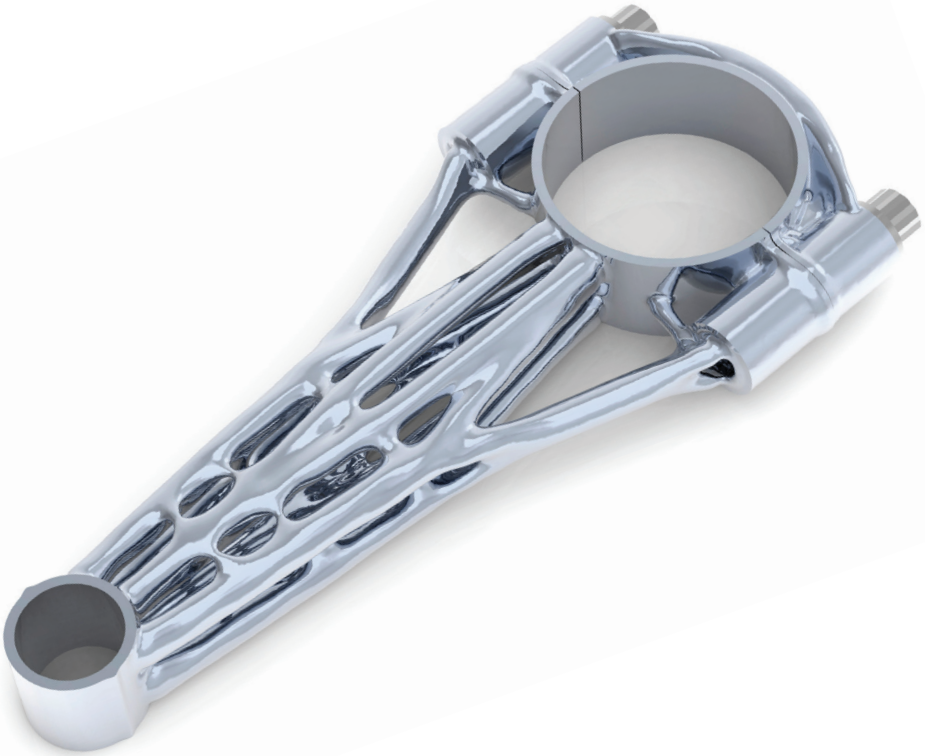
Race engine development

BDN Automotive



F1 TECHNOLOGIES

ULTIMATE PERFORMANCE

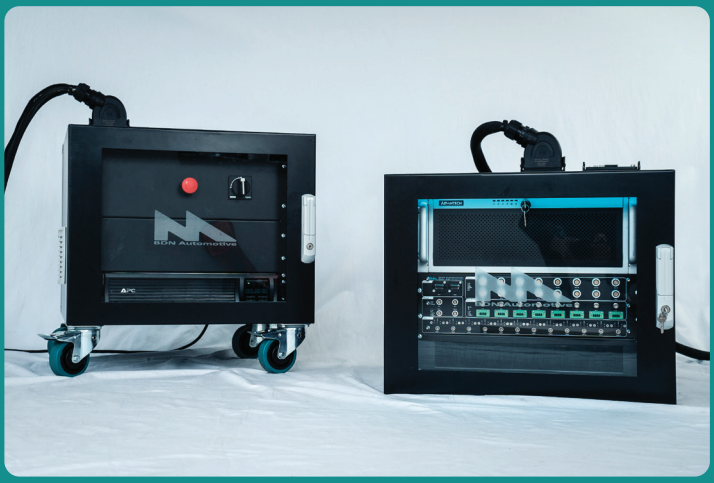
OUTSTANDING DURABILITY

DESIGNED BY EX. KOENIGSEGG ENGINEERS

BDN Automotive provides state-of-the-art race engine development and trackside race engineering services to all range of customers fullfilling any needs. Get the most out of your engines, and let's win races together!

Koenigsegg

"BDN Automotive supplied a bespoke combustion analyser to Koenigsegg Automotive AB for use in our engine development. Equipment is easy to use and responsive support is provided."



Race engine development

Race engine development is a really complex task, as exceeding the performance barrier is not possible only by sourcing the top level components from the market. The hidden performance is could be unleashed by finding the perfect balance between the different parts. BDN Automotive provides simulation based development services, reducing the extreme cost of the traditional trial and error method. This short introduction gives an insight to the engine development process where the processes inside the engine are revealed and understood. Having such an information helps us designing the characteristics of the iven engine satisfying all of our clients' needs whether it is a 1000+ hp drag bike, or a historyc rallye engine.

