

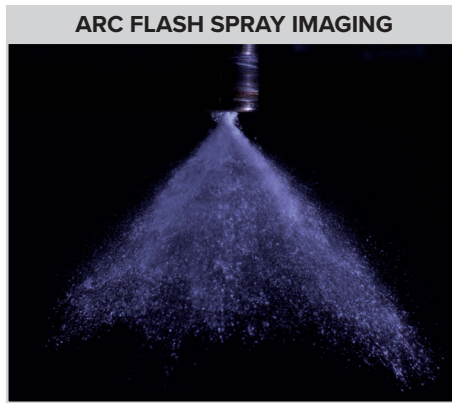
CORE CAPABILITIES

- Solidworks CAD & FLOW
- Converge CFD
- Arc Flash injector spray imaging
- Hexcell injector spray patterning
- Injector & pump flow testing (1 bar to 350 bar)
- Injector and fuel pump characterization
- Injector and fuel pump calibration support
- Precision EDM spray plate machining
- Fluid flow modeling
- Spray plate design optimization
- Single & multi-cylinder engine testing
- Engine combustion pressure measurement
- Powertrain integration & vehicle integration
- Chassis dynamometer testing (2WD & 4WD)
- Small batch manufacturing
- Private label programs & logo marking

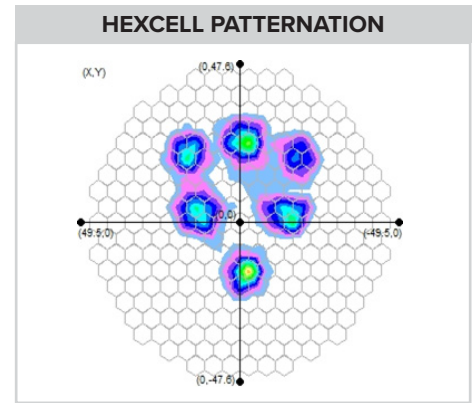
WHITE LIGHT SCANNING



ARC FLASH SPRAY IMAGING



HEXCELL PATTERNATION



COMPLETE FUEL SYSTEM SOLUTIONS



High Flow GDI Pumps



High Pressure Tubes



Direct Injectors



Low Pressure Tubes



Port Fuel Injectors



Fuel System Sensor Upgrades



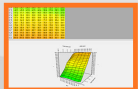
Low Pressure Fuel Pump



Vehicle + Track Testing



Calibration Services & Support



ENGINEERING SERVICES AND CUSTOM PROGRAMS

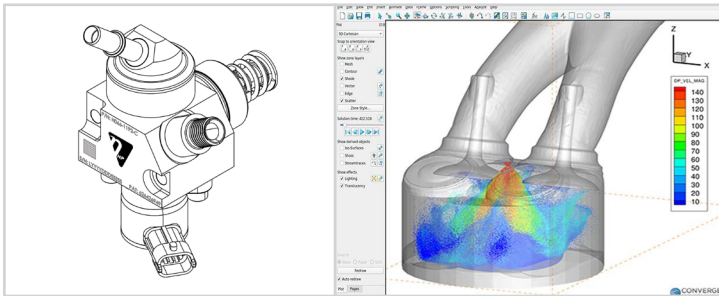


Special projects for OEM and Tier 1 advanced programs including combustion system integration, water and fuel injection.

Nostrum develops unique fueling and other liquid and gaseous flow solutions through a variety of simulation tools, advanced test equipment, and small batch manufacturing. This allows Nostrum to handle custom applications from design through to integration and calibration support to facilitate your success.

CONCEPT TO DESIGN RELEASE

Complete analytical development using 3D CAD design, Converge CFD, design reviews, and DFMEA.



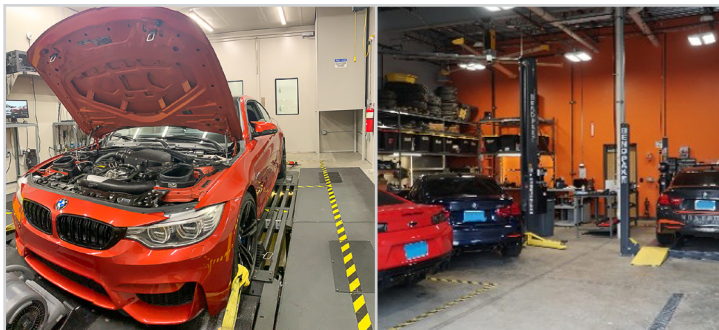
SMALL BATCH MANUFACTURING

Using key supply chain partners, in-house manufacturing, and in-house assembly.



