, EMC) with the constraints of mechanical integration to bring high added value technology to their customers.

On a daily basis, WATT & WELL engineering teams work towards innovation thanks to their strong expertise and passion for new technology. It leads them to take more and more challenging projects, such as Ariane 6 European space launchers or quick chargers for electric road vehicle.

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**2008**
Benoit SCHMITT, actual CEO, creates WATT CONSULTING in the heart of Paris, with the baseline «Rapid results in power electronics». The company soon became a young innovative enterprise (JEI french status)

**2011**
Introduction to high-voltage (30kV) and pulse energy. First motor control developed for high temperature environment: the Nar products range is born

**2012**
RENAULT partnerships with WATT CONSULTING to design their 40 kW converter

**2013**
Opening of new facilities in Pertuis (Aix-en-Provence region) dedicated to production, industrialization and after sale

**2014**
Structuring of the value chain to enhance growth opportunities. Certified ISO9001.

**2016**
To better fit the scope of its widen value chain, WATT CONSULTING becomes WATT & WELL with the baseline «Converting power into confidence». Opening of the US subsidiary in the industrial hub of Houston in Texas.

**2017**
Construction of new production facilities (four times bigger than the initial facilities). Airbus Safran Launchers partnership with WATT & WELL to develop the motor controller of the second stage motor of Ariane 6.

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**Localization**

Houston, TX

Massy, Paris region

Pertuis, Aix-en-Provence region
- 75% Exportation
- Customers all over the world: Europe, Asia, North America
- 80% Technical profile (PhDs, Engineers, technicians)
- 7 languages spoken
- +15,000 annual batch size
A privileged partnership

From A to Z and beyond, the engineering team is dedicated to the success of the project.

This is the reason why the leaders evolving in demanding industries rely on WATT & WELL expertise to confidently achieve better results, faster.

To ensure the bonne route of the project, customized resources are allocated:
- Highly responsive skilled engineers
- Professionals on the customers premises
- Constant adaptation to the customer’s time-line
- Investment in a long-term relationship

Converting power into confidence

They trust us

A comprehensive understanding of the challenges

**Oil&Gas**
- Best-in-class technologies (SiC, GaN, SOI, Silicon)
- Customization options for drilling
- Wireline and completion tools
- Minimizing risks and delivery time while maximizing output
- Operational under 175 °C

**Aerospace**
- Under DO160, DO254 & ECSS standards
- Fault tolerant power topologies
- Radiation tolerant control architecture
- Hot redundant systems with low reconfiguration time (<100 μs)

**Mobility**
- Design of fast charging stations for electric and hybridization vehicle under ISO15118 and CHAdeMO standards
- Hybridization of drive trains
- Design of embedded charging systems (slow, fast, ultrafast)

**Industrial applications**
- R&D collaborative approach
- High power density
- Physical modeling
- Resonant system
- Reversible system
- Protection
- Integration and cooling optimization
Taking power efficiency further

European leader DBT-CEV choses WATT & WELL technology for the development of power units applied to EV chargers

The modular DC source developed for our customer is a standalone 25 kW DC source. It features a modular design capable of parallel operation and can be used as part of a very high power system such as 150 kW and 300 kW EVSE (Electric Vehicle Supply Equipment systems). The next generation development includes reversible charger and high voltage (800-1000 VDC output).

**Features**

- **Dimension.** Highly compact form factor 19” rack, 3U
- **Temperature.** Forced air cooling with integrated fans.
- **Output voltage.** Up to 500 V and 25 kW
- **Galvanic isolation.** Input/Output reinforced galvanic isolation
- **High efficiency.** Up to 95 %
- **Grid.** 400 V 3-phases AC input, 50 Hz
- **Integrated output fuse and reverse diode.** FD versions
- **CANopen.** Compatible digital bus with advanced control, limitations, monitoring & logging capabilities

**Compatibility**

- CE marking according to
  - NF EN 61204-7
  - NF EN 61000-6-2
  - NF EN 61000-6-3
- Compatible with DC charging systems (CHAde-MO, CSS)