References

Projects, where our expertise were used:

BME MOTORSPORT

ARRABONA RACING TEAM

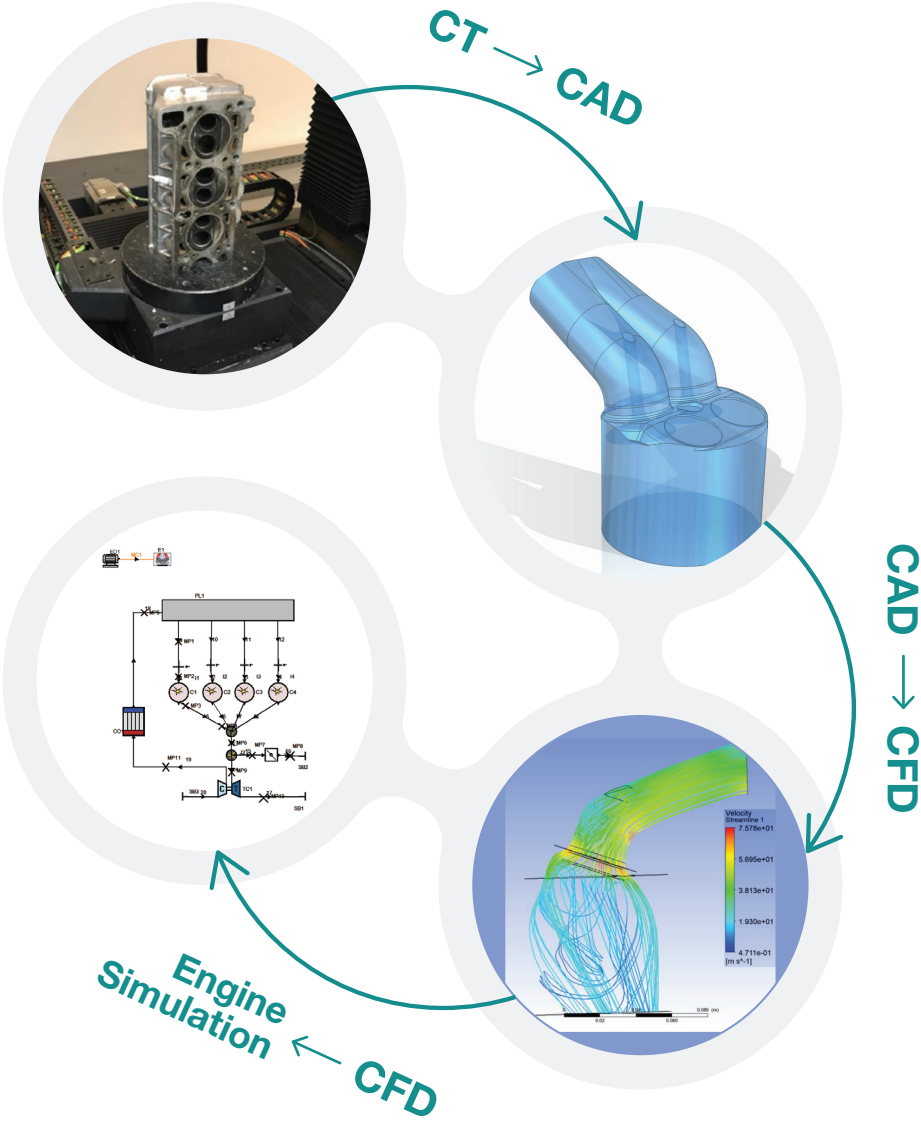
POLARIS RZR

KOENIGSEGG JESKO

TC RACING ENGINES

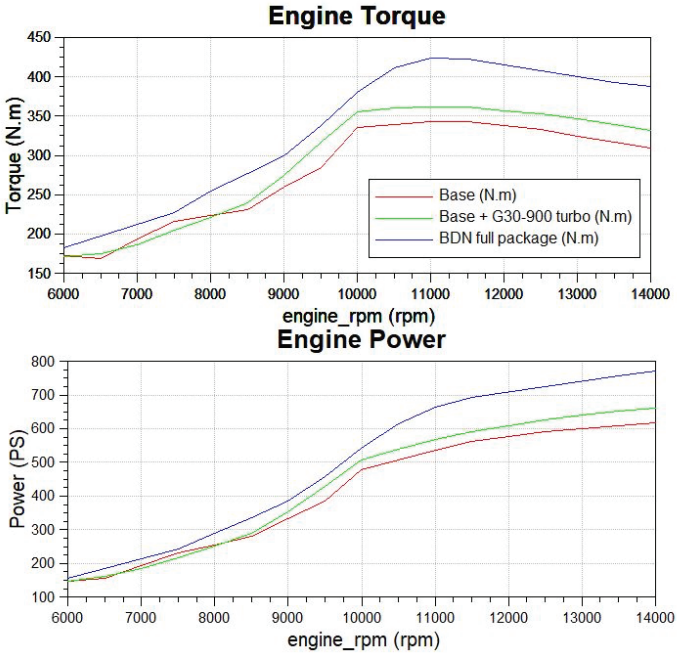
DANIEL LANCE

AND MANY MORE...



