NO BRAND

WATER PUMP UPGRADE KIT

KTM 790 / 890 / 990
KOVE 800X / 800 GT / 800 Rally
CFMOTO MT / MT-X 800 / 1000

Hydraulic performance and thermal-transport assessment

Technical Dossier – Partner Release, Revision 8.0

+60.2%	+65.4%	Ø43.4 mm
Simulated outlet flow vs OEM at 3,000 rpm (pump driven 1:1 with engine)	Simulated outlet flow vs OEM at 6,000 rpm (pump driven 1:1 with engine)	Same impeller diameter, blade count (6) and port interfaces as OEM; semi-open impeller with full-height blades, 10 mm housing spacer

Release position. This revision supersedes all previous NO BRAND partner-facing drafts. Primary claims are restricted to quantities reproducible from the October 2026 CFD source or to NO BRAND-confirmed design facts. Pump head, efficiency, shaft power, cavitation margin and vehicle temperature are not claimed; they are defined as measurement items in the validation plan (Section 10).

The 9,000 rpm source case is reported in Section 4 with qualification. It is not used as a release-level claim until the OEM case is repeated and the local low-pressure region of the NO BRAND case is resolved with documented settings (Sections 5.1 and 5.3).

Reading guide: Sections 1–5 define what the source establishes; Sections 6–7 derive only the thermodynamic consequences of those values; Sections 8–11 list open engineering items, the validation path and the approved wording. Appendices contain the arithmetic audit, source-data reconciliation and references. Annex B reproduces the original CFD report unaltered.

Document	Technical Dossier, Partner Release Rev 8.0
Date	1 November 2026
Prepared by	NO BRAND R&D; (internal engineering review)
Source record	NO BRAND R&D;, Technical Report on Simulation Results – OEM vs NO BRAND water pump, October 2026 (Annex B)
Status	Internal engineering review of simulation results. Not a homologation, certification or third-party review.

1. Executive summary

This dossier reviews the October 2026 CFD comparison of the OEM water pump and the NO BRAND upgrade geometry, simulated on the KOVE 800 pump. The source contains clear comparative flow results, together with internal inconsistencies and incomplete modelling metadata. The dossier therefore separates direct CFD outputs, arithmetic reconstructions, conditional thermodynamic calculations and system-level outcomes that still require measurement.

- **Primary hydraulic result.** Outlet volumetric flow is 63.63 vs 101.93 L/min at 3,000 rpm (+60.2%) and 124.13 vs 205.30 L/min at 6,000 rpm (+65.4%), OEM versus NO BRAND.
- **Applicability.** The pump housing, ports and OEM impeller are identical on all listed KTM 790/890/990, KOVE 800X/800 GT/800 Rally and CFMOTO MT/MT-X 800/1000 models (NO BRAND confirmed), so the pump-level results apply to all of them. Radiator size and coolant volume differ between models, so system-level thermal effects can differ.
- **Field experience.** The kit has been in customer use for 3 years, with kits beyond 40,000 km and no reported problems. OEM polymer impellers with cracked shrouds and blade roots have been observed by NO BRAND in service (Section 9).
- **Design basis.** Impeller diameter (Ø43.4 mm), blade count (6) and port interfaces are unchanged. The OEM impeller is closed (shrouded); the NO BRAND impeller is semi-open, with full-height blades whose leading edges extend into the impeller eye, and the housing is extended by a 10 mm spacer. A larger effective blade passage at the same tip speed is the physical explanation for the flow gain. In a semi-open design the blade-tip clearance to the cover is a governing dimension; it is not specified as a nominal value and is checked functionally at installation.
- **9,000 rpm.** The source reports 159.62 vs 306.97 L/min (+92.3%). The value is reported, not corrected, and is not a release-level claim: the OEM case departs from its own lower-speed trend and the NO BRAND case shows a local low-pressure region that needs resolving (Section 5).
- **Internal consistency.** Inlet velocity ratios match the flow ratios within 0.5%. Reported outlet-velocity values do not scale with flow for an unchanged outlet port and are excluded from quantitative claims until their averaging definition is confirmed.
- **Pressure and power.** Pump head and hydraulic power are not calculated, because inlet and outlet pressure quantities are not defined consistently in the source. Higher flow at the same speed requires higher shaft power; that cost is quantified on the pump bench (Section 10, stage 3).
- **Thermal consequence.** If the installed flow ratio equals the CFD flow ratio, the bulk coolant temperature rise needed to carry the same heat load is lower by 37.6% at 3,000 rpm and 39.5% at 6,000 rpm. This is a conditional energy balance, not a prediction of the ECU coolant reading.
- **Cavitation.** Pressure magnitudes in the source plots are consistent with absolute pressure. Local negative values in the NO BRAND 9,000 rpm impeller-eye region are non-physical; they indicate either a numerical artefact or cavitation that the single-phase model does not represent. No cavitation margin is claimed for either pump; resolving this region is the first CFD re-run item.

Partner-ready statement. With the pump driven 1:1 with engine speed, the supplied CFD cases show a NO BRAND outlet-flow advantage of 60.2% at 3,000 rpm and 65.4% at 6,000 rpm versus OEM, with the same impeller diameter, blade count and port interfaces. If that flow ratio is retained in the installed circuit, the bulk coolant temperature rise needed to transport a given heat load is correspondingly lower. Pump curves, shaft power, installed flow, cavitation margin and vehicle temperature are being measured under the validation plan in this dossier and are not claimed as established results.

2. Evidence hierarchy and source control

Level	Evidence	Release use
A – direct CFD output	Inlet/outlet volumetric flow, velocity metrics, reported outlet pressure, field plots at 3 speeds	Primary source values, with stated limitations
B – deterministic arithmetic	Flow gains, mass-balance mismatch, ratios, velocity/flow consistency check	Reproducible from Level A
C – conditional energy balance	Bulk-ΔT ratio and illustrative ΔT for a stated heat load	Valid only if installed flow ratio equals CFD flow ratio

Level	Evidence	Release use
D – scenario	Radiator convection scaling, vehicle temperature scenarios	Engineering exploration only; not a product claim
Not established	Pump curve, shaft power, efficiency, NPSH/cavitation margin, installed flow, vehicle temperature	Section 10 tests

Source precedence. The October 2026 CFD report is the source record and is reproduced unaltered in Annex B. Where its narrative, charts and comparison table differ, the conflict is recorded in Appendix A and one canonical value is selected for arithmetic consistency. A canonical value is not a substitute for a documented CFD re-run.

3. Design configuration under evaluation

Geometry and drive data below are NO BRAND design specifications, not CFD outputs. They define the analysed configuration.

Feature	OEM	NO BRAND	Evidence status
Inlet/outlet port interfaces	Reference	Unchanged	Design specification
Impeller outer diameter	43.4 mm	43.4 mm	Design specification
Impeller overall height	19.35 mm	24.5 mm (+5.15 mm, +26.6%)	NO BRAND: specification; OEM: measured on part
Pump housing	Original	Original + 10 mm spacer; original cover retained	Design specification
Impeller type	Closed (front shroud and back disc)	Semi-open (back disc only; the cover acts as stationary shroud)	Design specification; visual inspection of parts
Blade count	6	6	Visual inspection of parts
Blade geometry	OEM; blade height limited by shroud	Full-height blades, leading edges extended into the impeller eye	Design specification
Blade-tip clearance to cover	Not applicable (closed impeller)	No nominal value specified; functional check at installation (free rotation, no contact)	Open item; see Sections 8–10
Impeller material	Injection-moulded polymer	CNC-machined 6061-T6 billet aluminium, black anodised	Product specification
Pump drive ratio	1:1 with engine speed	1:1 with engine speed	Vehicle design fact
Applicability	Same pump on all listed models	Same kit on all listed models	NO BRAND confirmed; radiators differ by model

Engineering interpretation. Both impellers have the same diameter and blade count, so blade tip speed and blade number are identical. The differences are the impeller type and the blade passage. In the closed OEM impeller the shroud and its eye neck take up a significant part of the 19.35 mm overall height, so the effective blade passage is markedly lower than the overall height. The semi-open NO BRAND impeller has no shroud: its blades occupy the full 24.5 mm and extend into the eye, enlarging both the blade exit width and the inlet flow area. This explains why the simulated flow gain (+60–65%) is larger than the overall-height ratio (+26.6%). The separate contribution of exit width, inlet geometry and chamber height cannot be isolated from this study; a parametric CFD study or bench test would be required.

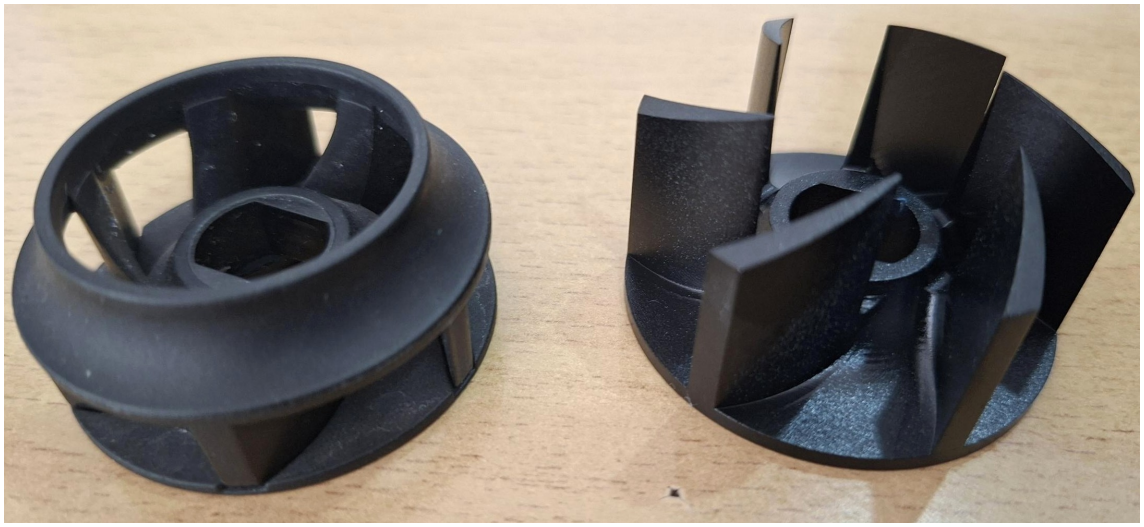


Figure 0. OEM impeller (left: closed, polymer, used part) and NO BRAND impeller (right: semi-open, 6061-T6 aluminium). Both have 6 blades and Ø43.4 mm.

Implications of the semi-open design. Without a shroud, part of the flow can leak over the blade tips from the pressure to the suction side. Flow and efficiency are therefore sensitive to the blade-tip clearance to the cover, and the clearance must be the same in the CFD model and in the assembled pump. Semi-open impellers are commonly less efficient than closed ones of similar size and more sensitive to clearance growth from tolerances or wear. These effects are covered by the clearance measurement, the documented CFD re-run and the bench power measurement (Sections 8–10).

4. Canonical hydraulic dataset and arithmetic audit

rpm	Outlet flow OEM [L/min]	Outlet flow NB [L/min]	Flow gain	Inlet v OEM / NB [m/s]	Outlet v OEM / NB [m/s]†	Reported outlet P OEM / NB [bar]†
3,000	63.63	101.93	+60.2%	1.73 / 2.76	3.63 / 4.09	1.095 / 1.096
6,000	124.13	205.30	+65.4%	3.36 / 5.54	7.22 / 8.20	1.329 / 1.347
9,000*	159.62	306.97	+92.3%	4.31 / 8.31	8.25 / 12.26	1.391 / 1.761

* 9,000 rpm: source result, reported with qualification (Section 5). † Retained for traceability only: outlet velocity is excluded from claims pending its averaging definition; reported outlet pressure is not interpreted as pump head.

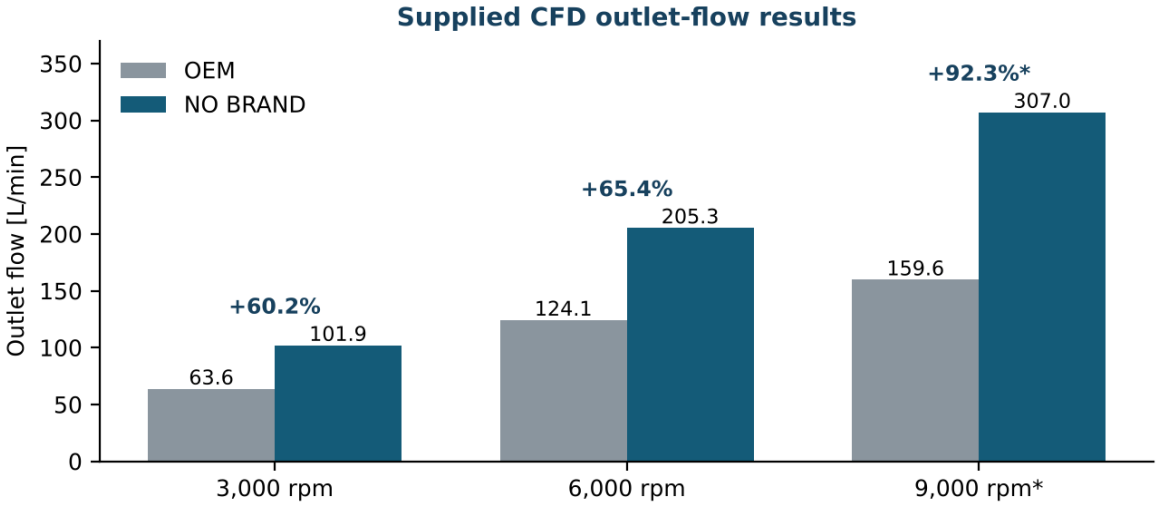


Figure 1. Supplied CFD outlet-flow results.

4.1 Flow conservation

rpm	OEM |Qout−Qin|/Qin	NO BRAND |Qout−Qin|/Qin
3,000	0.09%	0.41%
6,000	0.59%	0.84%
9,000	0.61%	0.51%

All six mismatches are below 0.85%, which indicates good inlet/outlet mass accounting at the reported precision. It does not replace residual histories, grid-independence, turbulence-model assessment or rotating-interface validation.

4.2 Velocity consistency check

For an unchanged cross-section, an area-averaged velocity ratio should track the volumetric-flow ratio. The NB/OEM inlet-velocity ratio differs from the flow ratio by -0.41%, -0.31% and +0.26% at 3,000/6,000/9,000 rpm. Because inlet velocity and inlet flow are likely evaluated on the same surface, this is a consistency check of the post-processing rather than independent evidence of the flow gain. The reported outlet-velocity ratios are lower than the flow ratios by 23–31%, which is not possible for an unchanged outlet port if both quantities are area averages on the same surface.

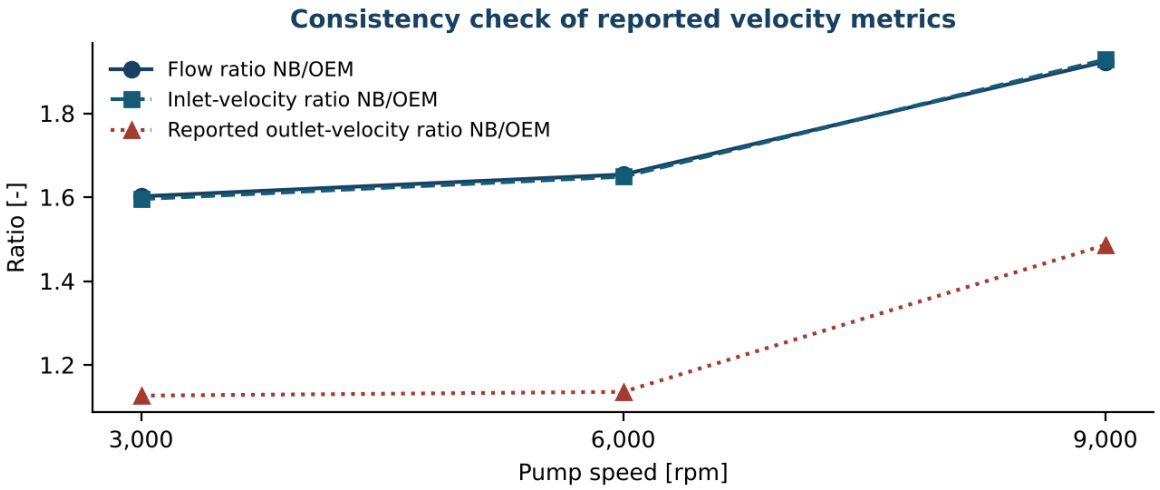


Figure 2. Inlet velocity is consistent with the flow ratio; the reported outlet-velocity metric is not.

Audit decision. Volumetric flow is the primary hydraulic quantity. Outlet velocity is not used to support any claim until the source defines its averaging surface and method.

5. Speed scaling, pressure interpretation and the 9,000 rpm case

5.1 Speed-normalized flow

rpm	OEM [L/min per 1,000 rpm]	NO BRAND [L/min per 1,000 rpm]
3,000	21.21	33.98
6,000	20.69	34.22
9,000	17.74	34.11

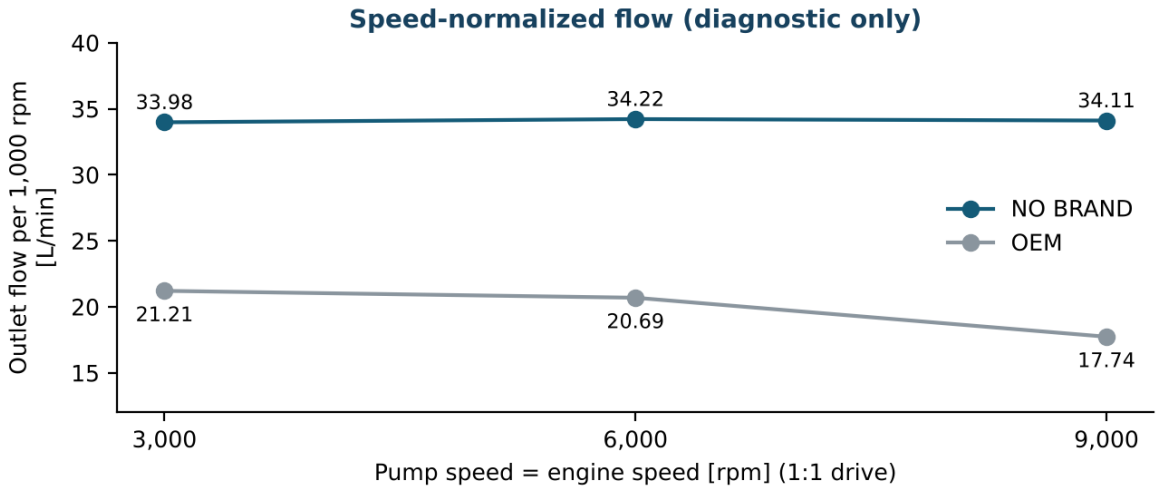


Figure 3. Speed-normalized flow at the 1:1 engine:pump drive ratio. Diagnostic trend only.

The NO BRAND cases scale almost exactly with speed (33.98, 34.22 and 34.11 L/min per 1,000 rpm). The OEM cases give 21.21, 20.69 and 17.74. The OEM 9,000 rpm result is therefore a re-check item. It is not declared erroneous, because the source does not document whether boundary conditions are homologous across speed. Affinity laws are used only as a plausibility indicator for each pump across speed, not as a validity test of an undocumented CFD set-up, and no trend-derived replacement value is issued.

5.2 Reported pressure data

rpm	Reported outlet pressure OEM [bar]	Reported outlet pressure NB [bar]	NB − OEM (reported outlet value only)
3,000	1.095	1.096	+0.14%
6,000	1.329	1.347	+1.40%
9,000	1.391	1.761	+26.59%

The source labels the inlet value as total pressure only in the 3,000 rpm narrative (OEM 102,367 Pa; NO BRAND 101,325 Pa) and does not define the outlet pressure as static or total, nor the averaging surfaces. These values are therefore not combined into a pressure rise. No pump head or hydraulic power is calculated at any speed; the pump bench (Section 10, stage 3) measures both directly.

5.3 Local low-pressure region and cavitation

The source plots are labelled “Pressure [Pa]”. Their magnitudes in the pipes and volute (roughly 90–140 kPa) and the 101,325 Pa inlet value are consistent with absolute pressure. On that reading, the local values below zero shown in the NO BRAND impeller-eye region (where the extended blade leading edges sit) at 9,000 rpm (legend minimum −148.6 kPa; about −9 kPa at 6,000 rpm) are not physical: a liquid cannot sustain negative absolute pressure. They indicate either a numerical artefact of the single-phase solution or a region where the real coolant would reach vapour pressure, i.e. cavitation that the model does not represent.

This matters most at high speed and with hot coolant, whose vapour pressure is higher, and it is consistent with the higher inlet velocity of the NO BRAND pump (8.31 vs 4.31 m/s at 9,000 rpm). The OEM pump is not shown to be free of the same effect: its plots were not analysed at that resolution and no margin is claimed for it either.

Treatment. No cavitation margin is claimed for either pump. The NO BRAND 6,000 and 9,000 rpm cases are re-run with documented absolute reference pressure, a realistic system inlet pressure and a cavitation-capable model, and cavitation onset is checked on the bench (Section 10, stages 1–2). Until then the 9,000 rpm values are not a release claim.

6. Thermal transport – deterministic consequence of flow

For a steady heat load carried by one coolant stream, $\dot{Q} = \dot{m} \cdot cp \cdot \Delta T$. With the same coolant in both configurations, the percentage reduction of the bulk temperature rise depends only on the flow ratio.

