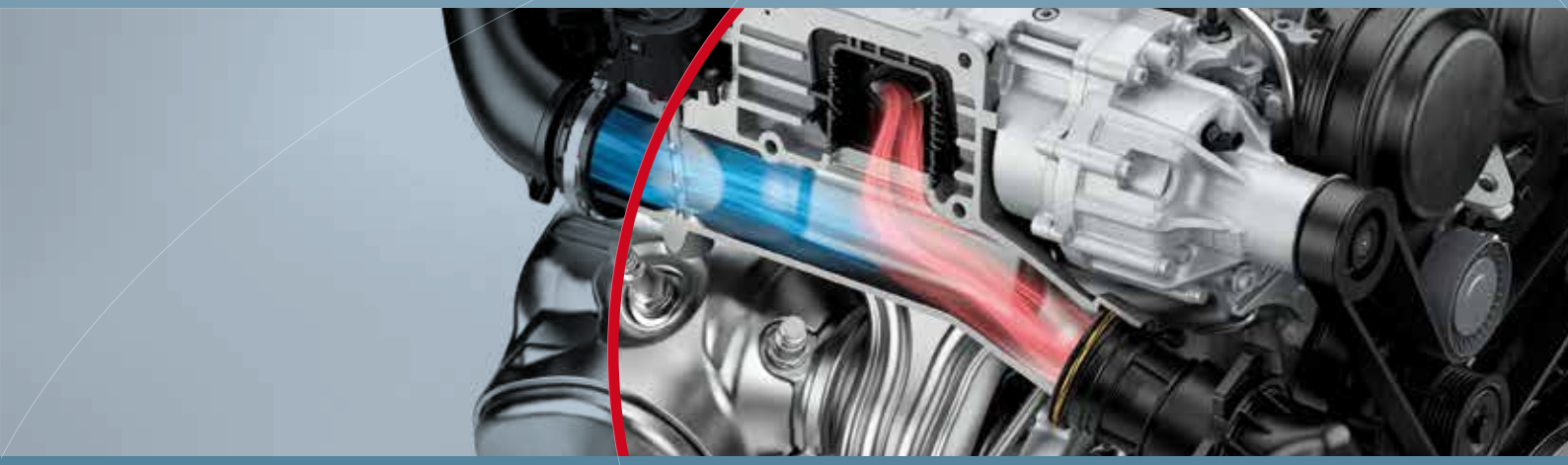
SONCEBOZ
from mind to motion



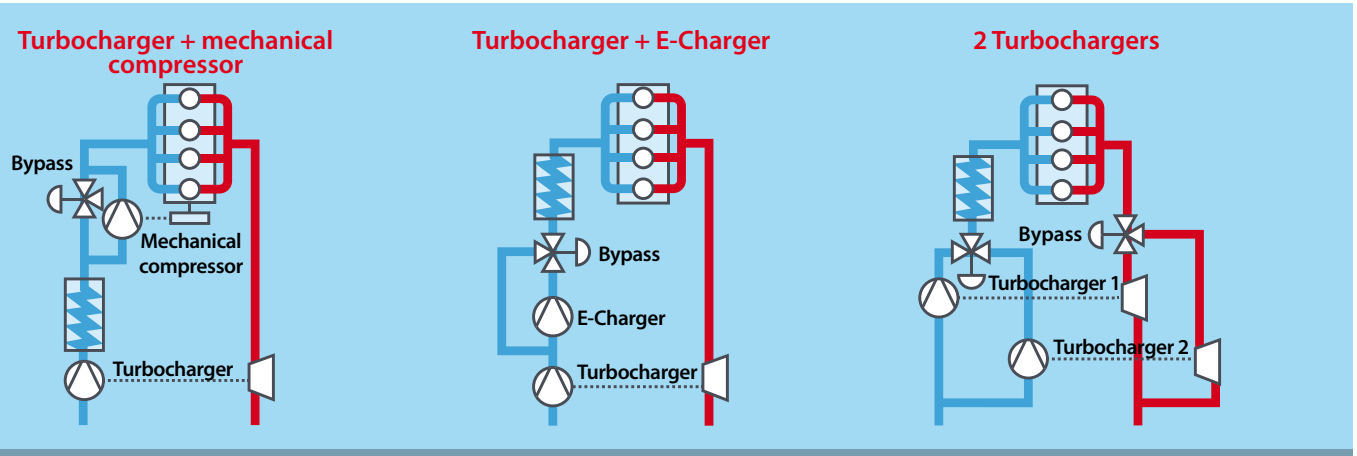
Motion systems

for challenging **Forced Air Induction** applications

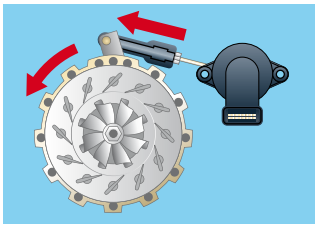
Challenges in **Forced Air Induction**

In internal combustion engines, fossil fuel is oxidized by air and thereby creating emissions. The basic principle consists of enhancing the effective compression ratio of the engine by feeding pre-compressed air to the intake. This maximizes the amount of useful energy extracted per fuel unit. Forced air induction was originally introduced in order to compensate the altitude effects on aircraft engines. It was latter carried over to passenger car and truck engines in order to improve torque and performance.

Nowadays forced air induction systems play an important role in meeting stringent emission regulation targets. Indeed, the design and capabilities of the air loop have become central to controlling the combustion process in the engine. By optimally filling the cylinder with air, the engines can be seriously downsized. The main challenge consists of avoiding a delay in air boosting in order to improve the drivability with an optimal response time in the torque development of the engine. Another key requirement is to design simple systems able to manage the air boost whatever the engine RPM level is.



Architecture examples of 2-stage charging systems using electric actuation



- **E-Variable Geometry Turbocharger**

  In a turbocharger the pumping of fresh air is achieved thanks to partial harnessing of the kinetic energy available in the exhaust gas. The main challenge is the difficult compromise between response time and power output. One answer is the introduction of a set of variable vanes in the turbine housing of a diesel engine, in order to maintain constant gas velocity across the turbine for a defined engine speed range. Scarce space under hood demands extremely compact actuators, with high precision and short response time.

- **E-Bypass Supercharger**

  The supercharger is an air compressor, powered by the rotation of the engine through a mechanical linkage. There is no time lag for pressure build-up, which is practically independent of the engine speed. The ability to reduce engine speed yields fuel consumption gains, and a compressor bypass eliminates air handling losses when boost is not required. Our electric actuator brings superior system dynamics and robustness for packaging in a tight environment

- **E-Waste-Gate Turbocharger**