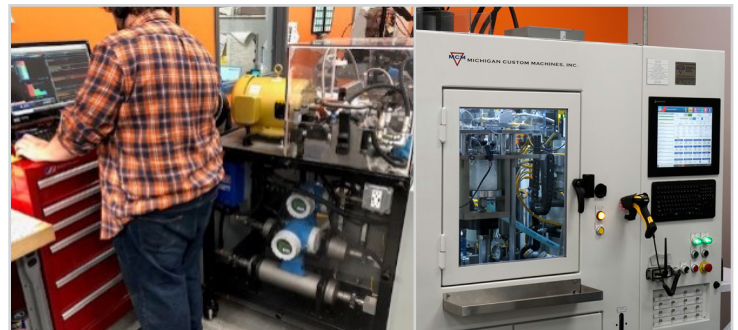
VEHICLE INTEGRATION & VALIDATION

Hardware integration, software integration, vehicle calibration, and vehicle testing on road, proving ground, and in test cell.



COMPONENT & SUB-COMPONENT TESTING

Using validation plans for prototypes/volume production on the component and sub-component level. Every product tested in Nostrum's unique test assets.



Specific engineering services & small batch manufacturing for a wide range of opportunities:

- Small batch DI & PFI injectors for research
- Water injectors (Port or Direct injection) for advanced research projects
- New engine combustion systems
- Aftermarket efficiency & emissions kits
- Spray modeling, imaging, measurement, and optimization
- Academic & regulatory projects (DOE, EPA, Federal, & State research projects)



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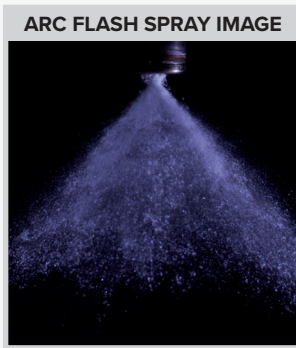
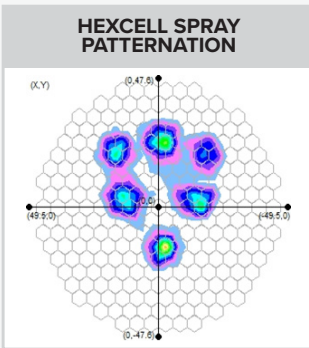
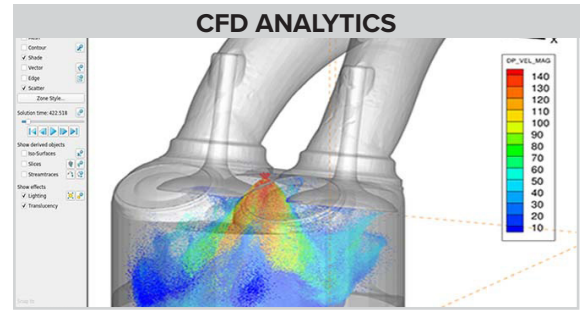
NOSTRUM HIGH FLOW DI FUEL INJECTORS



NHP'S RANGE OF HIGH FLOW DI INJECTORS ARE DESIGNED TO PROVIDE NEXT GEN PERFORMANCE WITH FUEL FLOW RATE INCREASES OF 10% TO 100% OVER THE FACTORY INJECTORS, ACROSS A WIDE RANGE OF VEHICLE APPLICATIONS, AND AT A RANGE OF PRICE POINTS TO FIT YOUR BUILD!

SUPERIOR DESIGN

Each combustion system requires a specific spray pattern with tightly controlled injector specs to optimize vehicle performance. Nostrum meets these demands using our Tier 1 capabilities and high precision tools including state-of-the-art Computational Fluid Dynamics (CFD) analytics and engine specific CAD to run virtual design of our injectors.



RIGOROUS PRODUCT VALIDATION

Prototypes are manufactured on-site and run through rigorous spray plume visualization and measurement tests using our arc-flash spray imaging asset and our Hexcell Patterning asset to validate injector spray targeting. The Nostrum validation process also includes the installation and testing of our injectors in-vehicle to ensure high product quality and unmatched vehicle fitment.