Coolant basis. The installed coolant is Pro Honda HP Coolant, a 50/50 ethylene-glycol / distilled-water mixture. For the illustrative 10 kW values, ASHRAE properties for 50 vol% ethylene-glycol/water at 90 °C are used (ρ = 1.03095 kg/L, cp = 3.551 kJ/kg·K). The percentage reduction does not depend on these values.

rpm	ṁ OEM [kg/s]	ṁ NB [kg/s]	ΔT OEM per 10 kW [°C]	ΔT NB per 10 kW [°C]	Reduction
3,000	1.093	1.751	2.58	1.61	37.6%
6,000	2.133	3.528	1.32	0.80	39.5%
9,000*	2.743	5.275	1.03	0.53	48.0%*

* Based on the 9,000 rpm source case, which is not a release claim (Section 5).

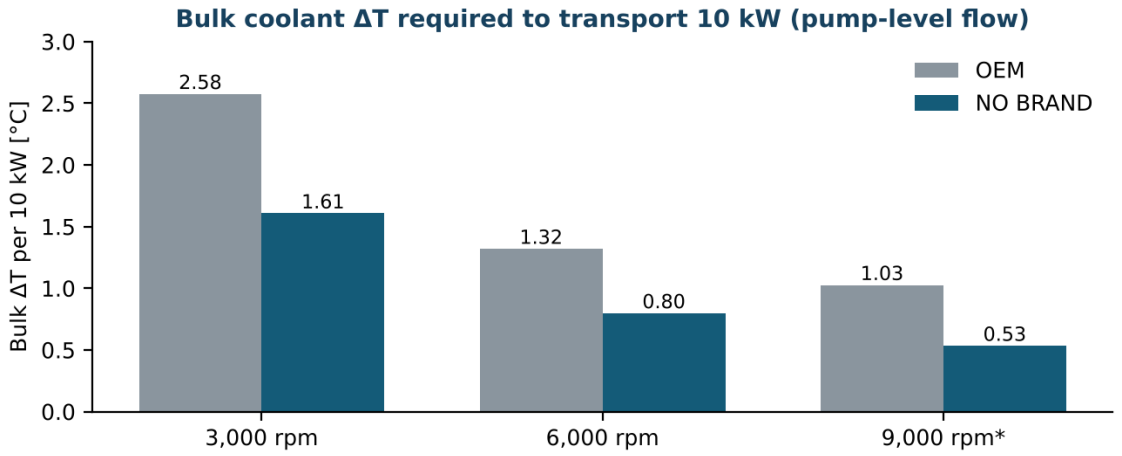


Figure 4. Bulk ΔT needed to carry 10 kW if the CFD flow were the installed flow.

What this shows. At equal heat load, a higher coolant mass flow needs a smaller bulk temperature rise to carry the same heat: 37.6% smaller at 3,000 rpm and 39.5% smaller at 6,000 rpm at the CFD flow ratios. It is a heat-transport relationship, not a prediction of engine or ECU coolant temperature.

7. Why an exact vehicle-temperature reduction is not reported

A system-level thermal prediction needs the installed pump operating point, radiator UA and airflow or fan curve, coolant- and air-side pressure losses, engine heat rejection versus load, thermostat and bypass flow, coolant volume and thermal masses. These are not part of the CFD package; a single “X °C cooler” figure without them would be false precision.

Installed flow. In the vehicle, flow is set by the intersection of the pump curve with the circuit resistance. The CFD gain is a pump-level result under the source boundary conditions; the installed gain may differ and is typically lower in a resistive circuit. It is measured directly in the vehicle A/B test with an inline flow meter.

Sensitivity worksheets (coolant-side share of radiator thermal resistance, installed-flow gain) are kept as internal engineering tools and are excluded from the claim set.

Thermostat. The analysis applies to the fully open thermostat condition. The opening threshold is not used in any calculation.

8. Numerical and modelling limitations – register

Topic	What is known	Release treatment	Closure
Boundary conditions	Not fully documented for all speeds/configurations	No head, pump-curve or installed-flow claim	Re-run with identical documented BCs
Pressure field	Magnitudes consistent with absolute pressure; local non-physical negative values (NO BRAND, 6,000/9,000 rpm)	9,000 rpm not a release claim; no cavitation margin claimed	Documented reference; cavitation-capable run; bench onset test
Mesh independence	Not supplied	Comparative source output only	Three-mesh grid-convergence study
Residual histories	Not supplied	Mass balance used as limited check	Publish residuals and criteria
Turbulence / wall treatment	Not supplied	No uncertainty assigned to absolute values	Document model, y+, wall treatment
Rotating-domain method	Not supplied	No solver-method claim	Document MRF/sliding-mesh settings
CFD working fluid	Properties and temperature not documented	Absolute outputs kept as source results	Document fluid in controlled re-run
Outlet velocity metric	Inconsistent with flow ratio for unchanged port	Excluded from claims	Confirm averaging surface/method
OEM 9,000 rpm	Below its own lower-speed trend	Reported, not primary	Re-run and compare
Installed circuit	No system curve simulated	Pump-level flow not assumed equal to vehicle flow	Bench curves + vehicle A/B
Shaft power / efficiency	Not simulated or measured; higher flow at equal speed needs more power	Cost acknowledged, not quantified	Torque/power on pump bench
Blade-tip clearance (NO BRAND)	No nominal value specified; functional check at installation; clearance in the CFD model not documented	Flow results apply to the modelled clearance only	Measure assembled kits; define nominal value and tolerance; model as-built clearance in re-run
Durability	3 years of customer use, kits beyond 40,000 km, no reported problems	Field experience stated; no laboratory endurance claim	Keep a case record (model, km, fitting date); structured inspection of returned units

9. Engineering considerations for prototype and production

- **Blade-tip clearance.** For the semi-open NO BRAND impeller, the axial clearance between blade tips and cover is the most important assembly dimension. Measure it with the 10 mm spacer installed, at assembly and at operating temperature, including tolerance stack-up, and define a nominal value with tolerance for production.
- **Dynamic balance and blade fatigue.** Define a balance requirement for operation up to 9,000 rpm and record residual unbalance. Check the free, unshrouded blade tips for vibration and fatigue at operating speed.
- **Seal and bearing load.** The taller impeller changes overhang and hydraulic load; inspect seal and bearings after endurance running.
- **Material and coolant.** CNC-machined 6061-T6 billet aluminium, anodised. Confirm anodising integrity and long-term compatibility with the coolant specified for each model and the other metals in the circuit. The alloy is independent of the hydraulic CFD result.
- **Field experience and OEM failure mode.** NO BRAND kits have been in customer use for 3 years, with kits beyond 40,000 km and no reported problems. NO BRAND has observed OEM polymer impellers with cracks through the shroud and into the blade roots (Figure 9.1). The aluminium impeller removes this polymer failure mode; a documented case record is recommended to support the field statement.



Figure 9.1. Cracked OEM polymer impellers removed from motorcycles in service (NO BRAND photo). Cracks circled in red.

- **Manufacturing fidelity.** Production parts must reproduce blade geometry, edge radii, surface finish and critical dimensions of the analysed CAD; keep as-built metrology with the test record.
- **Assembly repeatability.** Define spacer flatness, O-ring compression, fastener torque and bleed procedure, since installation variation can change system flow and thermal behaviour.

10. Validation plan

Stage	Method	Output / acceptance evidence
0. Field record	Case list of fitted kits: model, mileage, fitting date, any findings; inspection of any returned unit	Documented support for the 3-year / 40,000 km statement
1. CFD close-out	Re-run OEM and NO BRAND at 3k/6k/9k rpm (1:1 engine:pump) with the as-built NO BRAND blade-tip clearance and identical documented BCs, fluid properties and temperature; absolute reference pressure; mesh convergence; residuals; turbulence and rotating-domain settings; definition of every reported pressure and velocity average	Traceable dataset with convergence record; matched head comparison; confirmed 9,000 rpm case
2. Cavitation	Cavitation-capable CFD with coolant vapour pressure at operating temperature and realistic system pressure; bench NPSH / cavitation-onset observation	Cavitation margin or onset speed for both pumps
3. Pump bench	Q–ΔP curves for both pumps at 3k/6k/9k rpm; shaft torque and power; NO BRAND at nominal and maximum-tolerance tip clearance; controlled fluid temperature; repeat runs; ISO 9906 principles where applicable	Pump curves, efficiency, power cost, installed-flow estimate
4. Vehicle A/B	Same motorcycle, radiator, coolant, map, fill/bleed and fan logic; ambient within ±1 °C; ECU coolant plus radiator inlet/outlet thermocouples; inline flow meter; randomized order; ≥3 runs per configuration	Installed flow, time to threshold, stabilized temperature, radiator ΔT, fan duty, with confidence intervals
5. Endurance / production	Balance, clearance, seal/bearing inspection, thermal cycles, as-built dimensional verification	Durability and production repeatability

11. Claims register – approved wording

Statement	Status	Approved use
“The supplied CFD cases show +60.2% outlet flow at 3,000 rpm and +65.4% at 6,000 rpm versus OEM.”	Established as simulation comparison	Yes – primary claim
“Same impeller diameter, blade count and port interfaces as OEM; semi-open impeller with full-height blades and 10 mm housing spacer.”	Design specification	Yes
“The source 9,000 rpm case shows +92.3%.”	Source output; verification pending	Only with qualification
“Same pump on all listed KTM, KOVE and CFMOTO models; results apply to all.”	NO BRAND confirmed design fact	Yes (pump-level results only)

Statement	Status	Approved use
“In customer use for 3 years; kits beyond 40,000 km with no reported problems.”	Field experience	Yes; keep case record
“Aluminium impeller avoids the cracking seen on OEM polymer impellers.”	Material property; field experience	Yes
“Inlet velocity is consistent with the flow ratio.”	Consistency check	Yes
“Outlet velocity confirms the flow gain.”	Not established	No
“Equivalent / higher pump head.”	Not established	No
“Higher flow at equal speed requires more shaft power.”	Physically certain; size not yet measured	Yes, qualitatively
“Any specific hydraulic- or shaft-power figure.”	Not established	No
“At equal heat load the bulk coolant ΔT is lower if the flow ratio is retained.”	Conditional calculation	Yes, with the condition
“The motorcycle runs X °C cooler.”	Not established	No – requires A/B test
“No cavitation / cavitation-safe.”	Not established	No
“Higher efficiency.”	Not established	No

Release position. The evidence supports a strong, reproducible simulated flow-capacity advantage at 3,000 and 6,000 rpm with the same impeller diameter. This dossier stops where the source evidence stops: no head, power, efficiency, cavitation or vehicle-temperature figure is needed to state that result, and each of these is assigned to a defined test.

Appendix A – Source-data reconciliation

Item	Source inconsistency	Treatment in this dossier
OEM outlet velocity	Narrative 3.72 / 7.62 / 8.17 m/s; charts 3.63 / 7.22 / 8.25 m/s	Chart values kept for traceability; metric excluded from claims
OEM flow	Narrative 63.58/63.60, 123.26/124.06, 159.00/159.45 L/min vs chart/table values	Chart/table values used; conflict recorded
OEM 6,000 rpm pressure	132,872 Pa labelled 1.31 bar (chart) and 1.35 bar (table)	Correct conversion: 1.329 bar
NO BRAND flow rounding	Narrative 203.6 and 307 L/min	203.58 and 306.97 L/min
Outlet-pressure deltas	Source +0.3%, +2.5%, +26.3%	Recalculated from Pa: +0.14%, +1.40%, +26.59% (reported outlet values only)
Pressure rise / head	Inlet labelled total pressure at 3,000 rpm only; outlet quantity undefined	No head or hydraulic-power calculation at any speed
Negative pressure values	NO BRAND plots show local values below zero; legend “Pressure [Pa]”	Magnitudes read as absolute; negative values treated as non-physical (artefact or unmodelled cavitation); re-run item
Affinity-law use	Useful as trend check	Plausibility diagnostic only
9,000 rpm trend	OEM 9,000 rpm below its lower-speed trend	No corrected value issued
Outlet-flow sign	Some charts show negative outlet flow (boundary-normal direction)	Magnitudes used
Source conclusions	“Better impeller design”, “clearly outperforms”	Superseded by the claims register (Section 11)

Appendix B – Formula audit

- Flow gain = $Q_{NB}/Q_{OEM} - 1$: 101.93/63.63 − 1 = +60.2%; 205.30/124.13 − 1 = +65.4%; 306.97/159.62 − 1 = +92.3%.
- Mass-balance mismatch = $|Q_{out} - Q_{in}|/Q_{in}$; maximum 0.845% (NO BRAND, 6,000 rpm).
- Heat transport: $\dot{Q} = \dot{m} \cdot cp \cdot \Delta T$ with $\dot{m} = \rho \cdot Q$. At common fluid properties and heat load, $\Delta T_{NB}/\Delta T_{OEM} = Q_{OEM}/Q_{NB}$, so the reduction is $1 - Q_{OEM}/Q_{NB}$.
- No efficiency, power or NPSH equation is used, because shaft torque, matched pressures and the absolute inlet static pressure are not available.

Appendix C – Selected source evidence

The extracts below are reproduced from the source report (Annex B) without alteration.

10. Comparison charts and conclusions

RPM	PARAMETER	NO BRAND	OEM	DELTA
3000	Inlet Velocity	2.76 [m/s]	1.73 [m/s]	+59.8%
	Outlet Velocity	4.09 [m/s]	3.63 [m/s]	+12.7%
	Inlet Volume Flow	101.51 [L/min]	63.57 [L/min]	+59.7%
	Outlet Volume Flow	101.93 [L/min]	63.63 [L/min]	+60.2%
	Outlet Pressure	1.10 [bar]	1.09 [bar]	+0.3%
6000	Inlet Velocity	5.54 [m/s]	3.36 [m/s]	+65.1%
	Outlet Velocity	8.2 [m/s]	7.22 [m/s]	+13.5%
	Inlet Volume Flow	203.58 [L/min]	123.40 [L/min]	+65%
	Outlet Volume Flow	205.30 [L/min]	124.13 [L/min]	+65.4%
	Outlet Pressure	1.35 [bar]	1.31 [bar]	+2.5%
9000	Inlet Velocity	8.31 [m/s]	4.31 [m/s]	+92.7%
	Outlet Velocity	12.26 [m/s]	8.25 [m/s]	+48.5%
	Inlet Volume Flow	305.42 [L/min]	158.66 [L/min]	+92.5%
	Outlet Volume Flow	306.97 [L/min]	159.62 [L/min]	+92.3%
	Outlet Pressure	1.76 [bar]	1.39 [bar]	+26.3%

Figure C1. Source comparison table (source page 23). Known inconsistencies are reconciled in Appendix A.

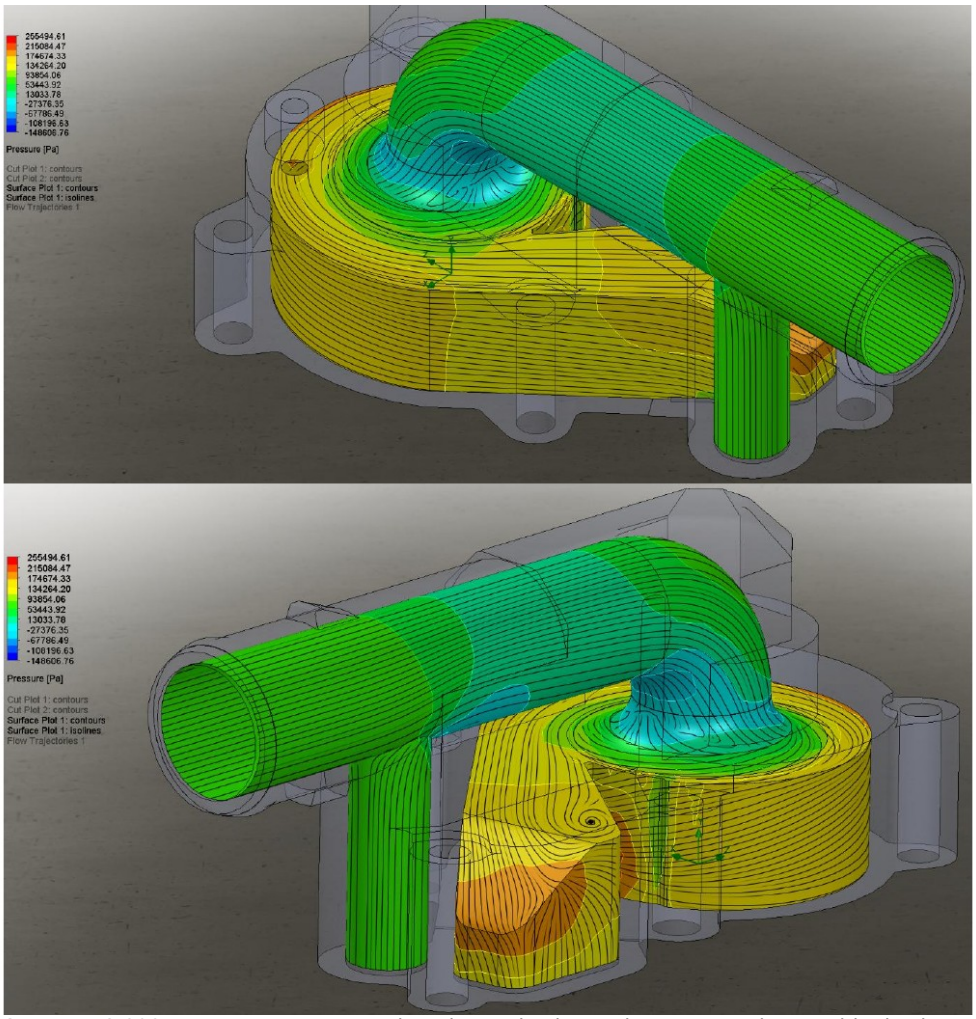


Figure C2. NO BRAND 9,000 rpm source pressure plot. Pipe and volute values are consistent with absolute pressure; the below-zero values in the impeller-eye region are non-physical and are the first CFD re-run item (Section 5.3).

Appendix D – References and provenance

[R1] NO BRAND R&D;, Technical Report on Simulation Results – OEM vs NO BRAND water pump, October 2026. Source record, reproduced in Annex B.

[D1] NO BRAND design specification: impeller Ø43.4 mm; NO BRAND impeller height 24.5 mm; 10 mm housing spacer; modified blade geometry; CNC-machined anodised 6061 aluminium impeller; pump driven 1:1 with engine speed.

[R2] Honda Powersports service and owner documentation: Pro Honda HP Coolant or equivalent ethylene-glycol antifreeze, 1:1 with distilled water.

[R3] ASHRAE Handbook – Fundamentals, Chapter 31, aqueous ethylene glycol: 50 vol%, 90 °C, ρ = 1030.95 kg/m³, cp = 3.551 kJ/(kg·K). Used only for the illustrative 10 kW values.

[R4] KSB Centrifugal Pump Lexicon – Affinity laws. Used as a plausibility framework only; similarity and non-cavitating flow are required.

[R5] ISO 9906:2012, Rotodynamic pumps – Hydraulic performance acceptance tests – Grades 1, 2 and 3. Reference framework for bench verification.

Revision control

Revision 8.0 supersedes previous NO BRAND partner-facing drafts. Changes in Rev 8.0: multi-model applicability (identical pump on all listed KTM, KOVE and CFMOTO models), field experience (3 years, beyond 40,000 km), OEM failure-mode evidence and comparison photographs, blade-tip clearance treated as functional check, material 6061-T6. Changes in Rev 7.3: impeller type (closed OEM vs semi-open NO BRAND), equal blade count (6), blade-tip clearance added as open item (Sections 3, 8–10). Changes in Rev 7.2: measured OEM impeller height (19.35 mm) and revised design interpretation (Section 3). Changes in Rev 7.1: pressure-field interpretation (Section 5.3) and related entries; removal of “independent” wording for the internal review and the velocity check; qualitative shaft-power statement; cover headline restricted to 3,000/6,000 rpm and design facts; 9,000 rpm thermal row marked; release designation changed to Partner Release. The source report is retained unaltered; future revisions keep the canonical table, correction log and claims register.

ANNEX B

Original October 2026 CFD source report

The following 26 pages reproduce the source report unaltered, for full traceability. Its numbers, wording and conclusions are not corrected inside this annex.

Governing rule: where the source narrative, chart labels, percentages or conclusions differ from this dossier, the canonical dataset (Section 4), the reconciliation log (Appendix A) and the claims register (Section 11) of Partner Release Rev 8.0 govern.

TECHNICAL REPORT ON SIMULATION RESULTS

1. Introduction

The purpose of this report is to analyze, evaluate and compare the flow simulation results between the OEM water pump and the NO BRAND water pump kit, for three different operating scenarios. **3000 rpm**, **6000 rpm**, and **9000 rpm**.
The study focuses on comparing key parameters such as inlet and outlet velocities, volume flow rates, and operating pressures.

2. Results Analysis for the OEM water pump by Operating Scenario

2.1. 3000 rpm Operating Scenario

In the 3000 rpm scenario, the key flow characteristics are as follows:

- **Inlet Velocity:** The inlet velocity averaged **1.73 m/s**
- **Outlet Velocity Av:** The average outflow velocity was recorded at **3.72 m/s**
- **Volume Flow Rate:** The inlet and outlet flow rates balance at approximately **63.58 l/min** and **63.60 l/min** respectively, demonstrating mass convergence validity.
- **Pressures:** The inlet total pressure was maintained at **102367 Pa (1.02 bar)**, while the outlet pressure reached **109498 Pa (1.09 bar)**.