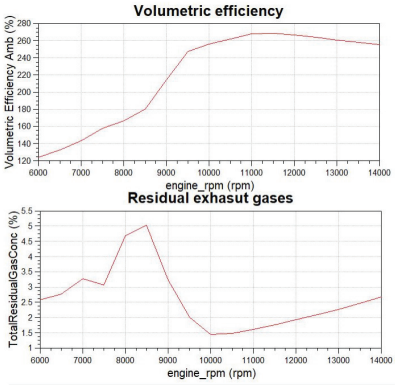
This diagram shows how a whole engine simulation is built up, which could be used for a complex analysis without needing to build the actual engine and running it on a dyno. This makes the development process more efficient, cost effective and quicker.

Parameter analysis:



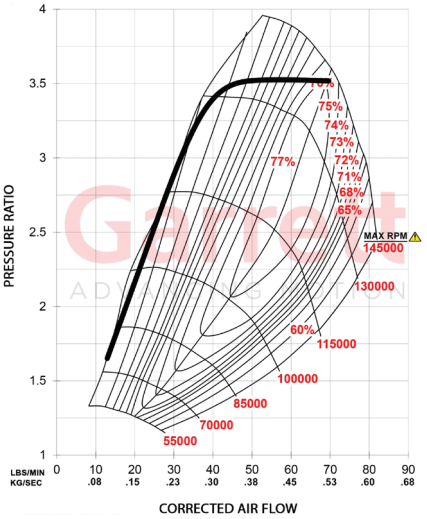
Different engine parameters are related to different components or calibration, which could all be visualised and examined during the process, such as:

- Compression ratio
- Valve size
- Cylinder head port design
- Camshaft design
- Intake and exhaust system
- Ignition/injection timing
- Air to fuel ratio
- Etc.



Turbo matching:

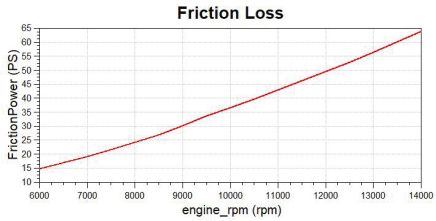
Selecting the best available turbocharger for the given application starts with defining the target torque curve. From this all the flow parameters could be calculated, and the compressor and turbine maps could be imported into the simulation. Calculating the compressor and turbine energy helps in the design of the exhaust manifold and wastegate sizing, comparing different turbochargers and A/R ratios.

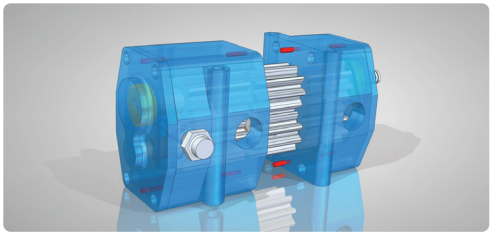


TURBOCHARGER COMPRESSOR MAP

Loss analysis:

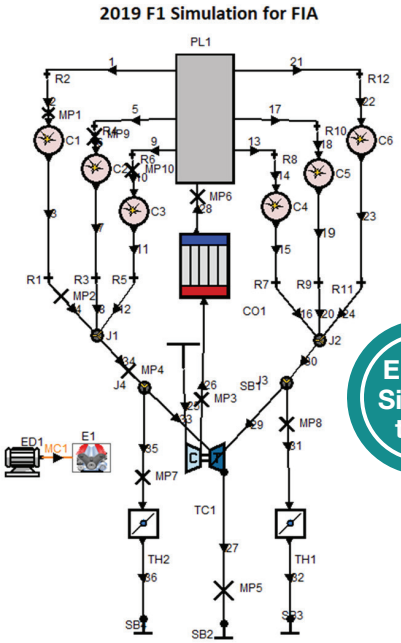
Mechanical and thermodynamic losses are crucial to increase the efficiency, thus gaining extra performance and durability. Different losses could be decreased using various methods, as an example frictions could be modified by using special surface finish matching between the components.