EXPANSIVE TESTING PROCESSES

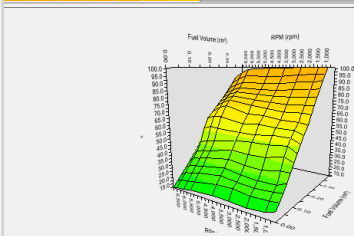
Nostrum injectors are individually serial numbered, tested, and batched at vehicle relevant conditions with the application specific injector drive current profile. Production Nostrum DI injector testing includes:

- Tip leak rate at multiple pressures
- Pressure decay
- Opening and closing time
- Static flow at multiple pressures
- Dynamic flow at multiple pulse widths & pressures
- Resistance and inductance
- Maximum operating pressure



CALIBRATION SUPPORT

14.6	15.1	15.6	14.2	13.1	12.7	11.6
20.9	22.5	22.0	19.1	18.0	17.3	15.6
24.7	25.6	27.0	24.6	22.6	21.9	19.7
28.3	29.3	31.4	28.4	27.5	26.4	23.8
34.3	34.9	36.7	33.6	32.3	31.1	29.0
41.9	41.5	42.4	38.4	37.4	36.1	32.5
49.6	49.4	48.5	45.1	44.1	42.6	37.0
55.5	53.8	53.8	54.3	55.1	52.9	45.2
59.9	60.8	59.6	62.9	62.8	60.5	53.5
64.5	66.3	66.2	71.1	69.9	65.4	58.9
69.6	71.0	72.4	75.1	72.7	69.0	64.1
74.6	75.2	76.2	78.0	75.8	72.3	68.0
79.7	79.5	80.1	80.9	78.9	75.9	71.4
84.8	83.7	83.5	84.2	82.0	78.9	74.6
90.1	88.6	88.3	88.4	86.2	82.9	78.4
95.5	94.1	93.8	93.8	91.2	87.6	82.6
100.9	100.7	100.4	99.2	96.3	92.1	86.9



DIRECT FIT



OEM QUALITY COMPLETE PRODUCT

NHP injector products are direct-fit installation, flow-matched sets with the correct spigot dimensions, orientation pin to the fuel rail, correct body outline to the cylinder head, and correct electrical connector for the OEM harness.

PREMIUM PRODUCT SUPPORT

Every product includes a comprehensive installation and tuning guide developed by Nostrum's highly skilled team. Our technicians and engineers are available for additional support to ensure your success!

FIND SOME OF OUR DI INJECTOR APPLICATIONS ON THE BACK!

NOSTRUM HIGH FLOW DIRECT INJECTION FUEL INJECTORS

2.0L VW EA888



3.0L NISSAN VR30DDTT



GM GEN V V8



2.0L GM ECOTEC LTG



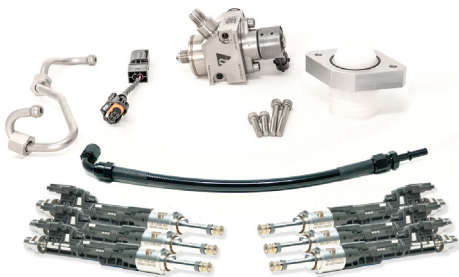
2.0L SUBARU FA20DIT STAGE 1



BMW N55/S55 STAGE 1 & 2



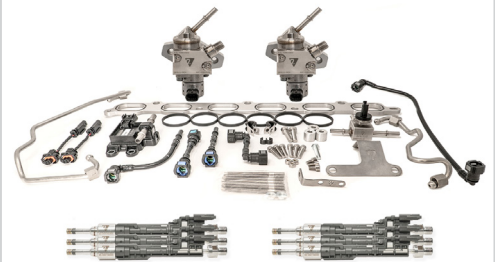
BMW N55 STAGE 1 BUNDLE



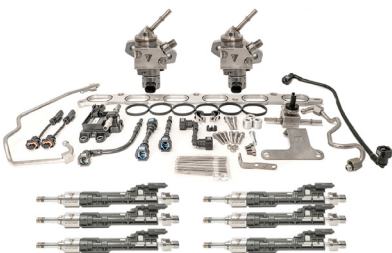
BMW N55 STAGE 2 BUNDLE



BMW S55 STAGE 1 BUNDLE



BMW S55 STAGE 2 BUNDLE



3.0L ECOBOOST STAGE 1 BUNDLE



3.0L ECOBOOST STAGE 1



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Increase vehicle fuel flow capacity through the RPM range with OE grade pump kits developed using NHP's Tier 1 engineering capabilities and built in our PPAP validated processes. These comprehensive kits include all the high-quality parts needed for a direct fit, clean installation, and trouble-free performance. Flow rate increases range from +22% to +63% over stock depending on the application.

OEM BUILD QUALITY

Pump assemblies are fully stainless-steel welded and guaranteed to provide a durable and leak free product. Each HPFP product is application specific with attention to long term performance and quality.