2.2. 6000 rpm Operating Scenario

By doubling the rotational speed to 6000 rpm, the following changes are observed:

- **Inlet Velocity:** Increased noticeably to **3.35 m/s** scaling proportionally relative to the 3000 rpm case.
- **Outlet Velocity:** The average outflow velocity rose to **7.62 m/s**
- **Volume Flow Rate:** The flow rate doubled, approximating **123.26 l/min** at the inlet and **124.06l/min** at the outlet.
- **Pressures:**The outlet pressure increased significantly to **132872Pa (1.31 bar)**

ANNEX B – ORIGINAL OCTOBER 2026 CFD SOURCE – SOURCE PAGE 1/26 – UNALTERED – REV 8.0 GOVERNS CORRECTIONS

2.3. 9000 rpm Operating Scenario

In the highest evaluated scenario at 9000 rpm:

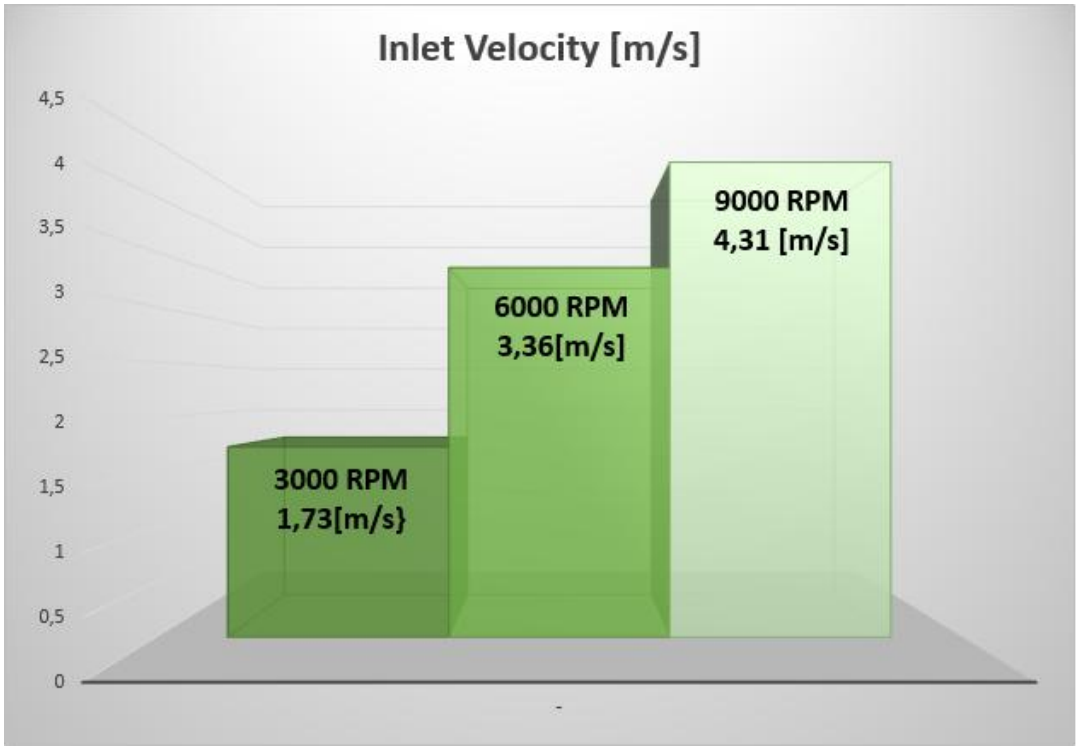
- **Inlet Velocity:** Reached **4.33 m/s**
- **Outlet Velocity:** The average outflow velocity was at **8.17 m/s**
- **Volume Flow Rate:** The flow increased to **159.00 l/min** (inlet) and **159.45 l/min** (outlet).
- **Pressures:** The outlet pressure settled at **139069 Pa (1.39 bar)**

3. Comparative Summary for the OEM pump and Conclusions

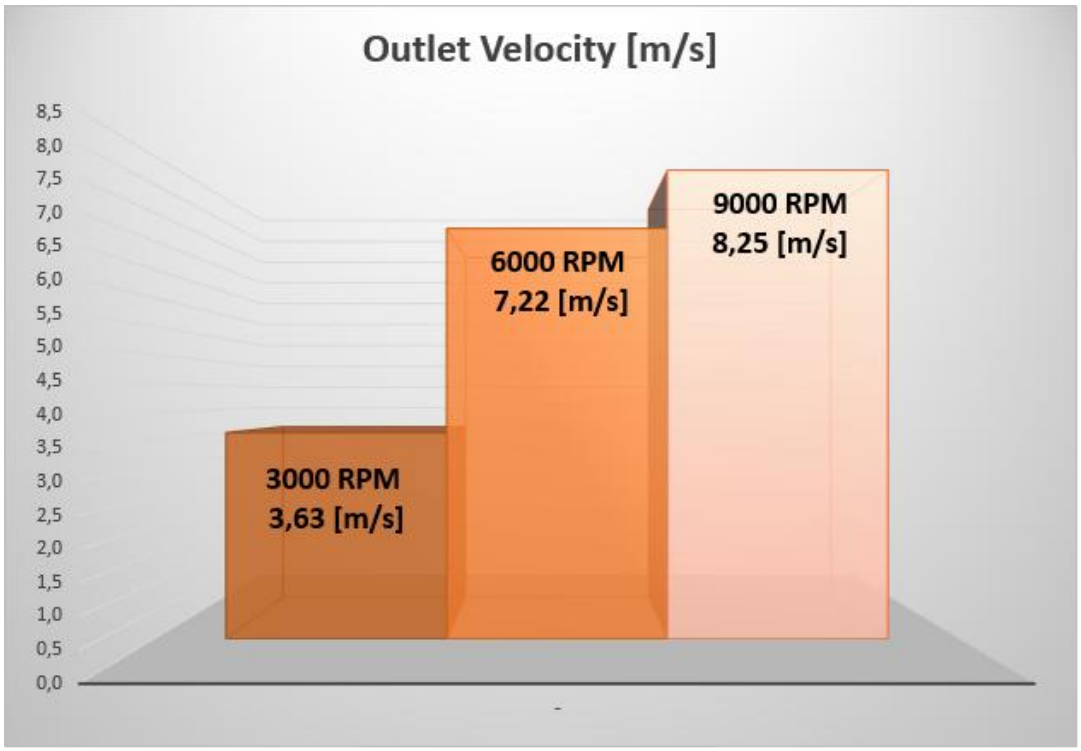
Scenario [rpm]	Inlet Velocity [m/s]	Outlet Velocity [m/s]	Outlet Pressure [Pa]	Inlet Volume Flow Rate [l/min]	Outlet Volume Flow Rate [l/min]
3000	1.73	3.72	109498 (1.09 bar)	63.58	63.60
6000	3.35	7.62	132872 (1.35 bar)	123.26	124.06
9000	4.33	8.17	139069 (1.39bar)	159.00	159.45