  A turbocharged engine needs a safety bypass valve called waste-gate. the main challenge of an electric waste-gate actuator is to position the valve with high precision, while being able to maintain a large force in order to withstand the gas pressure and pulsations coming from the engine. Very high temperature and high vibration levels are formidable constraints that the actuator must meet.

- **E-Charger**

  Hybrid propulsion concepts and the underlying electric architecture increase the attractiveness of an electric booster for forced air induction. It offers the possibility to cancel the time response problem of conventional forced air induction systems. A system delivering 2 kW at 80'000 RPM enables the use of state-of-the-art compressor technologies.

Our **solutions**

Sonceboz has long been favored for deploying our mechatronic drive systems expertise to generate competitive advantages for our partner-customers. Our vigilant anticipation of market needs anchors our relentless drive for innovative, high quality solutions to minimize total cost of ownership. Our application-specific actuators stand as dependable solutions for VGT, e-VGT, bypass, E-Charger, WGT, e-WGT applications:

- DC brushless actuator
- Linear BLDC actuator
- Rotary BLDC actuator
- High speed BLDC motor

Based on a patented and modular electromagnetic concept, the compact dimensions and outstanding mechanical performance make those motion systems the natural fit for a successful integration on your engine:

- High torque in a compact design
- High-resolution integrated sensors
- High dynamic positioning up to 50ms
- Benchmark time-to-speed actuator
- Operating temperature: [-40°; +170°C]

The unparalleled characteristic of these actuators have been demonstrated in high-volume powertrain applications. They will bring you rapid benefits in terms of optimal integration in your systems.

Sonceboz expertise at work:

Your **benefits**

- *A close partnership with electric drive experts*
- *Excellent Sonceboz quality track record*
- *Validated application-specific actuator for quick time-to-market*
- *Extreme compactness to fit right at home in tight engine compartments*
- *Outstanding torque, speed, positioning performance, precision and accuracy*

SONCEBOZ
Motion systems

Our core competencies consist of design, development and production of **mechatronic drive systems** and **electric motors** that operate in **harsh environments**.
We are committed to improving safety, decreasing energy consumption and minimizing the impact on the environment. Our focus on **innovation**, **best in class quality** and **exceptional service** is our key to success for worldwide OEM customers and their suppliers.

Your contact for Forced Air Induction Solutions
info@sonceboz.com

SONCEBOZ
2605 Sonceboz - Switzerland
Tel. +41 (0)32 488 11 11
Fax +41 (0)32 488 11 00
www.sonceboz.com

SONCEBOZ