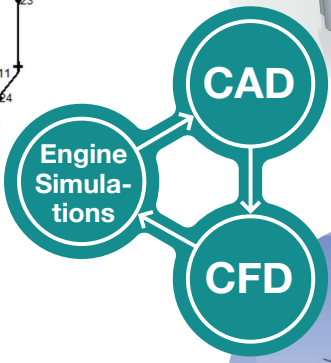


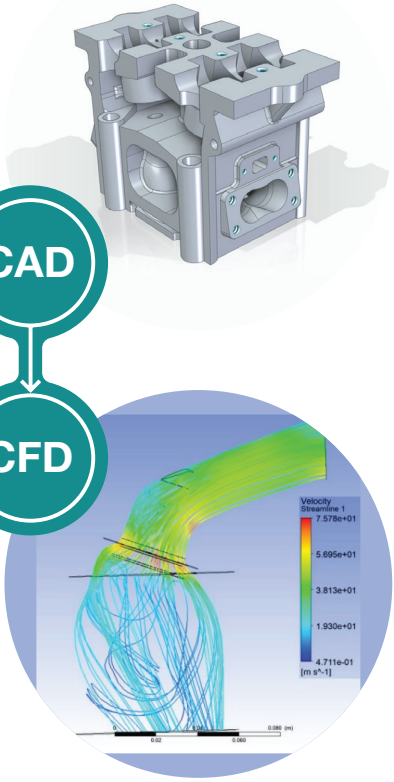


Component design

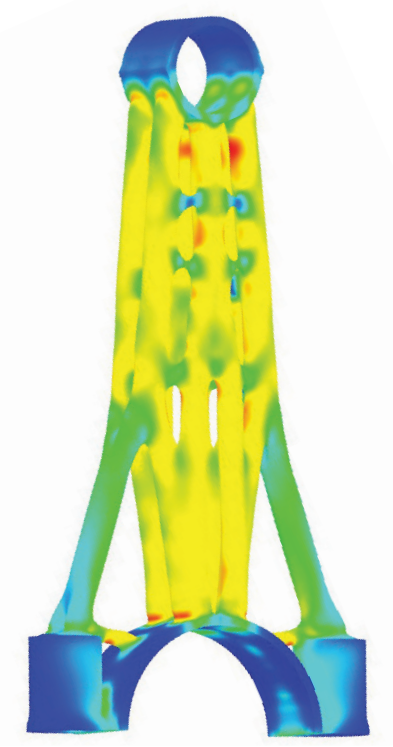
The whole engine simulation, the 3D CFD analysis and the structural simulations open the possibility for designing all components for the given application, which guarantees unbeatable performance.







Generative design



Utilising the most modern technologies the designs can be created in generative software to optimise weight, stiffness and strain for the given load parameters. Manufacturing of such a part could be done by different ways of additive manufacturing, such as 3D printing, or high pressure diecasting.

CASE STUDY:	CONNECTING ROD
Engine:	1.6 16V NA
BMEP:	16 bar
Power:	265 bhp
Torque:	205 Nm
Peak cyl.press.:	110 bar
Peak RPM:	10,500

Weight reduction: 40%

GET YOURS NOW

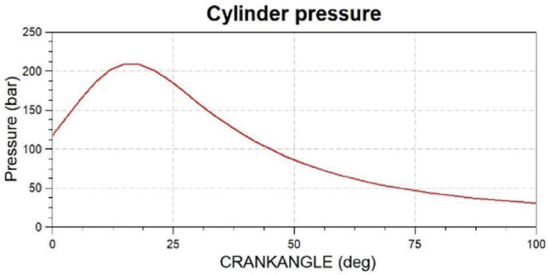
Contact us with your engine parameters to design your bespoke ultimate performance connecting rod set.

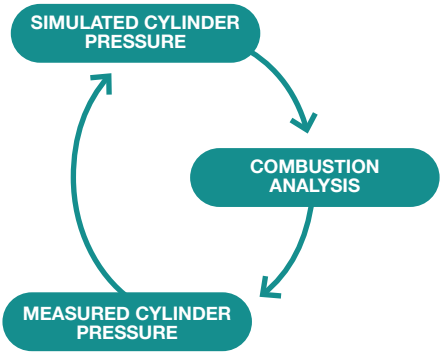
Email: nimrod.ludescher@bdn-automotive.com
Phone: +44 (0) 7367 196 589

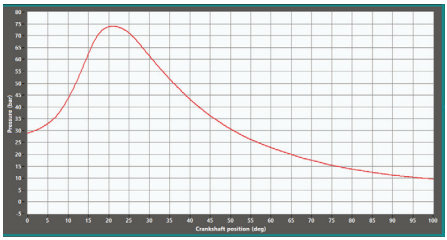
BOOK A MEETING:

Measurement, validation

The simulations are only as good as their validation process. BDN Automotive provides a patented combustion analysis process which is used by OEMs and hypercar manufacturers as well. The measured values are feed back to the simulations as an input parameter to simulate real world conditions. This enables us to trust the virtual environment 100%!