4. OEM Charts

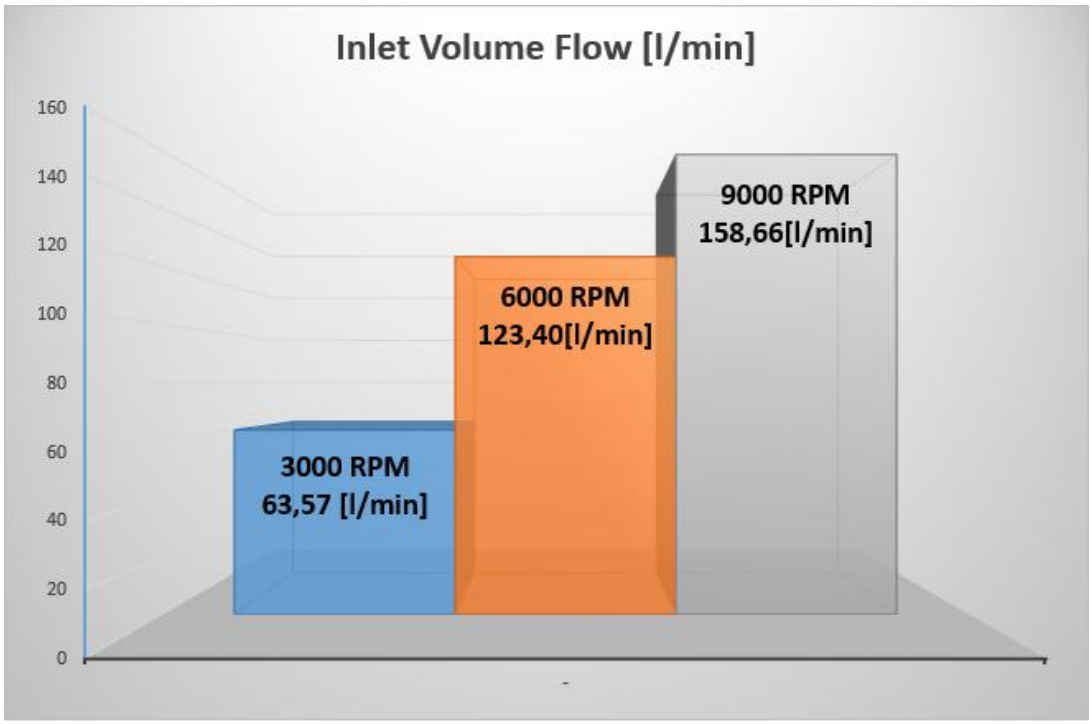
4.1. Inlet velocity chart



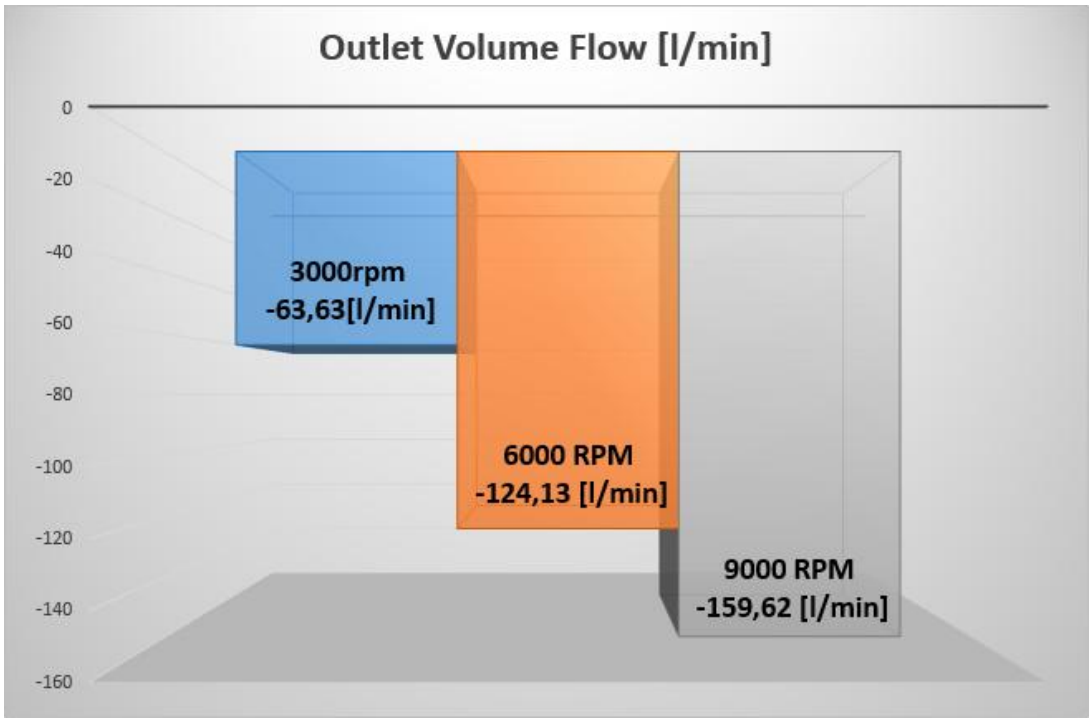
4.2. Outlet velocity chart



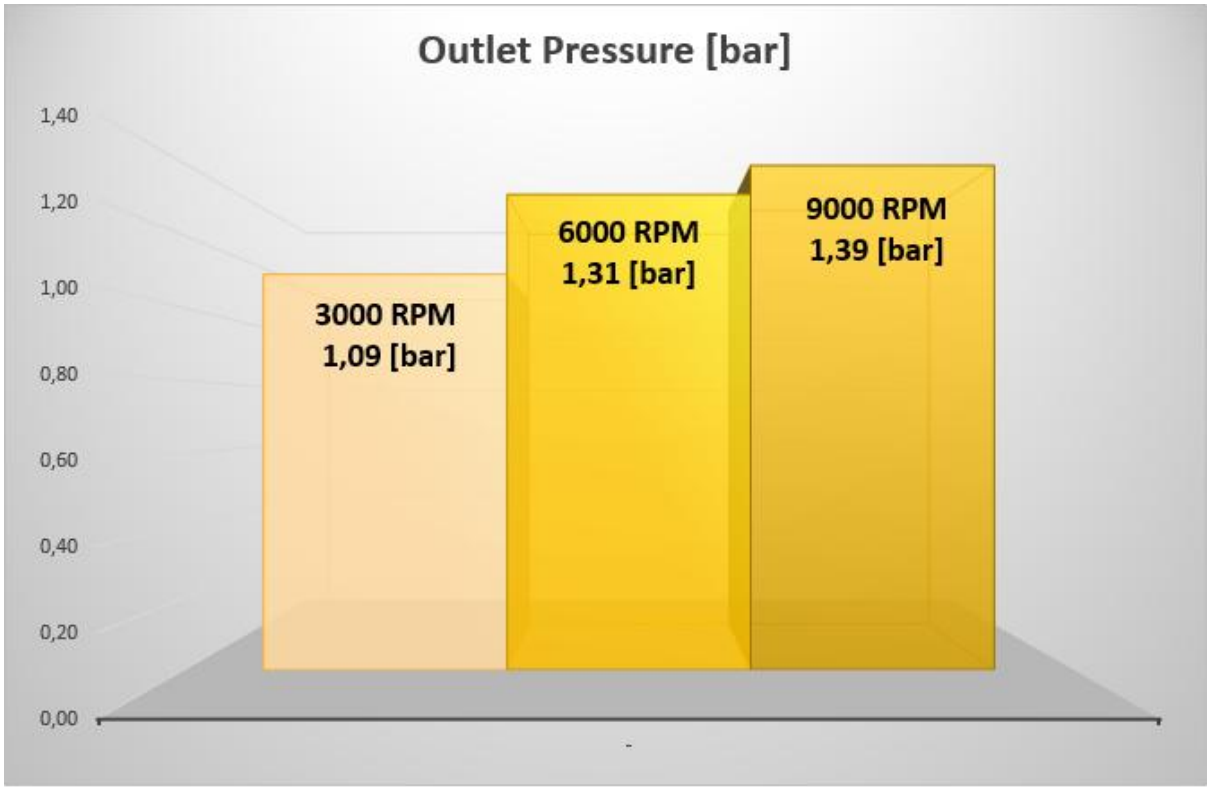
4.3. Inlet Volume Flow chart



4.4. Outlet Volume Flow chart

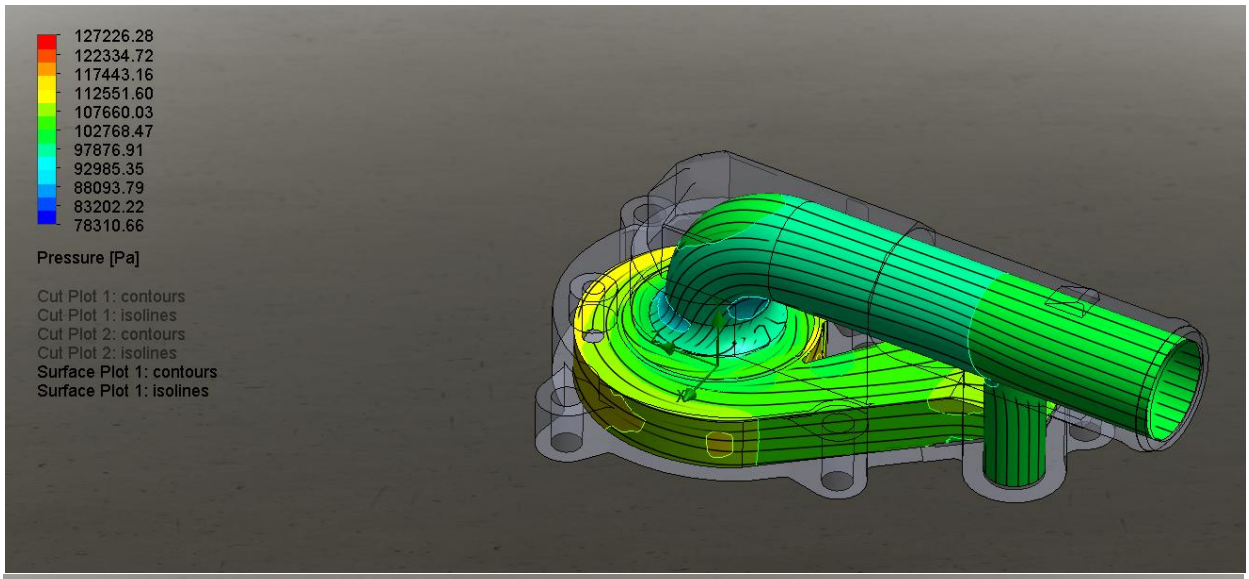


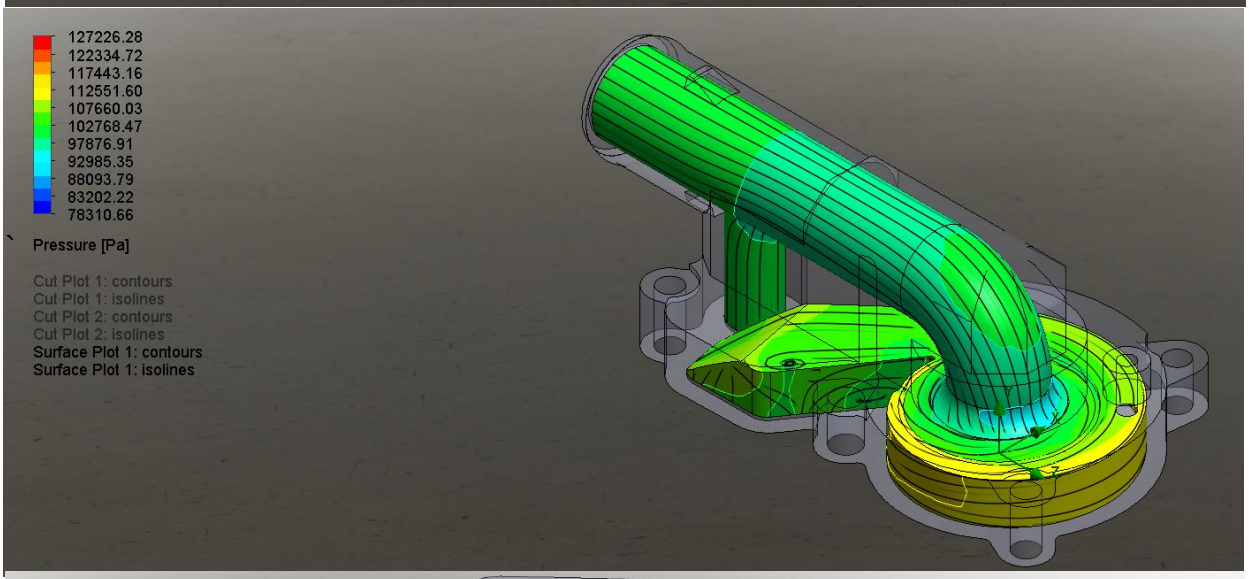
4.5. Outlet Pressure chart

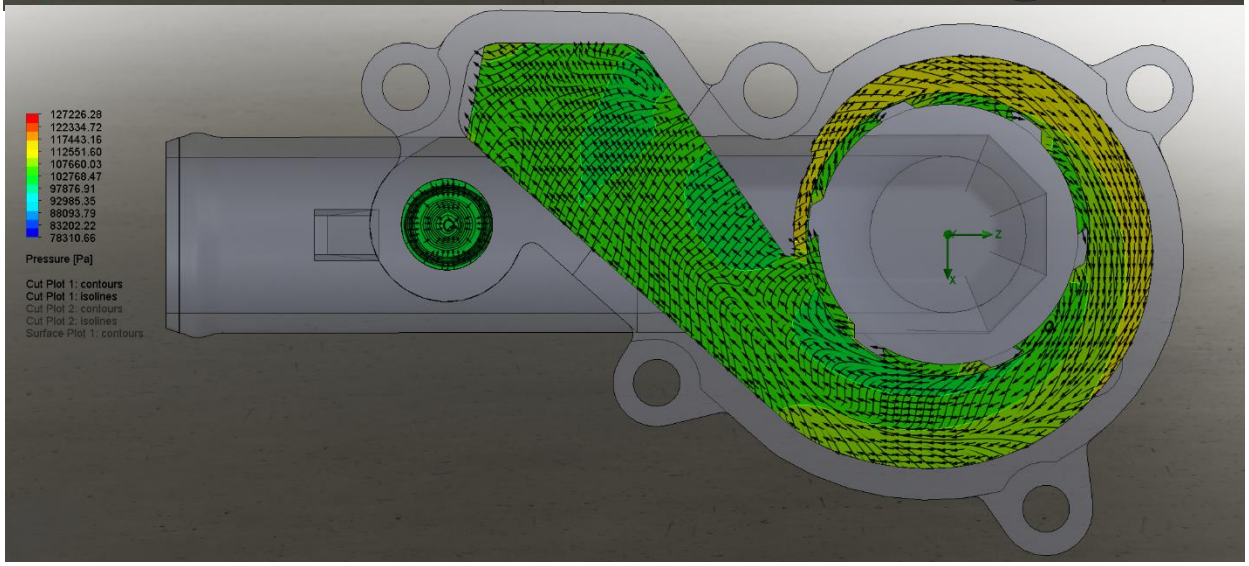


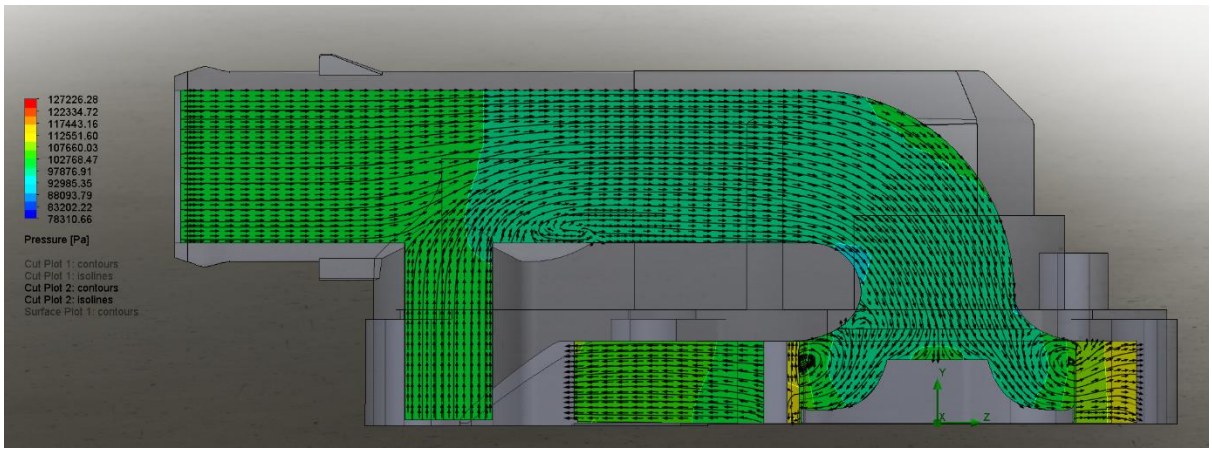
5. OEM Plots

5.1. Pressure plots 3000 RPM

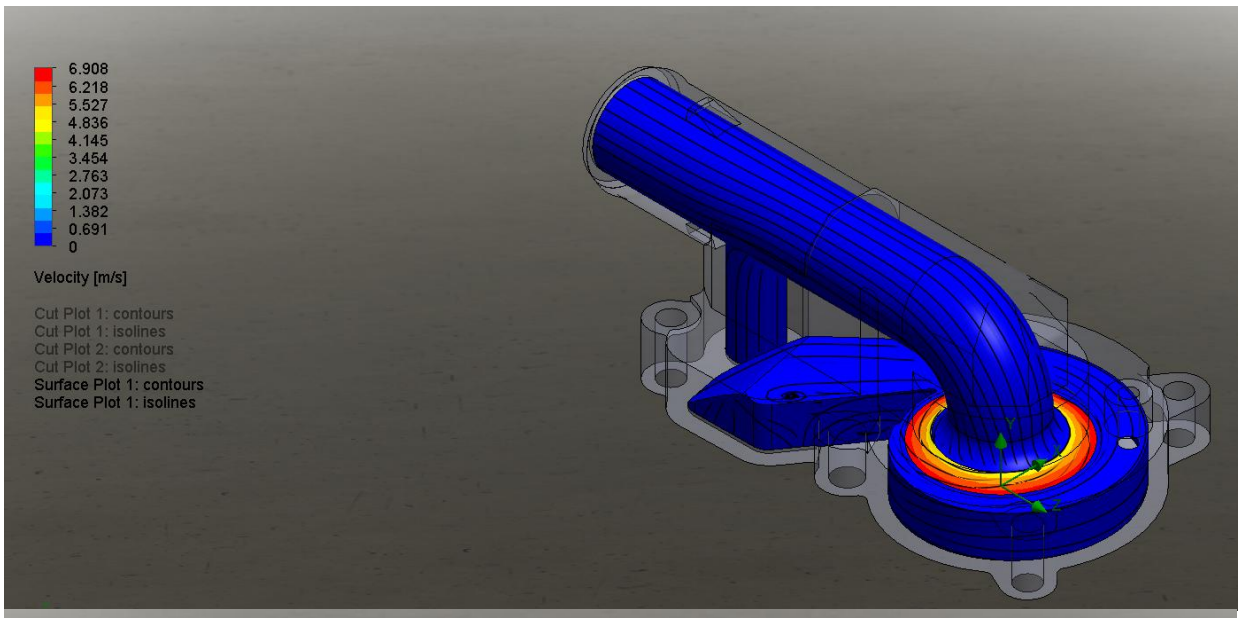


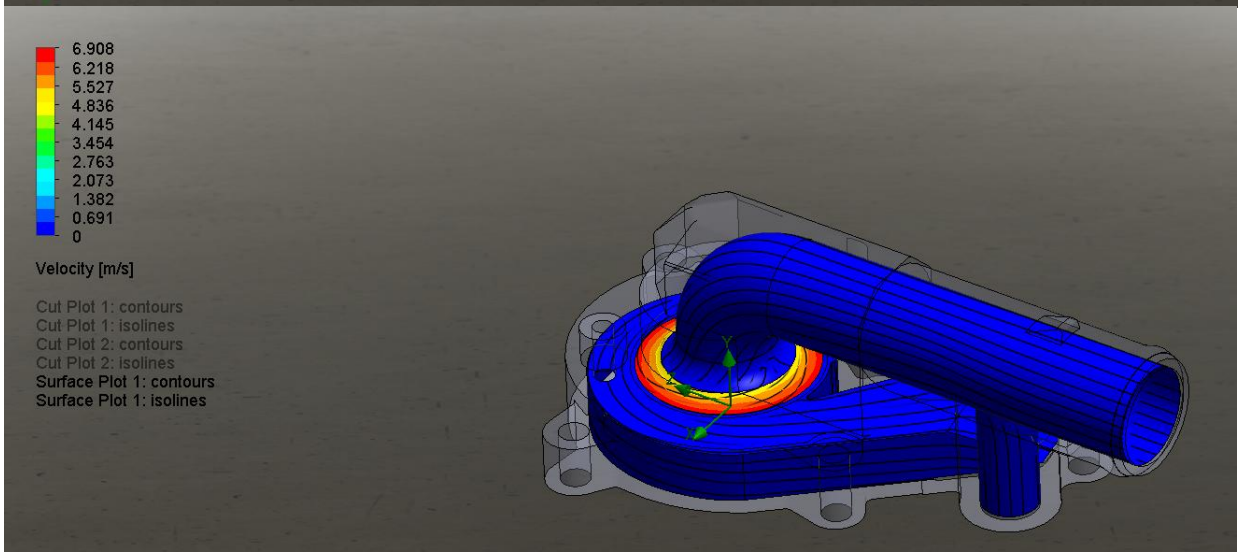




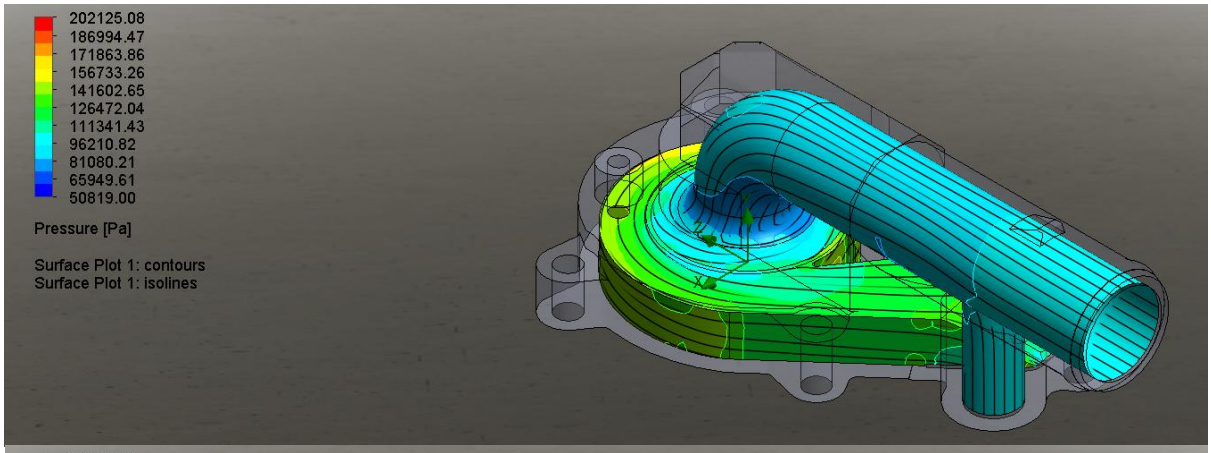


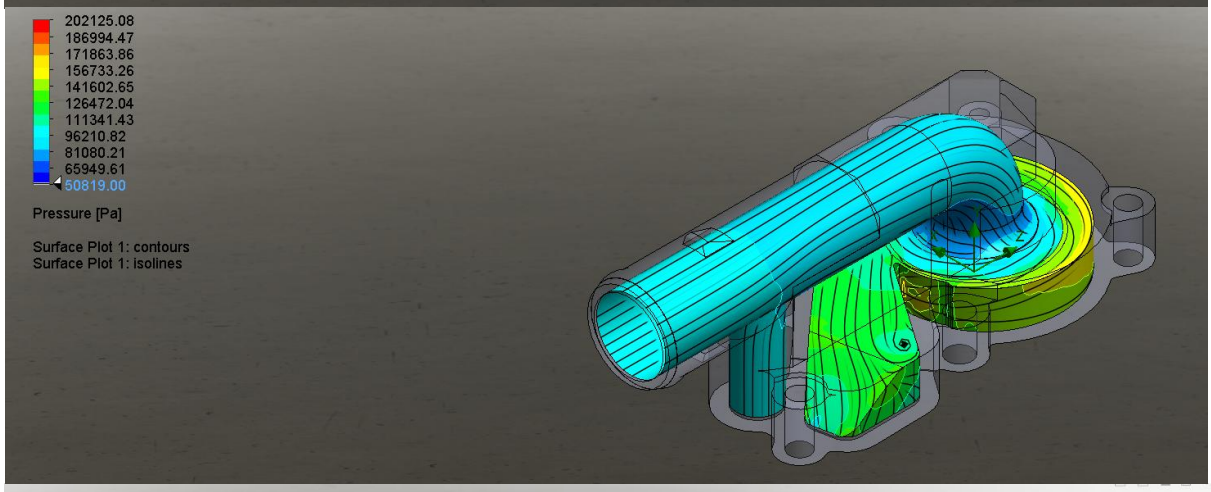
5.2. Velocity plots 3000 RPM

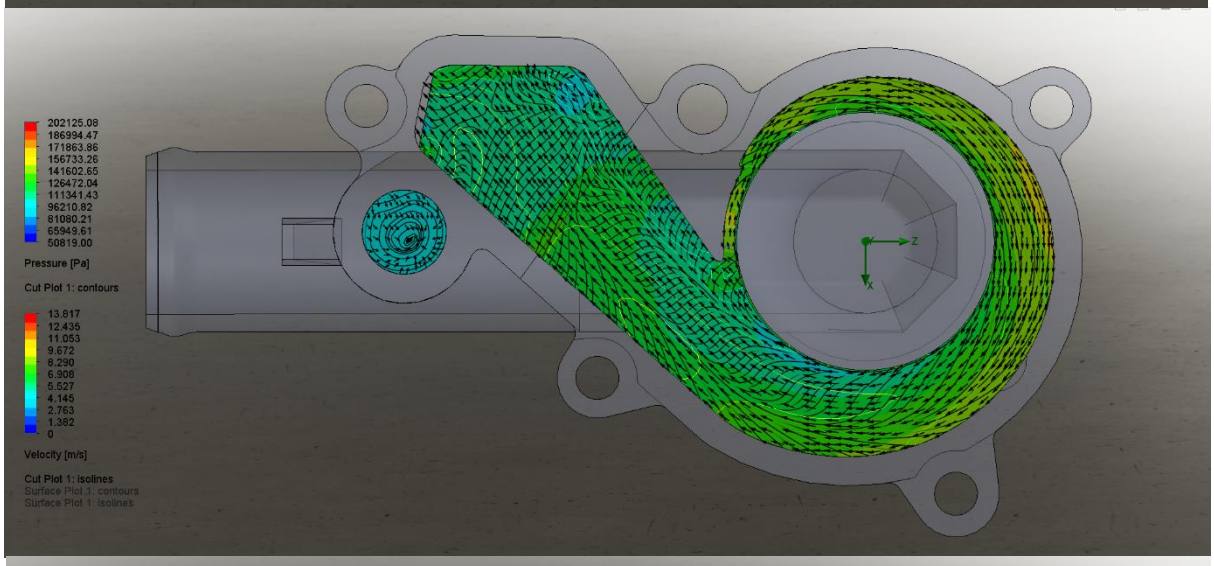


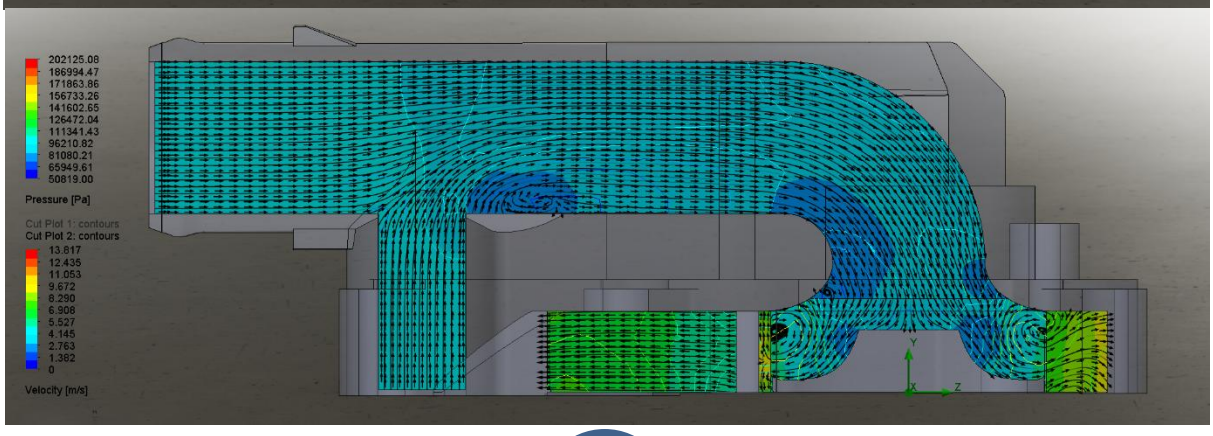


5.3. Pressure plots 6000 RPM

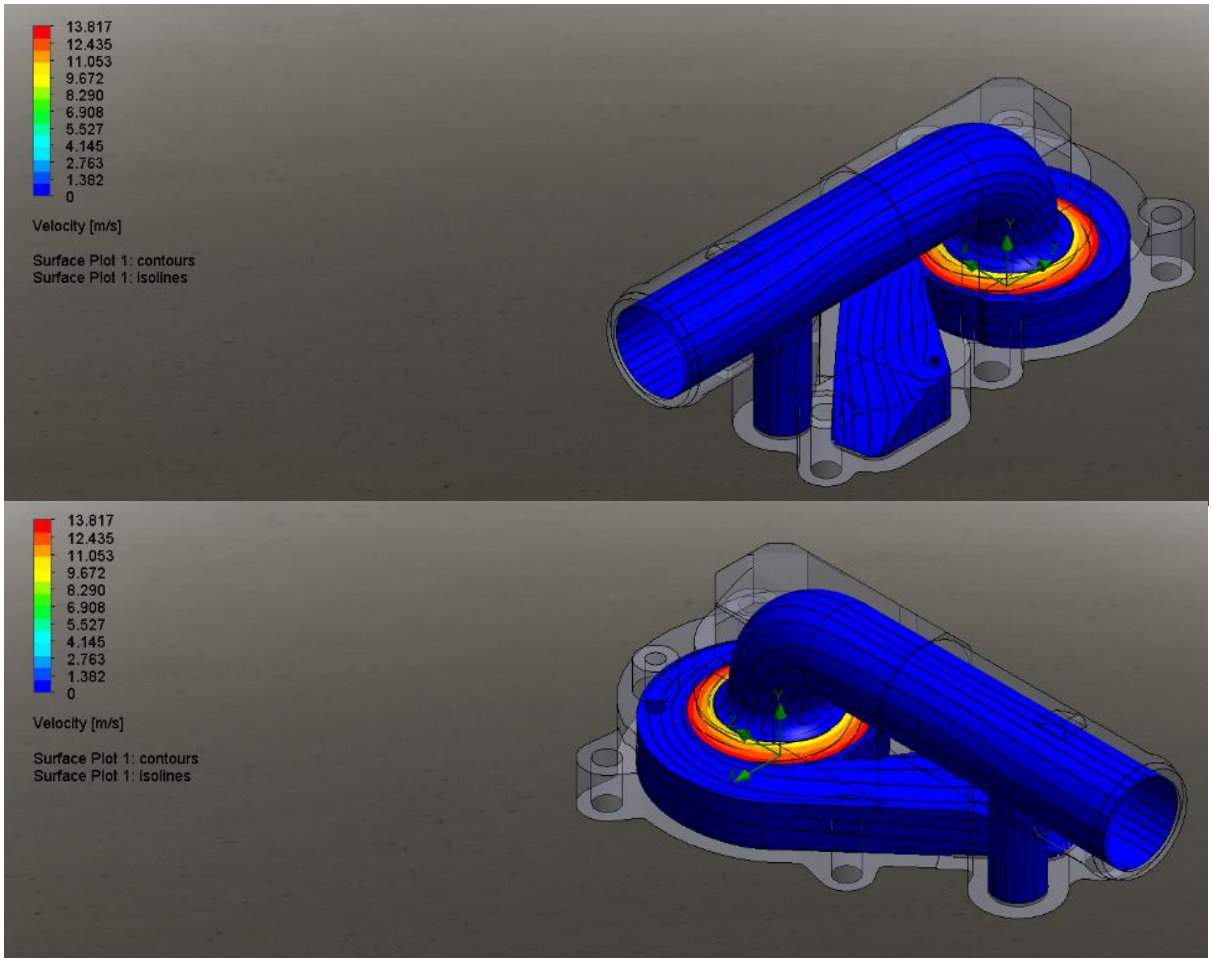




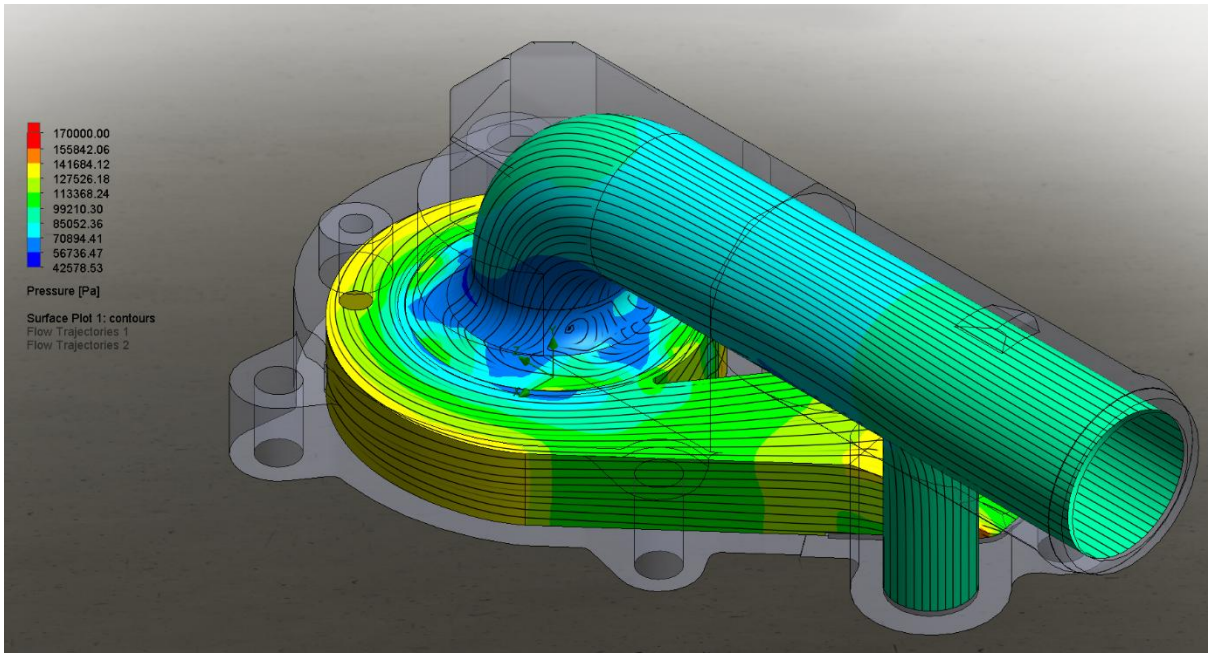


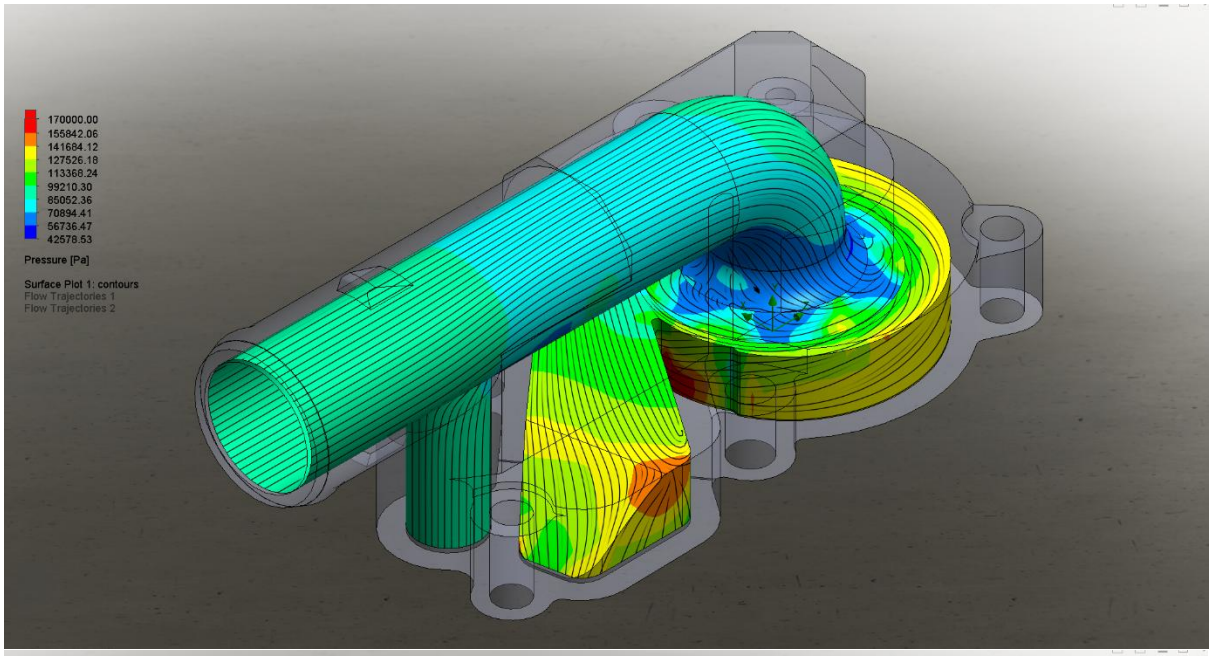


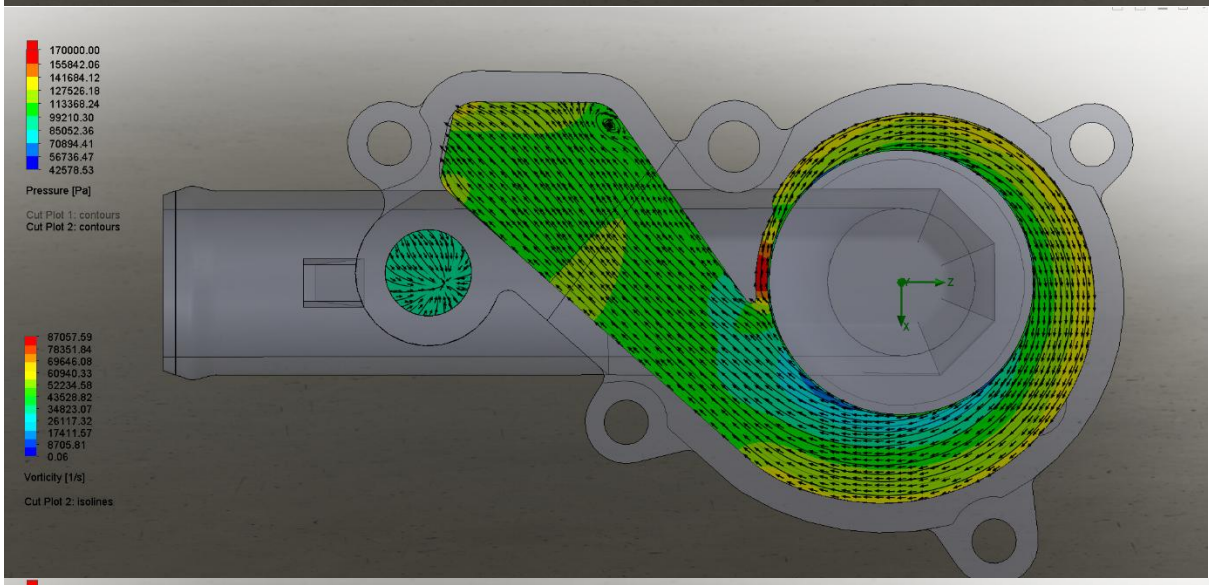
5.4. Velocity plots 6000 RPM

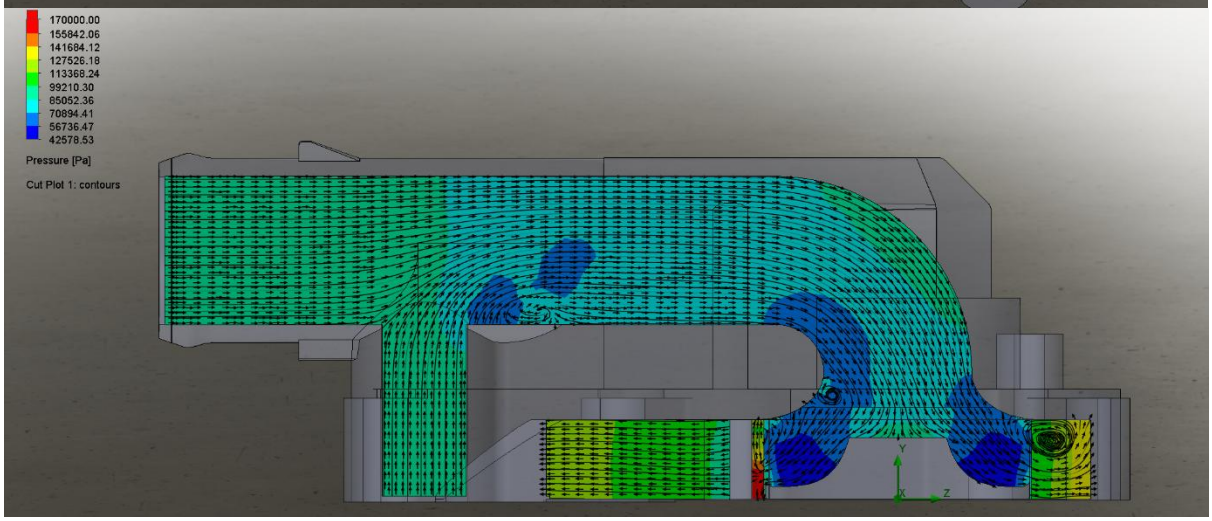


5.5. Pressure plots 9000 RPM

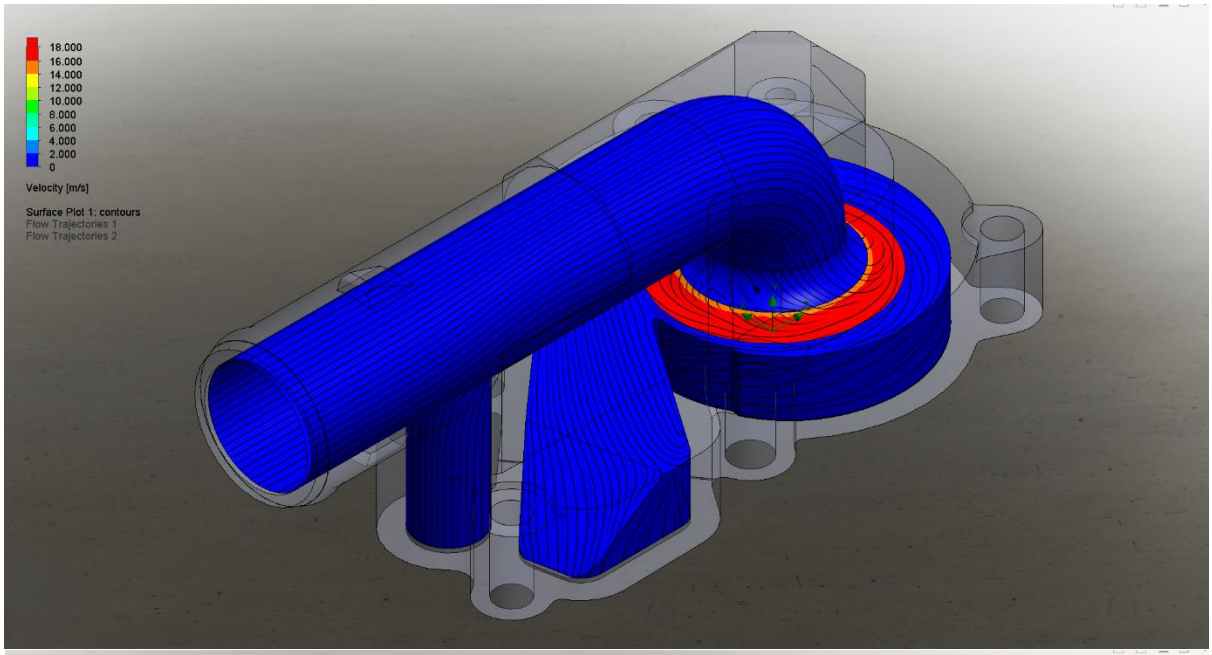


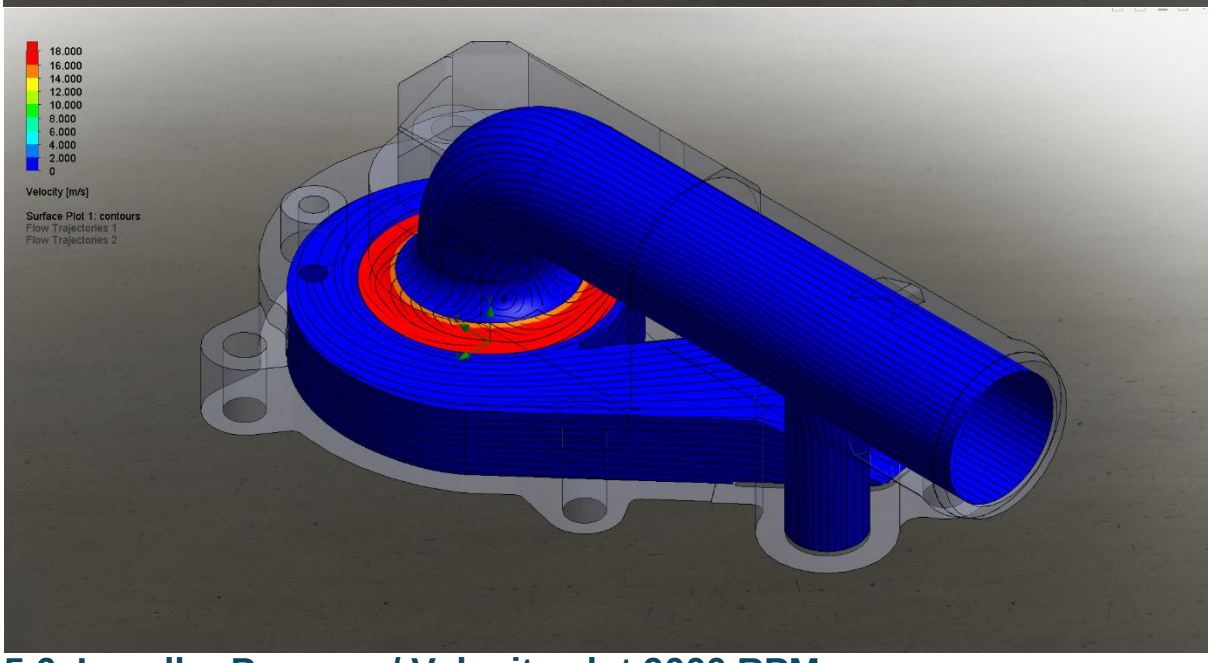

170000.00
155842.06
141684.12
127526.18
113368.24
99210.30
85052.36
70894.41
56736.47
42578.53
Pressure [Pa]
Surface Plot 1: contours
Flow Trajectories 1
Flow Trajectories 2


170000.00
155842.06
141684.12
127526.18
113368.24
99210.30
85052.36
70894.41
56736.47
42578.53
Pressure [Pa]
Cut Plot 1: contours
Cut Plot 2: contours
87057.59
78351.84
69646.08
60940.33
52234.58
43528.82
34823.07
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17411.57
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0.06
Vorticity [1/s]
Cut Plot 2: isolines

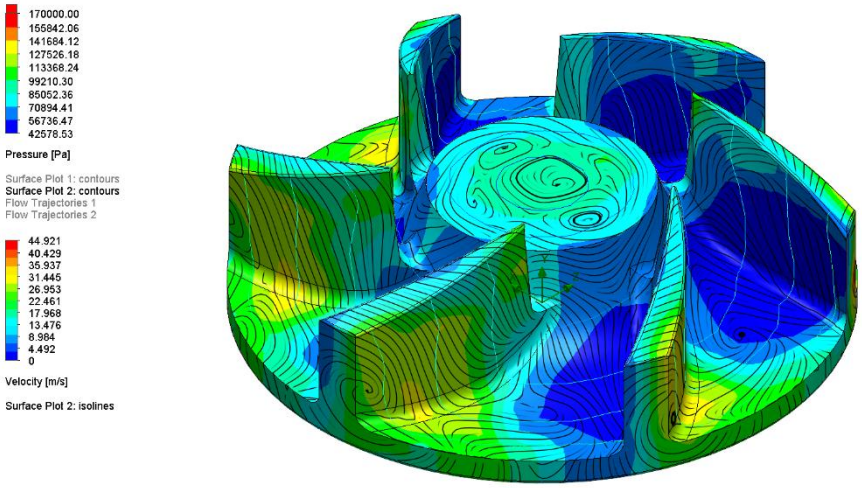

170000.00
155842.06
141684.12
127526.18
113368.24
99210.30
85052.36
70894.41
56736.47
42578.53
Pressure [Pa]
Cut Plot 1: contours

5.6. Velocity plots 9000 RPM





5.6. Impeller Pressure/ Velocity plot 9000 RPM



6. Results Analysis for the NO BRAND water pump kit by Operating Scenario

6.1. 3000 rpm Operating Scenario

In the 3000 rpm scenario, the key flow characteristics are as follows:

- **Inlet Velocity:** The inlet velocity averaged **2.76 m/s**