**Customization options**

- Master for multi source management
- Custom Current / Voltage / Power levels

**Versions**

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**Advanced power control & modeling**

- Simulink-based modeling
- Code generation via Simulink Embedded Coder
- Advanced Graphical User Interface
**Interface board to control a set up converter**

- Supply oscillators U,V,W
- PWM inverter UVW, IGBT driving
- PWM dead time ensuring (FPGA)
- Phase currents Measurements & filtering, sensor supply,

**Electric Bike Motor Control**

- Easily upgradable and modifiable system
- Torque established by speed, couple or power
- Regenerative braking added
- Communications and parameters modifiable via CAN bus
- 250 W brushless motor with a FOC
- Power density: +50 %
Rapid Prototyping Capabilities

Our success stories in eMobility. Benefits at a glance.

**Bidirectional chargers**
- Input: 230 VAC
- Output: 400 VDC
- Power: 3.6 kW
- Hard Switching frequency: 45 kHz
- EMI filter, PFC, cooling system (fans) included
- CAN communication

**Power inverter stack for a motor**
- 2 x 10 kW, 750 VDC
- Directly compatible with dSPACE© MicroLabBox
- Embedded hardware protections: OVLO, OCP, Short-Circuits) with front-panel LED indicators
- Air-cooling with integrated fans
- Compact design in a single 19” rack (3U)

**40 kW reversible DC/DC converter**
- Reversible interleaved converter
- EMI filter
- CAN communication
- Busbar sizing (up to 400 A)
- Liquid cooling system
- Input: 100 VDC – 200 VDC
- Output: 300 VDC – 400 VDC
- Power: up to 60 kW

**Custom: 100 kW inverter**
- 3-phase inverter motor
- Power: 100 kW
- Input: 400 VDC
- Output: Arms
- Water-cooling
- Protection: OCP, OVLO, CC
- Compact design in a single 19” rack (3U)
- Control interface: dSpace
Electric Vehicle Chargers Experts

Delivering innovation at each step of a project

WATT & WELL is a power electronic conversion expert delivering innovative products to their automotive customers since 2008. Improving e-Mobility thanks to deep experience in EV, hybrid electric vehicles and those using hydrogen fuel cell technology.

Advanced power control & modeling
- High switching frequency (> 200 kHz)
- Massive use of SiC technology
- Resonant, interleaved topologies

Quick time-to-market
- Off-the-shelf Power Unit
- Customization options
- Custom design: 6-8 months for a prototype

Embedded chargers
- Reversible Chargers for Vehicle to Grid
- Low cost chargers with & without galvanic insulation
- Double insulation chargers

Modular approach
- CANopen bus with multi-power unit management
- Control unit development
- 2 charging points management

Charging stations
- Power units & high level control for up to 150 kW

- Multiple power unit management
- Control unit development
- 2 charging points management

Why our customers chose WATT & WELL

"Matra M&S called upon WATT & WELL to improve the command algorithms of a synchronous in-wheel motor used for electrically assisted bikes. Thanks to WATT & WELL’s skills and expertise, this project not only has enabled us to increase the system’s efficiency, but also to add a number of sophisticated control modes that would help customize the final application. During this project, the WATT & WELL Team was able to adapt itself to the characteristics of our work environment and of our methods. Both teams could find the best means of combining their resources in order to keep within the cost objectives and the project’s schedule."

Gilles CHELARD, Technical Director

Matra M&S

"We have chosen WATT & WELL to develop a major part of our ultra-fast chargers. This part is AC/DC power converter for our DC charging output (Chademo and CCS). We have found in WATT & WELL the ideal partner for this development because power conversion is their specialty. This is completed by their full involvement in this type of complex R&D project. I recommend working with WATT & WELL on this type of development and production."

Guillaume SIMON, Technical Director

DBT

"WATT & WELL proved to be a caring partner for the technical solutions as well as for respecting its engagements. The quality of follow-up, of upholding the initial planning, and the interactivity of its teams puts WATT & WELL on a high level of professionalism, which is a source for Renault’s satisfaction"

Samuel CREGUT, Research and Advanced Power Electronics Project Manager
WATT & WELL

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