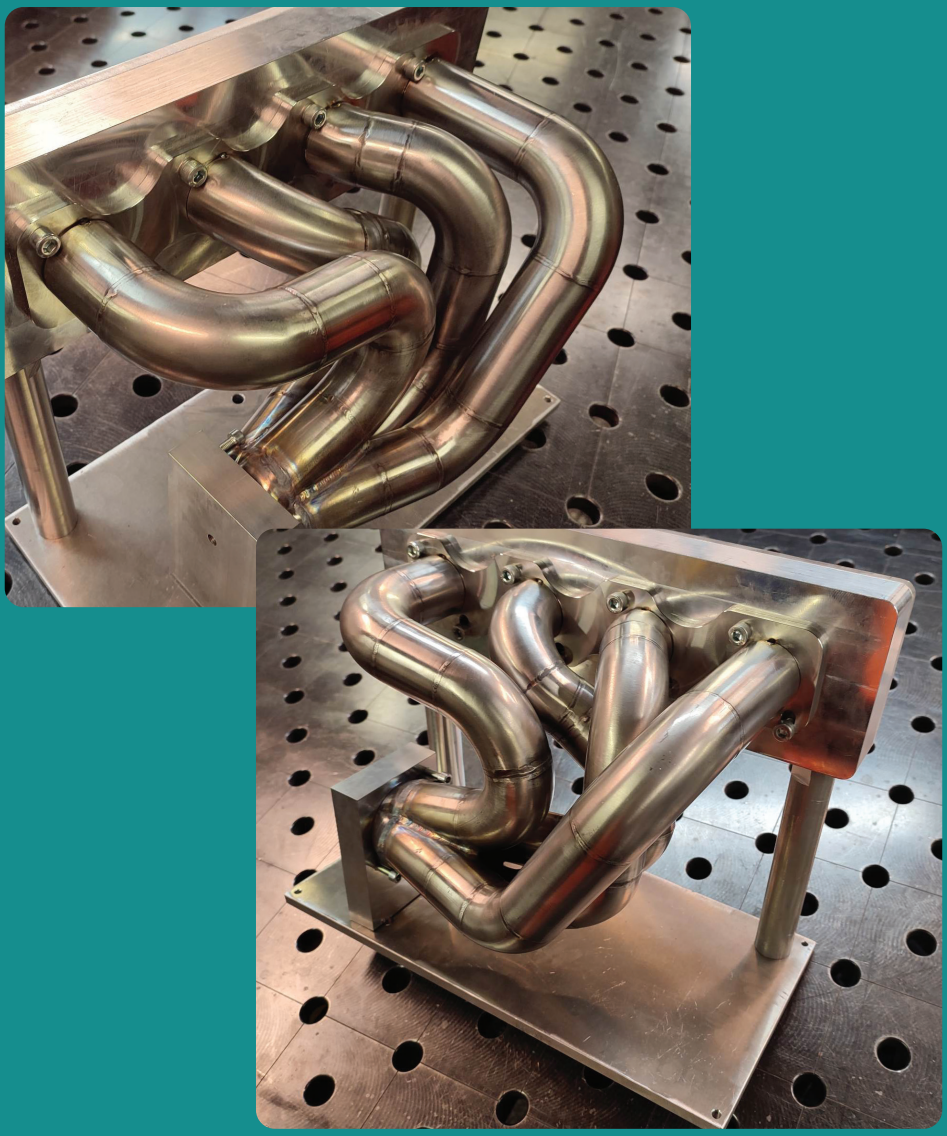


Measurement possibilities:

- Cylinder pressure measurement
- Port pressure validation
- Exhaust gas temperature
- Air-to-fuel ratio
- Torque/power measurement
- etc

Complex service – race engineering

BDN provides a complete solution from the first sketch to building and calibrating your engine, and supporting you trackside. Our motorsport engineers are qualified by Cranfield University Advanced Motorsport Engineering MSc, and have multiple years of experience in trackside support, OEM and hypercar development. Tell us your idea, and let us make it reality!



Exhaust manifold developed for a turbocharged Hayabusa drag bike

Team Brothers DRAG RACING

BDN Automotive

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