- **Outlet Velocity Av:** The average outflow velocity was recorded at **4.09 m/s**
- **Volume Flow Rate:** The inlet and outlet flow rates balance at approximately **101.51 l/min** and **101.93 l/min** respectively, demonstrating mass convergence validity.
- **Pressures:** The inlet total pressure was maintained at **101325 Pa (1.01 bar)**, while the outlet pressure reached **109647 Pa (1.10 bar)**.

6.2. 6000 rpm Operating Scenario

By doubling the rotational speed to 6000 rpm, the following changes are observed:

- **Inlet Velocity:** Increased noticeably to **5.54 m/s** scaling proportionally relative to the 3000 rpm case.
- **Outlet Velocity:** The average outflow velocity rose to **8.20 m/s**
- **Volume Flow Rate:** The flow rate doubled, approximating **203.6 l/min** at the inlet and **205.3 l/min** at the outlet.
- **Pressures:** The outlet pressure increased significantly to **134737 Pa (1.35bar)**, reflecting the system's increased energy.

6.3. 9000 rpm Operating Scenario

In the highest evaluated scenario at 9000 rpm:

- **Inlet Velocity:** Reached **8.31 m/s**
- **Outlet Velocity:** The highest average outflow velocity was recorded at **12.26 m/s**
- **Volume Flow Rate:** The flow increased to **305.42 l/min** (inlet) and **307 l/min** (outlet).
- **Pressures:** The outlet pressure settled at **176053 Pa** (**1.76 bar**)

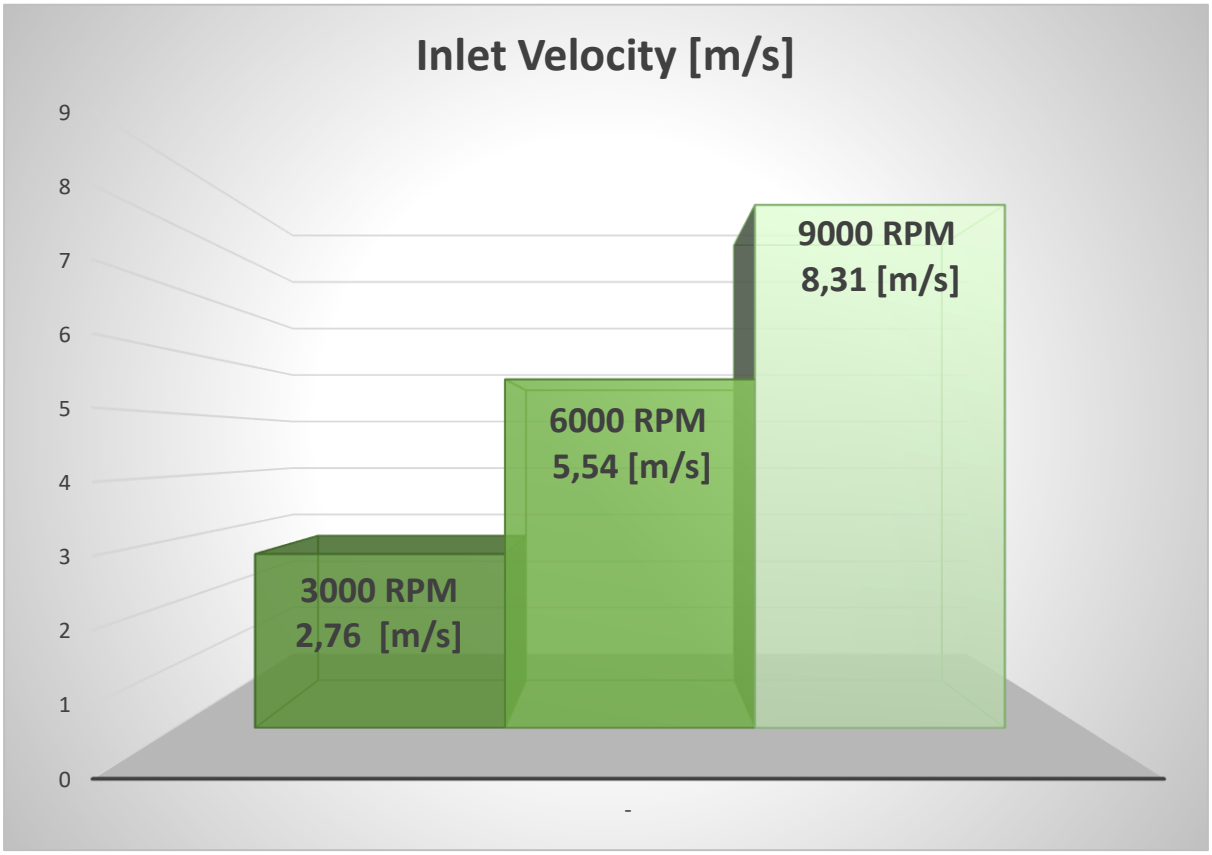
7. Comparative Summary for the NO BRAND water pump kit

Scenario [rpm]	Inlet Velocity [m/s]	Outlet Velocity [m/s]	Outlet Pressure [Pa]	Inlet Volume Flow Rate [l/min]	Outlet Volume Flow Rate [l/min]
3000	2.76	4.09	109647 (1.10 bar)	101.51	101.93
6000	5.54	8.20	134737 (1.35 bar)	203.6	205.3
9000	8.31	12.26	176053 (1.76bar)	305.42	307

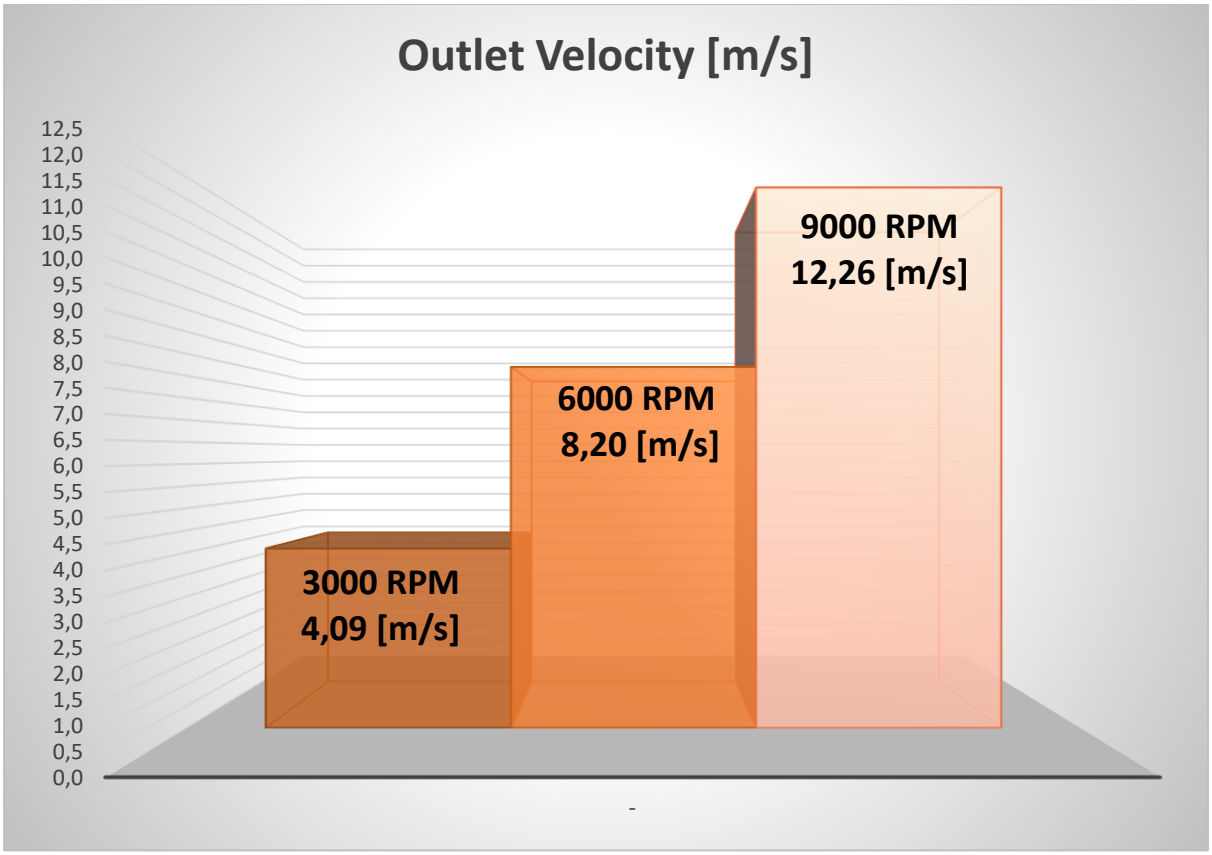
1. **Flow Linearity:** The volume flow rate exhibits a highly predictable increase proportional to the rpm rise, confirming the consistent hydraulic behavior of the model.
2. **Simulation Convergence:** All parameters reached 100% progress with successful convergence, ensuring data reliability.
3. **Volume Build-up:** Higher rotational speeds lead to a corresponding rise in Outlet Volume Flow rate, a critical factor for the cooling efficiency of the heat exchanger.