KIT COMPONENTS INCLUDE:

- OEM style stainless-steel high-pressure tube
- Direct connect low pressure tube assemblies
- All the additional hardware needed for a high-quality installation
- No trimming, permanent modification, or additional parts required

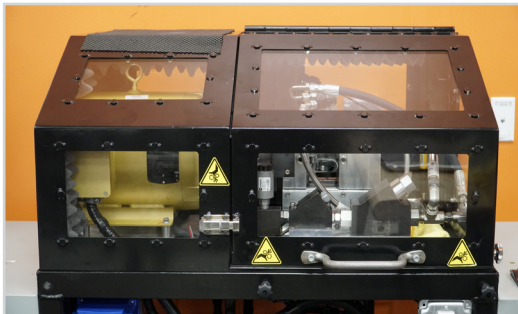
OEM TYPE ACCESSORIES FOR S55



TESTING & VALIDATION

During the development process, our products are subject to vehicle validation testing and mileage accumulation on a range of fuels. Every production HPFP is 100% inspected and dynamically tested at vehicle relevant conditions for quality and performance prior to shipment.

TESTING



IN-VEHICLE VALIDATION



PREMIUM PRODUCT SUPPORT

Detailed installation and tuning guides are developed and validated by our highly skilled team. Additional support is also available to ensure your success!

*Installation guides are available to retail and dealer customers.

*Tuning guides are available to our dealer and certified tuner network.

TUNING



INSTALLATION



3.0L BMW N55 BIG BORE



3.0L BMW N55 BIG BORE STAGE 1 BUNDLE



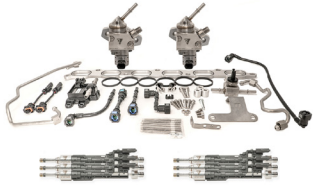
3.0L BMW N55 BIG BORE STAGE 2 BUNDLE



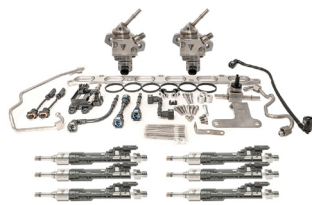
3.0L BMW TWIN S55 STANDARD BORE



3.0L BMW TWIN S55 STAGE 1 BUNDLE



3.0L BMW TWIN S55 STAGE 2 BUNDLE



3.0L ECOBOOST FORD EXPLORER BIG BORE



3.0L FORD EXPLORER BIG BORE STAGE 1 BUNDLE



2.0L GM ECOTEC LTG STANDARD BORE



2.0L GM ECOTEC LTG BIG BORE



2.3L ECOBOOST FORD MUSTANG BIG BORE



2.3L FORD FOCUS RS BIG BORE



SUBARU FA20F



SUBARU FA20F STAGE 1 BUNDLE



3.0L SC VAG EA837



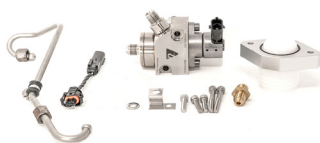
2.0L VAG EA888 GEN 3



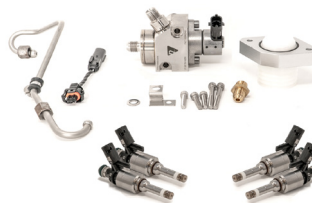
2.0L VW EA888 STANDARD BORE



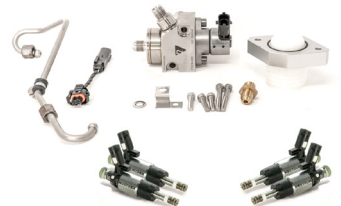
2.0L VW EA888 BIG BORE



2.0L VW EA888 STAGE 2 BUNDLE



2.0L VW EA888 STAGE 3 BUNDLE



FOR VR30 338, VR30 405, CLA45 APPLICATIONS
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Nostrum's Port Fuel Injection (PFI) injectors use nozzles with colliding jet technology to achieve superior atomization and application specific spray pattern designs to minimize intake manifold and intake port wall wetting to give you the most efficient fuel delivery. These spray-targeted, high flow injectors are available for a variety of vehicle and engine applications with more to be added in 2022!

OPTIMAL DESIGN TO FIT YOUR ENGINE

Each engine design requires a specific spray pattern with tightly controlled injector specifications to optimize vehicle performance. Nostrum meets these demands using our Tier 1 capabilities and high precision tools including state-of-the-art Computational Fluid Dynamics (CFD) analytics and engine specific CAD to run virtual design of our injectors.