8. NO BRAND Charts

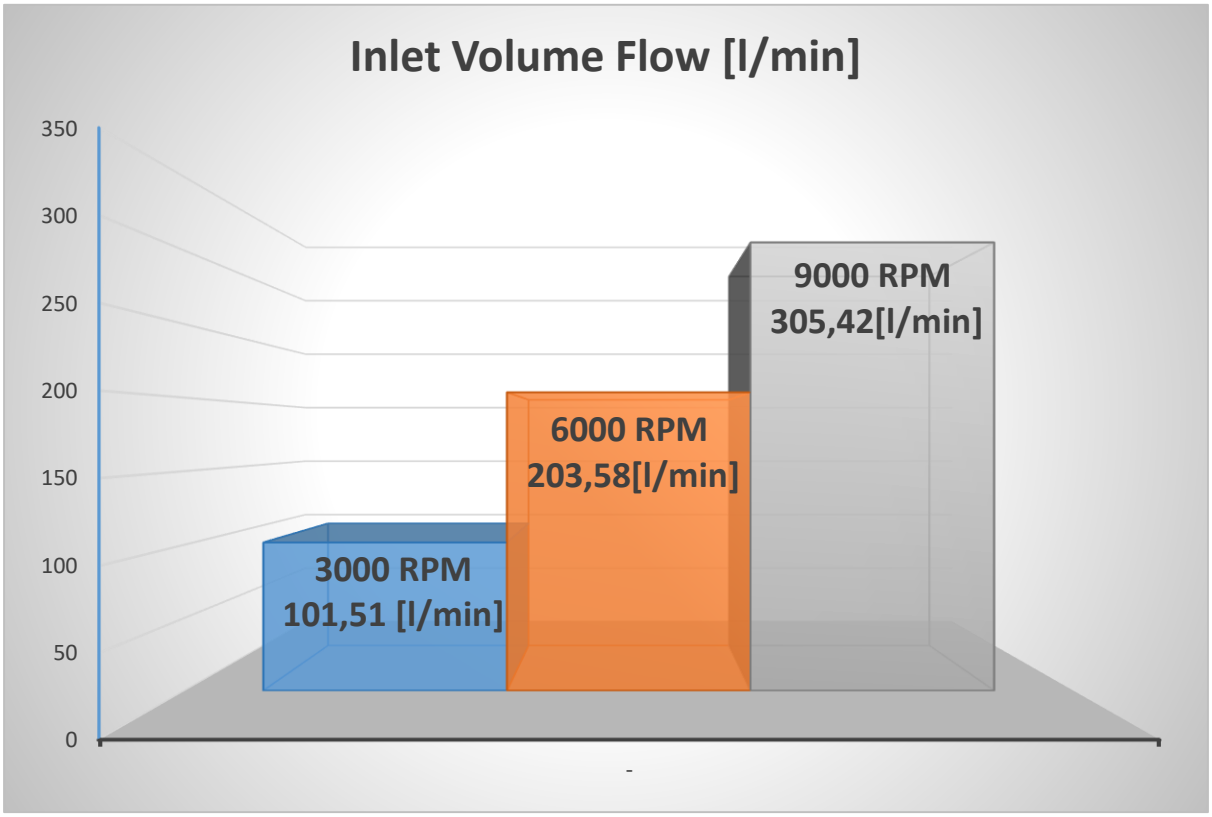
8.1. Inlet velocity chart



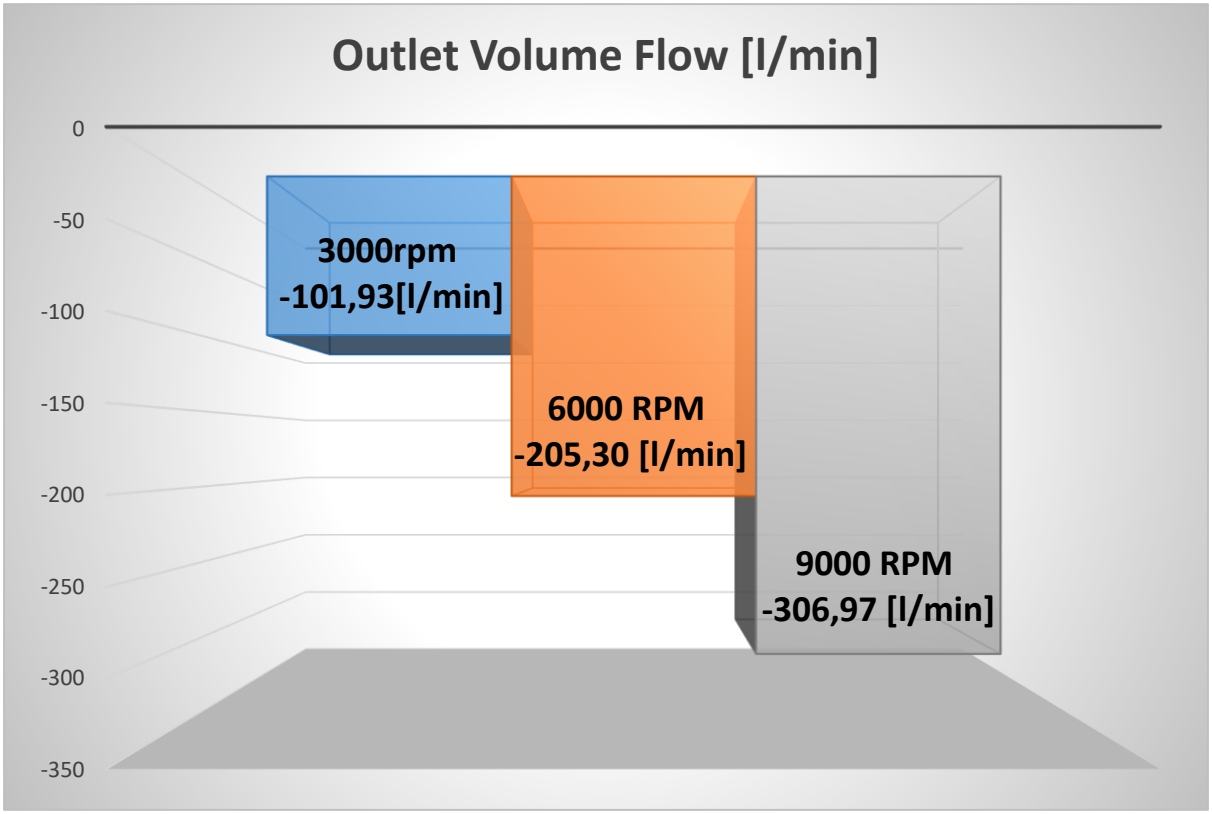
8.2. Outlet velocity chart



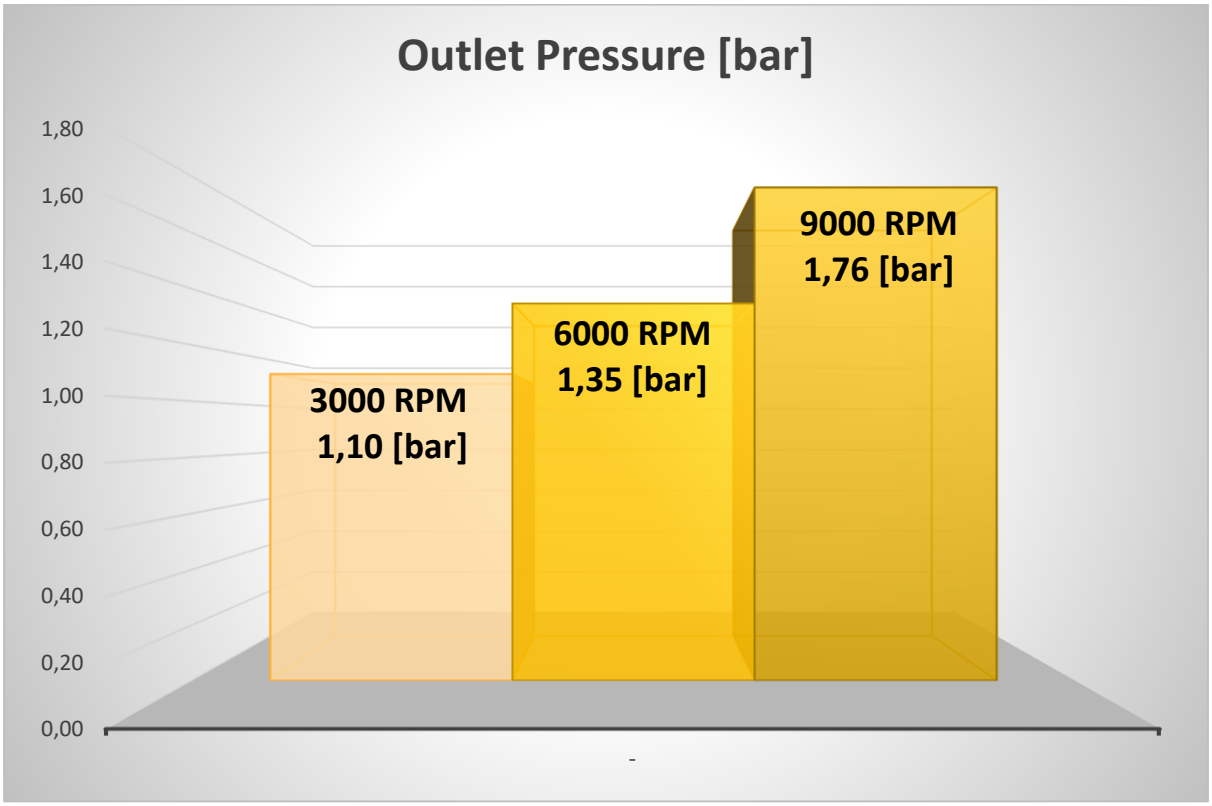
8.3. Inlet Volume Flow chart



8.4. Outlet Volume Flow chart

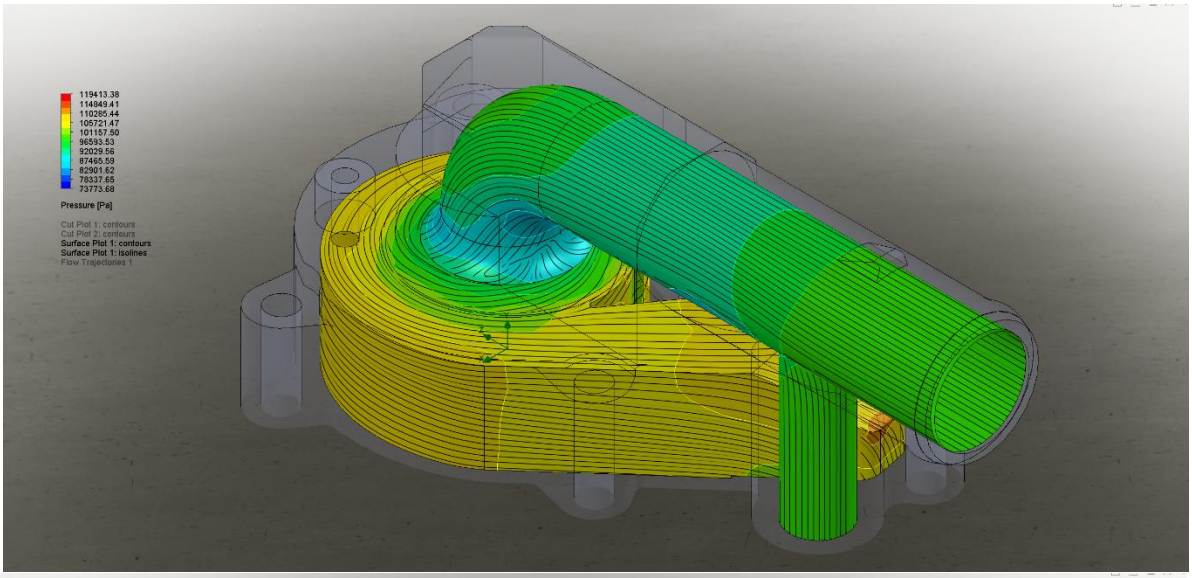


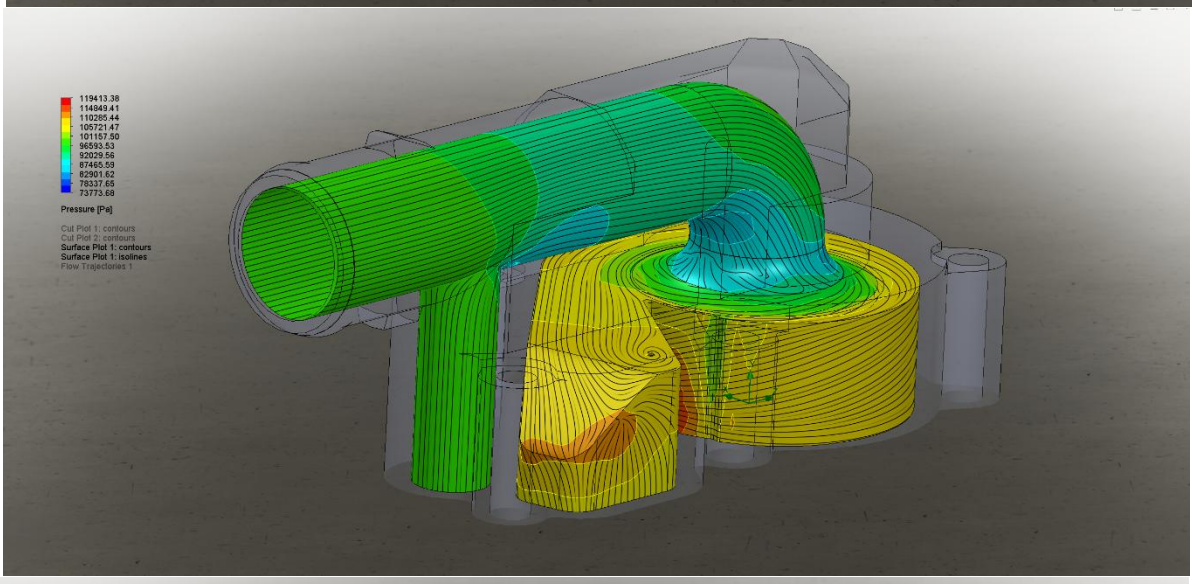
8.5. Outlet Pressure chart

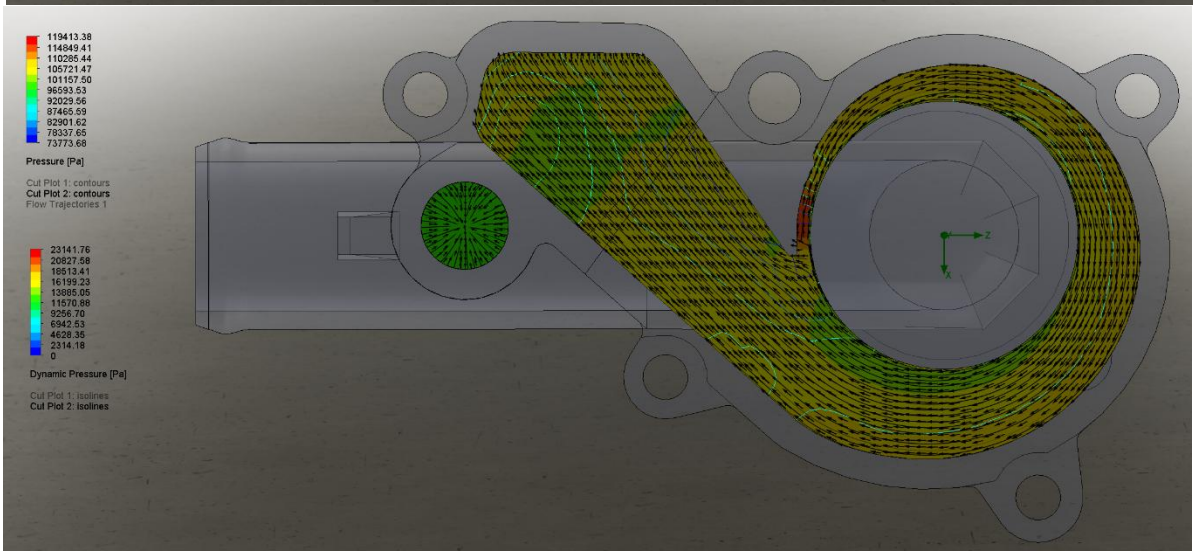


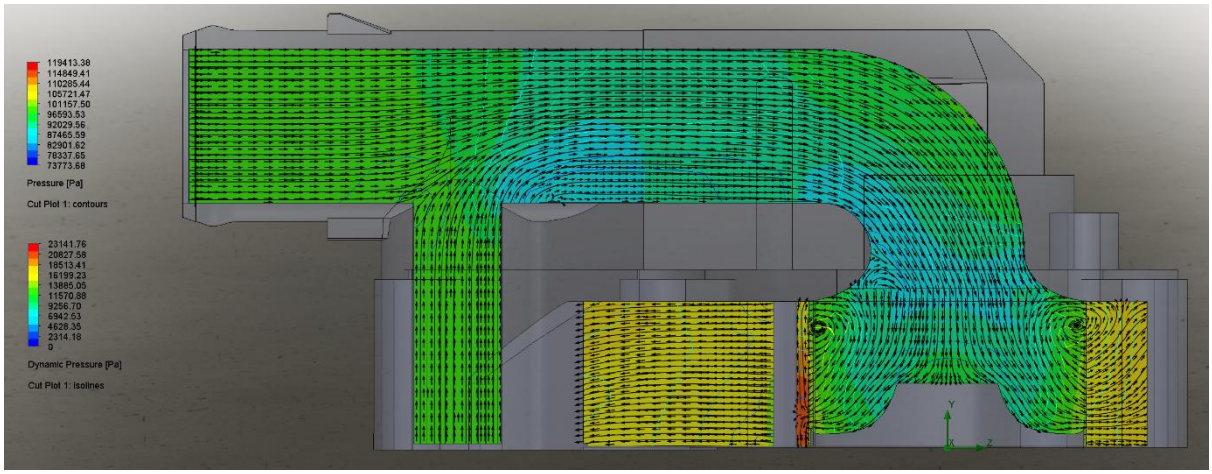
9. NO BRAND Plots

9.1. Pressure plots 3000 RPM

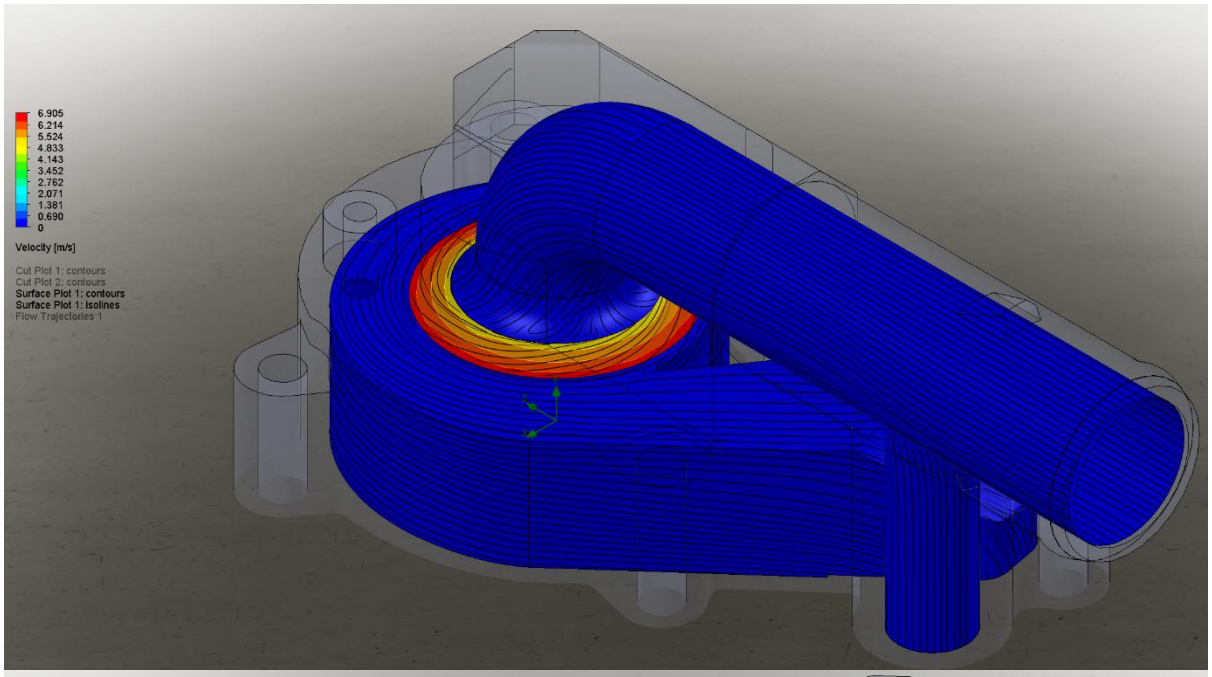


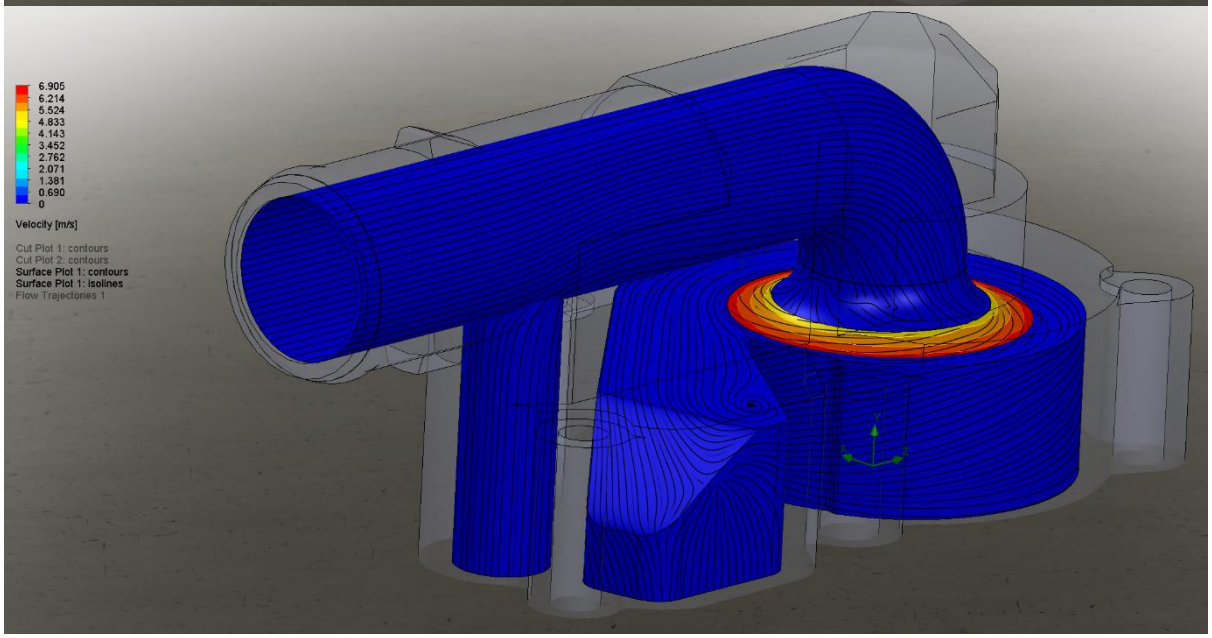




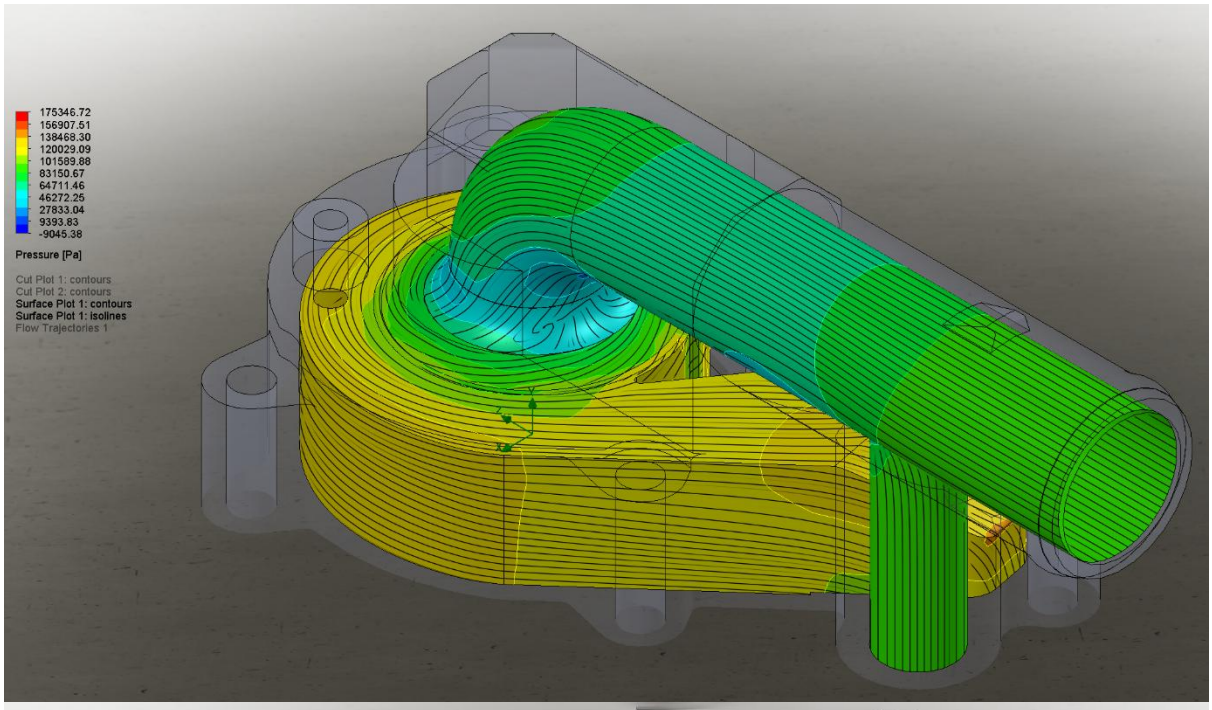


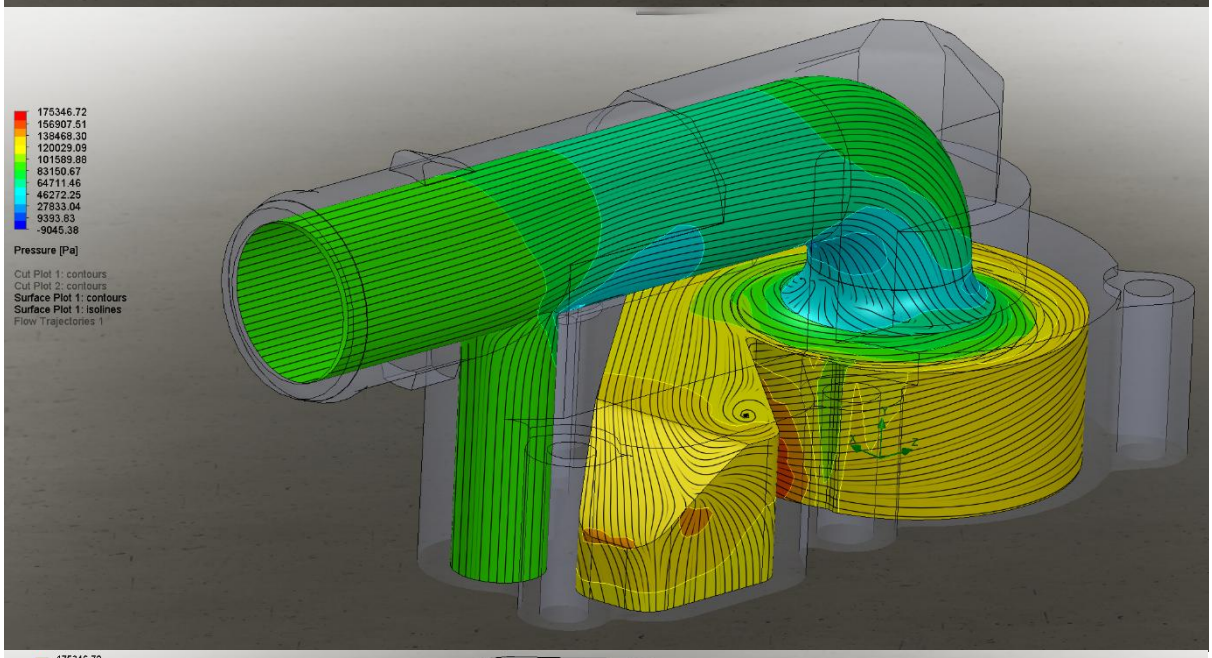
9.2. Velocity plots 3000 RPM

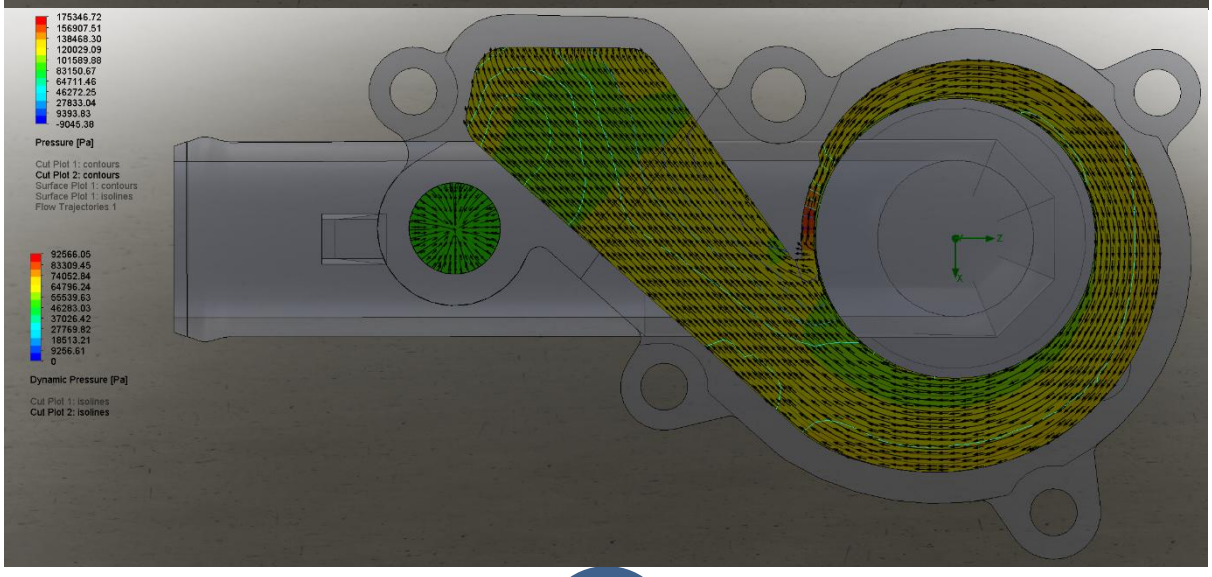


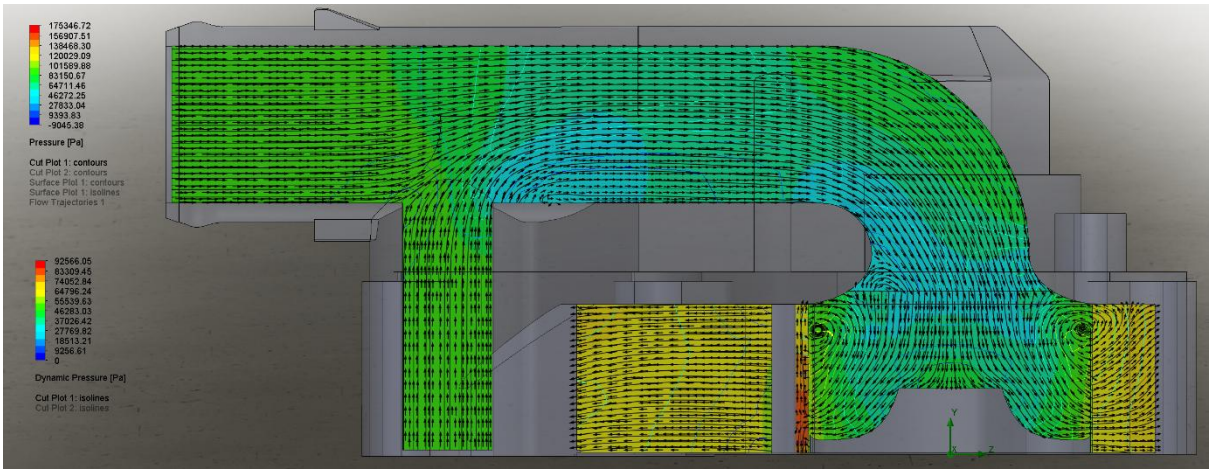


9.3. Pressure plots 6000 RPM

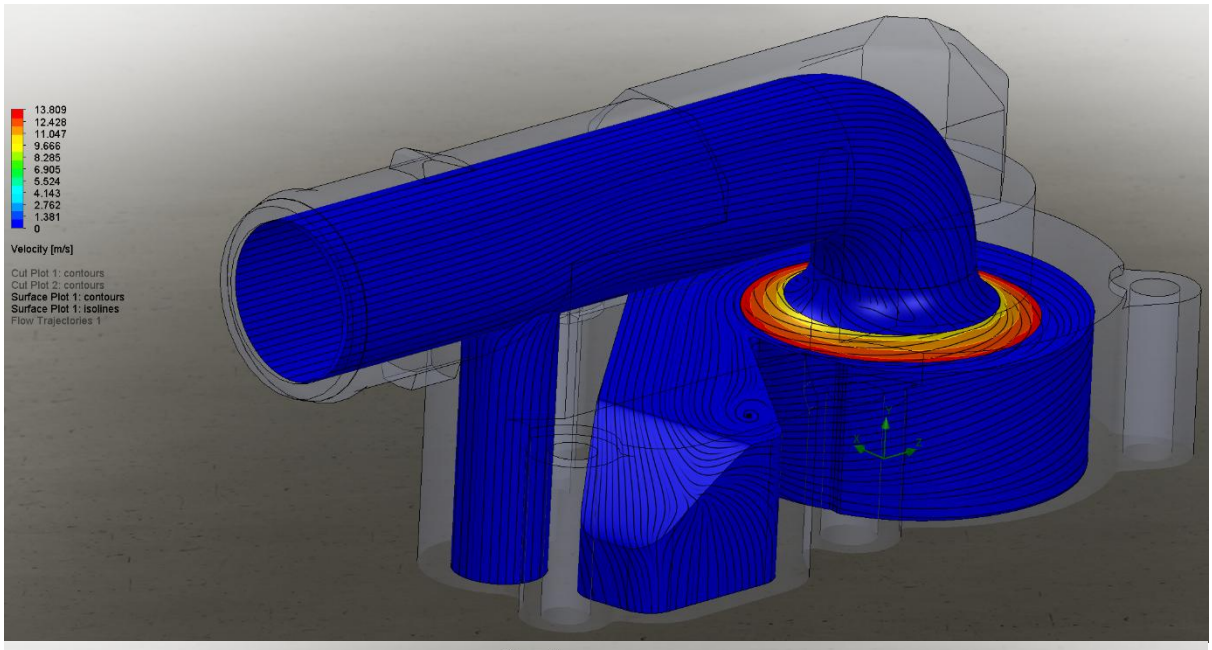


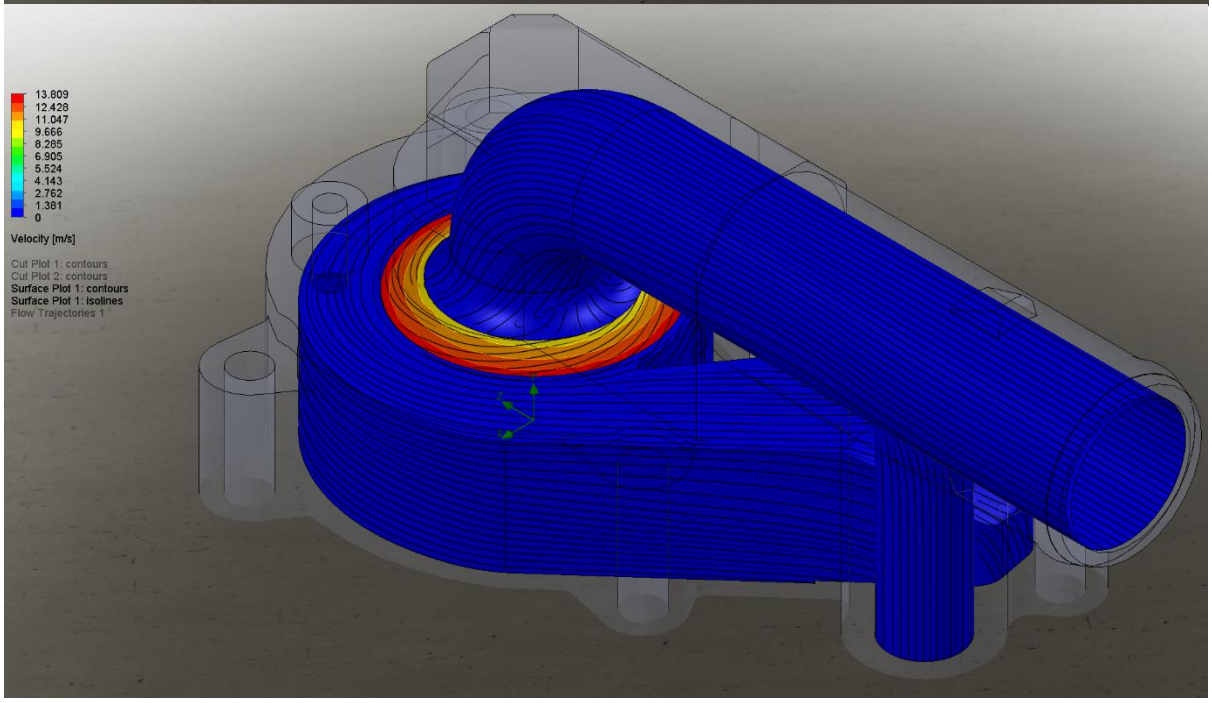




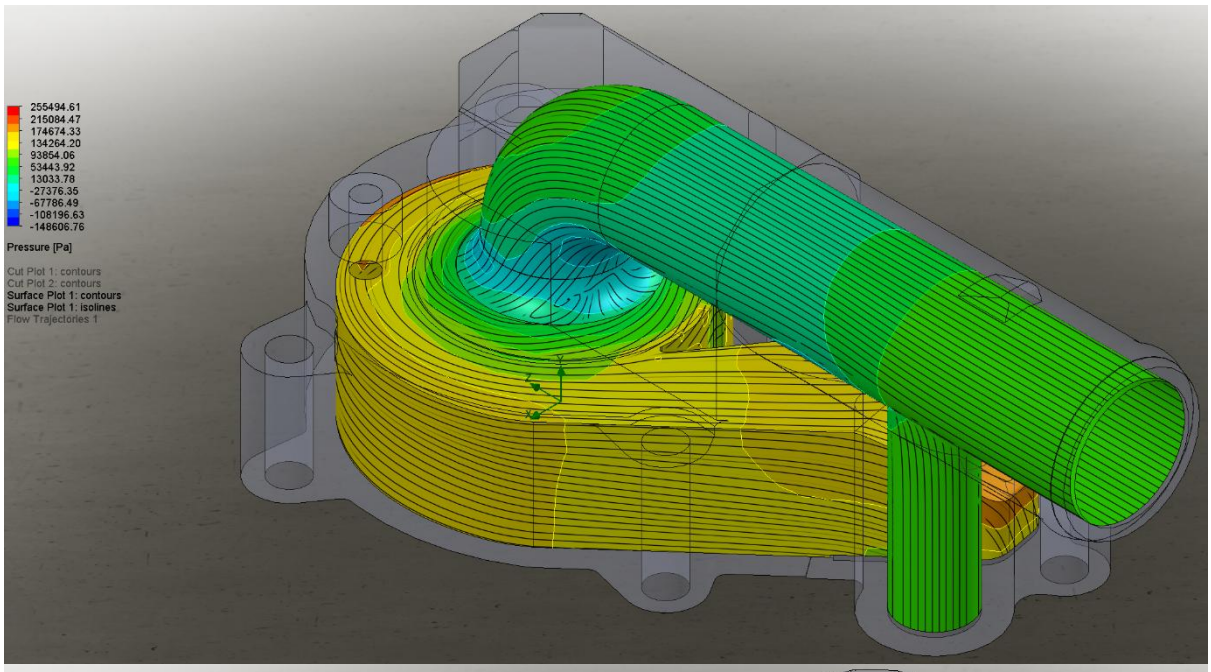


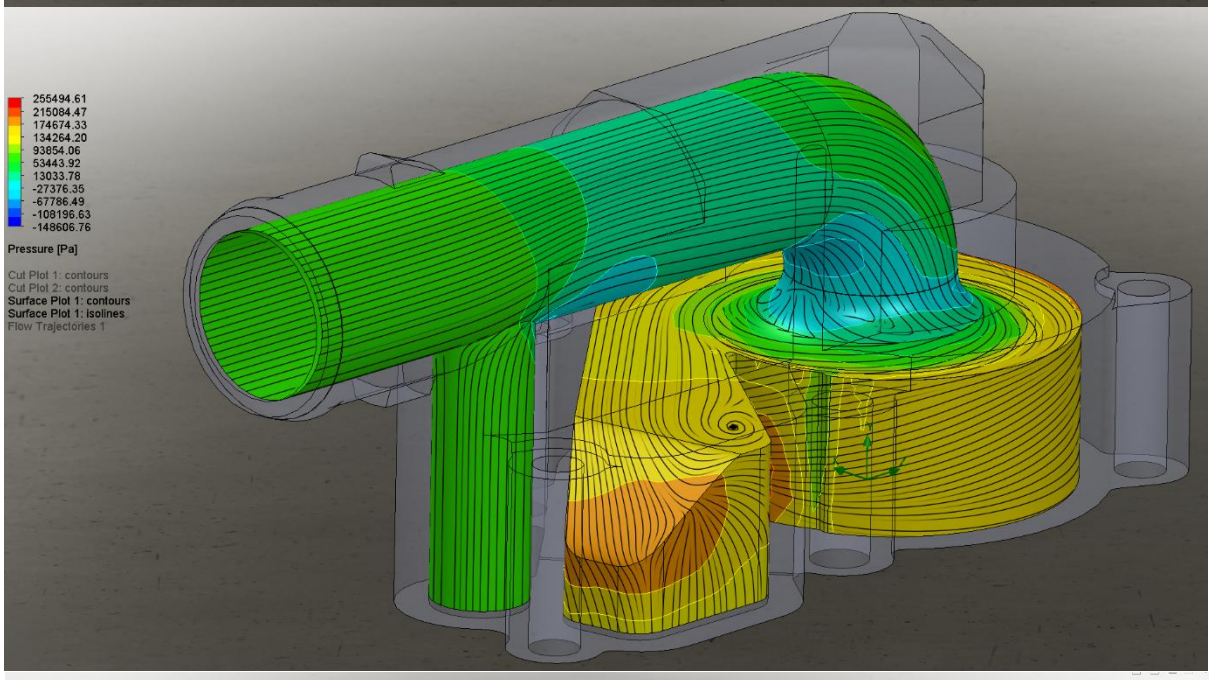
9.4. Velocity plots 6000 RPM

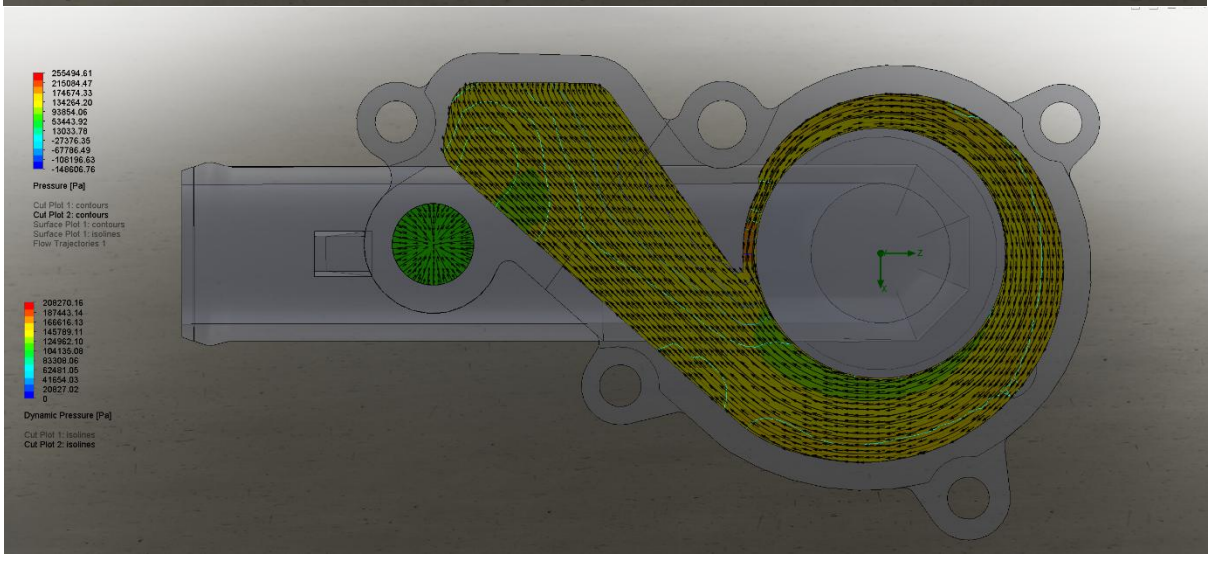


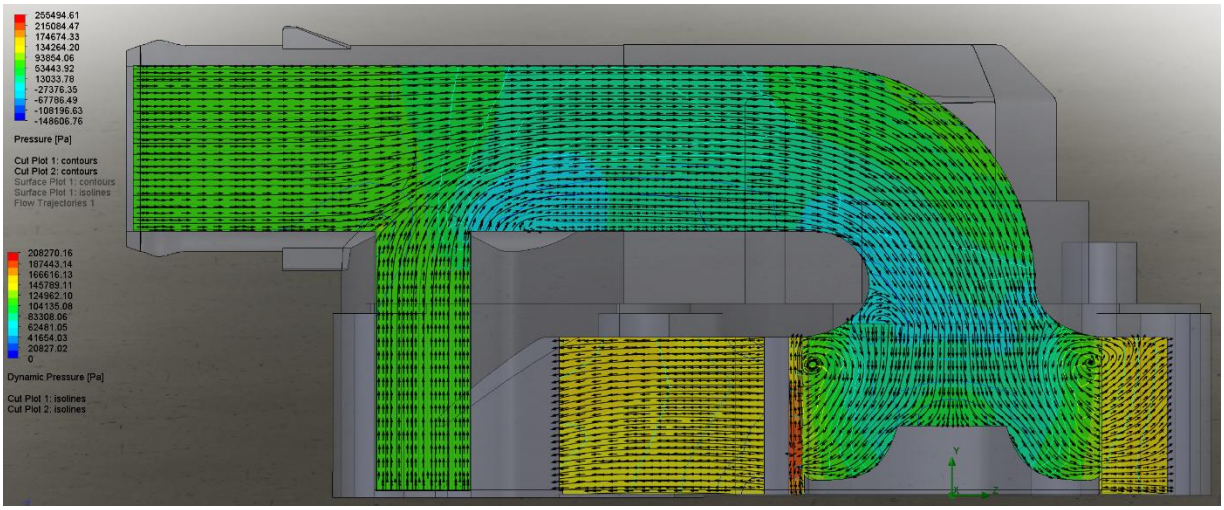


9.5. Pressure plots 9000 RPM

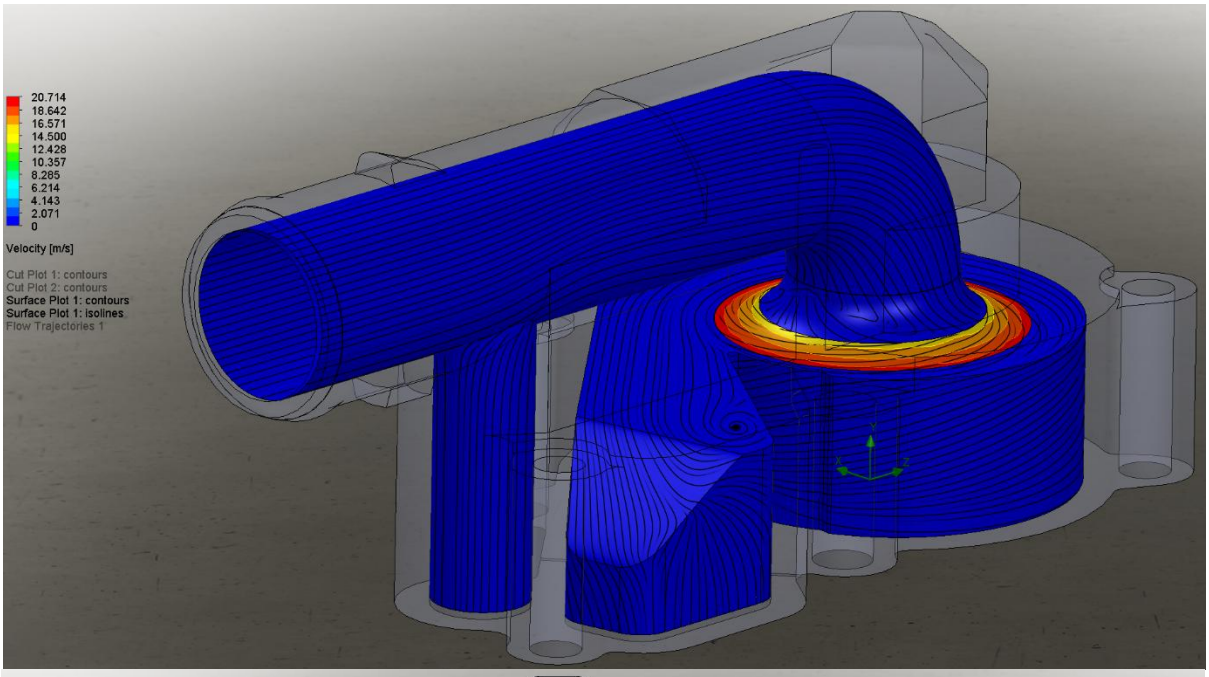


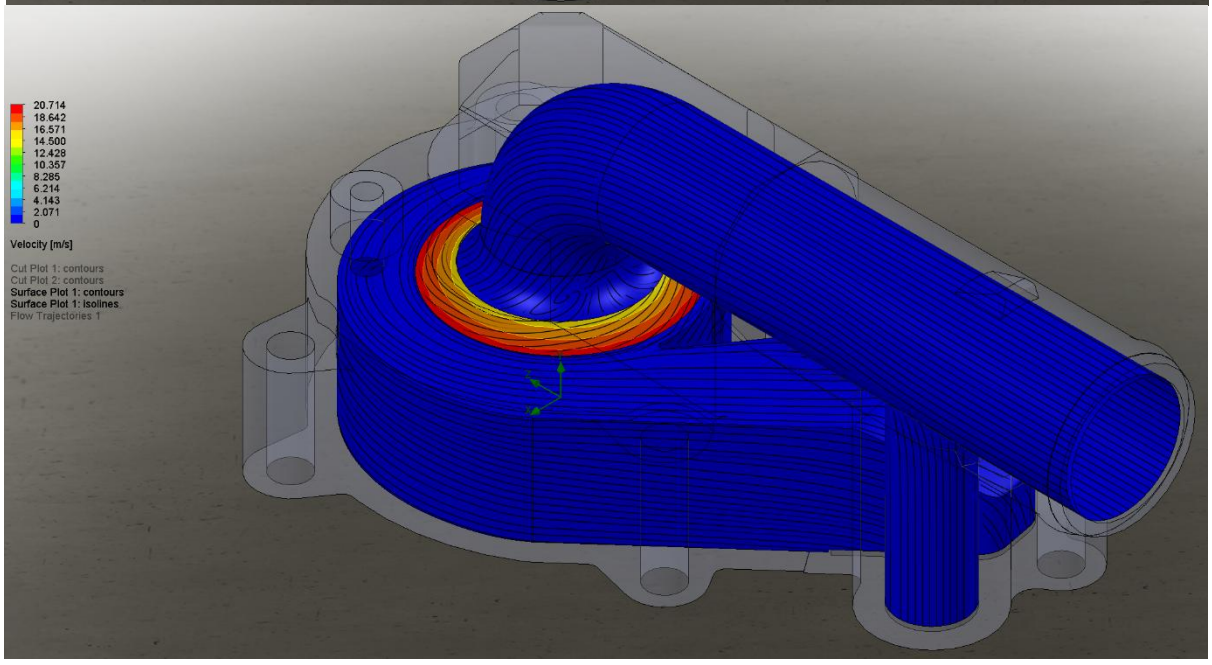




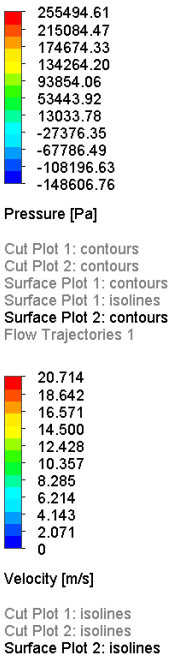


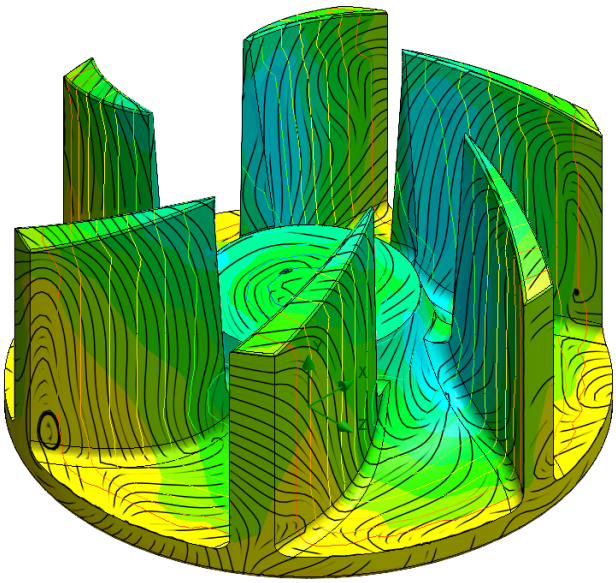
9.6. Velocity plots 9000 RPM





9.6. Impeller Pressure/ Velocity plot 9000 RPM

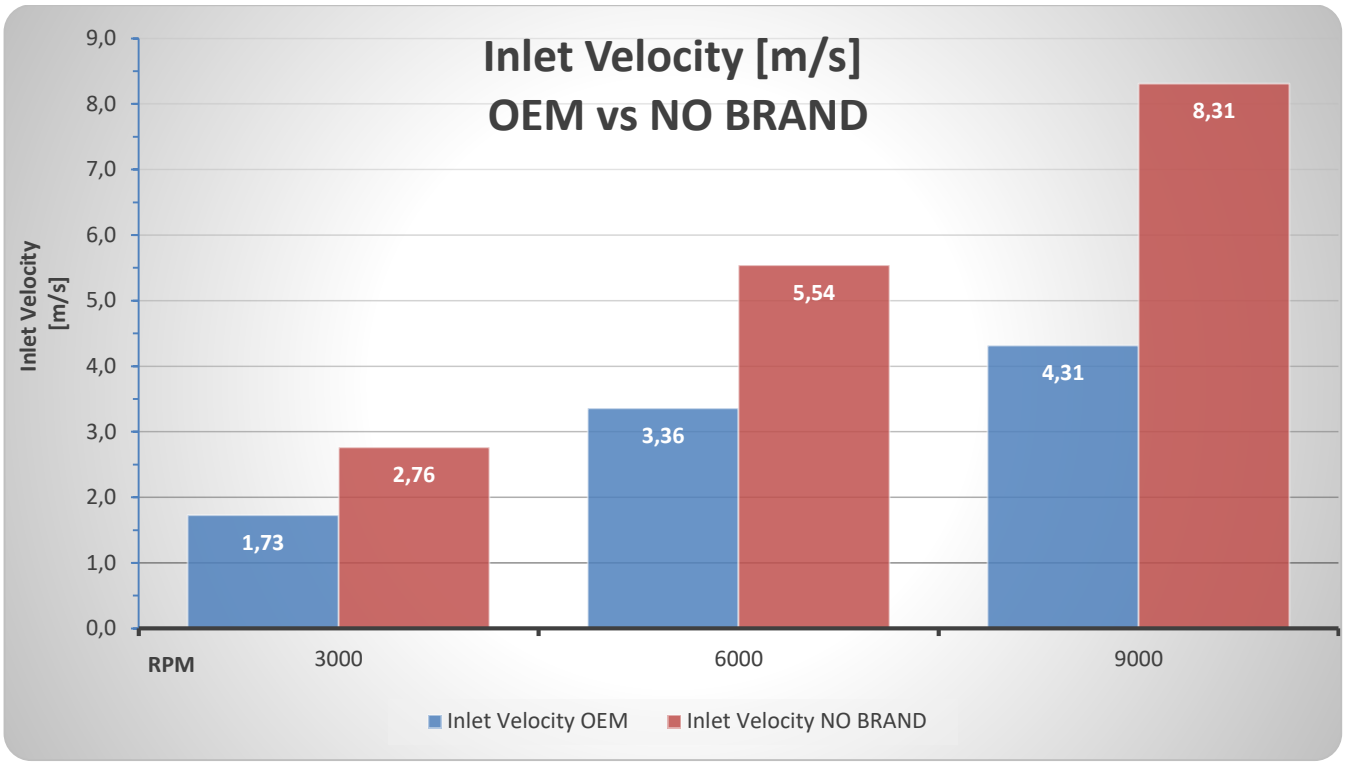




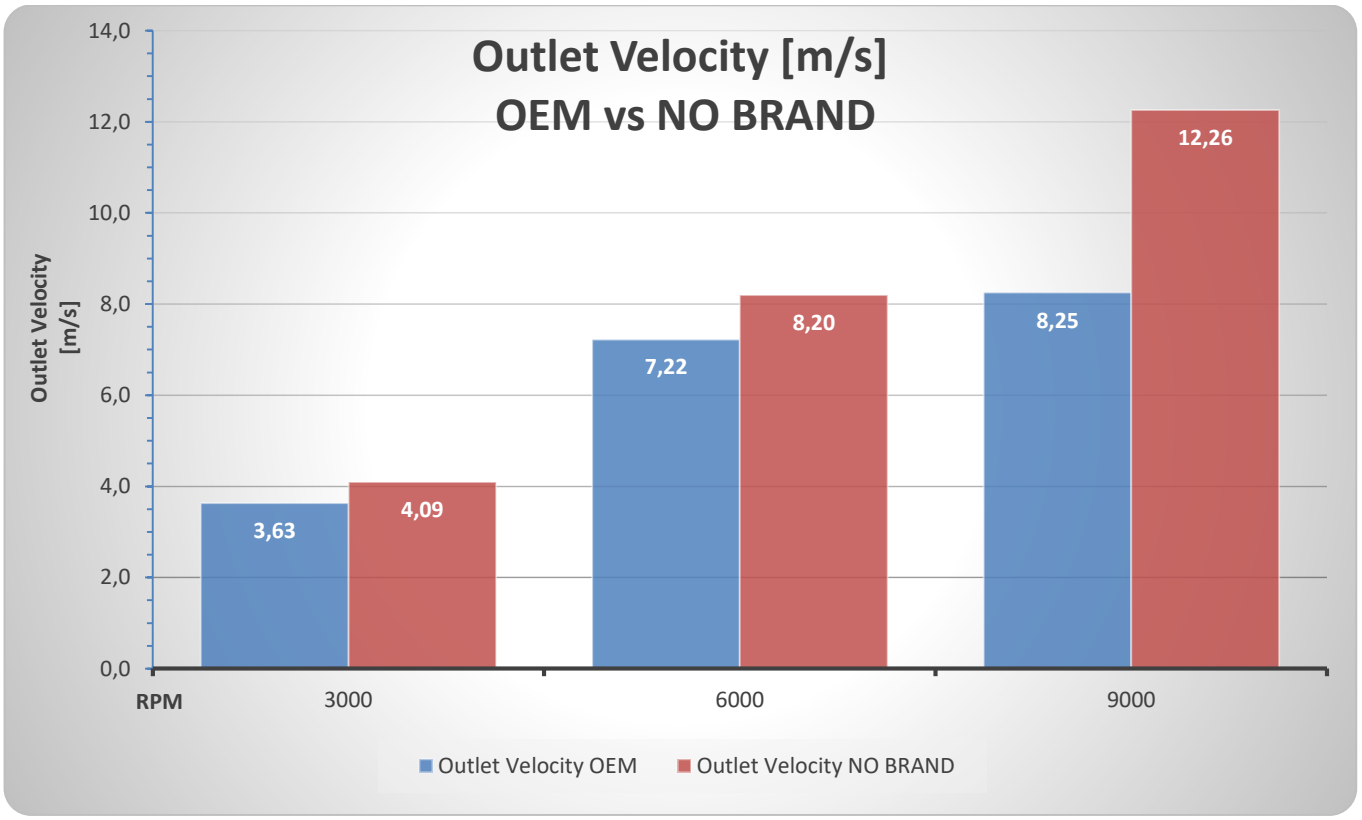
10. Comparison charts and conclusions

RPM	PARAMETER	NO BRAND	OEM	DELTA