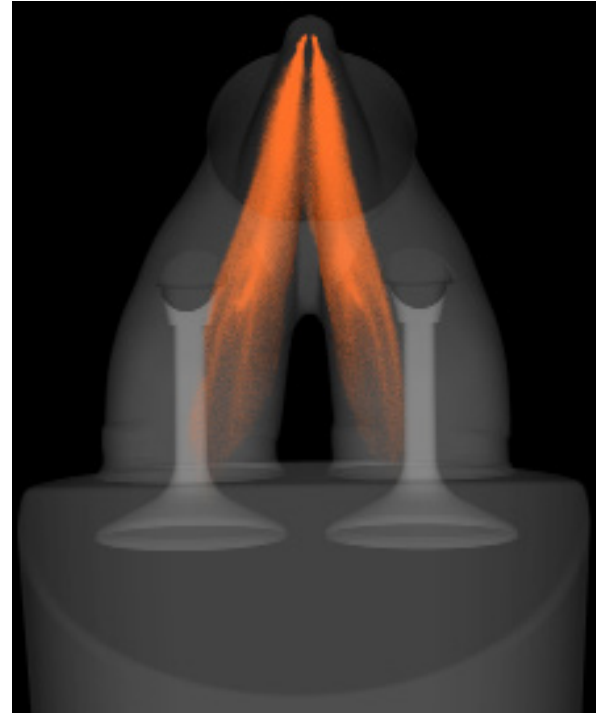
OEM QUALITY SPLIT GAMMA CAPABILITY

Our PFI injectors are custom designed for specific intake port geometries. On most four valve cylinder head applications this requires using split gamma/twin spray technology where the injectors have individual spray plumes that target behind each intake valve. Nostrum's injectors for these applications retain the OEM split gamma design while supporting increased flow rate and retaining factory-like idle and drivability.

TWO STATION PRODUCTION PFI TEST ASSET



SPLIT GAMMA CFD IMAGING



COMPREHENSIVE TESTING PROCESSES

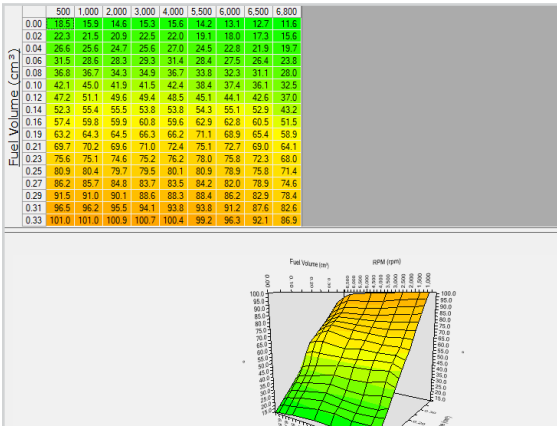
Nostrum production injectors are individually serial numbered and 100% tested at vehicle relevant conditions to evaluate critical injector parameters including:

- Pressure decay
- Opening and closing time
- Static flow at multiple pressures
- Dynamic flow at multiple pulse widths
- Resistance and inductance
- SMOV & DMOV

IN-VEHICLE VALIDATION

Prototypes are run through rigorous validation processes that include installation of our injectors in-vehicle. In-vehicle testing includes calibration verification, driveability, and full load testing on our in-house AWD capable chassis dynamometer. Our validation process ensures a high product quality and unmatched vehicle fitment.

CALIBRATION SUPPORT



DYNAMOMETER VALIDATION



PREMIUM PRODUCT SUPPORT

Every product includes comprehensive installation instructions as well as tuning guides developed by Nostrum's highly skilled team. Our technicians and engineers are available for additional support to ensure your success!

- Installation guides are available to retail and dealer customers.
- Tuning guides are available to our dealer and certified tuner network.

PFI SPECIFICATIONS

- Same OEM injector outline for direct fit
- No spacers or adapters necessary!
- Patented orifice plates produce optimized fuel delivery and efficient combustion
- Compatible with ethanol up to E100
- Flow range: 400-1050 cc/min @ 3 bar
- 100% flow matched batched sets
- Every injector set is batched based on multiple dynamic and static test points as well as opening and closing time

EXAMPLE PORT FUEL INJECTOR APPLICATIONS

1000CC NISSAN 350Z (VQ35)



950CC FORD 5.0L COYOTE/5.2L VOODOO



1000CC NISSAN GTR (VR38)/370Z (VQ37)



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