3000	Inlet Velocity	2.76 [m/s]	1.73 [m/s]	+59.8%
	Outlet Velocity	4.09 [m/s]	3.63 [m/s]	+12.7%
	Inlet Volume Flow	101.51 [L/min]	63.57 [L/min]	+59.7%
	Outlet Volume Flow	101.93 [L/min]	63.63 [L/min]	+60.2%
	Outlet Pressure	1.10 [bar]	1.09 [bar]	+0.3%
6000	Inlet Velocity	5.54 [m/s]	3.36 [m/s]	+65.1%
	Outlet Velocity	8.2 [m/s]	7.22 [m/s]	+13.5%
	Inlet Volume Flow	203.58 [L/min]	123.40 [L/min]	+65%
	Outlet Volume Flow	205.30 [L/min]	124.13 [L/min]	+65.4%
	Outlet Pressure	1.35 [bar]	1.31 [bar]	+2.5%
9000	Inlet Velocity	8.31 [m/s]	4.31 [m/s]	+92.7%
	Outlet Velocity	12.26 [m/s]	8.25 [m/s]	+48.5%
	Inlet Volume Flow	305.42 [L/min]	158.66 [L/min]	+92.5%
	Outlet Volume Flow	306.97 [L/min]	159.62 [L/min]	+92.3%
	Outlet Pressure	1.76 [bar]	1.39 [bar]	+26.3%

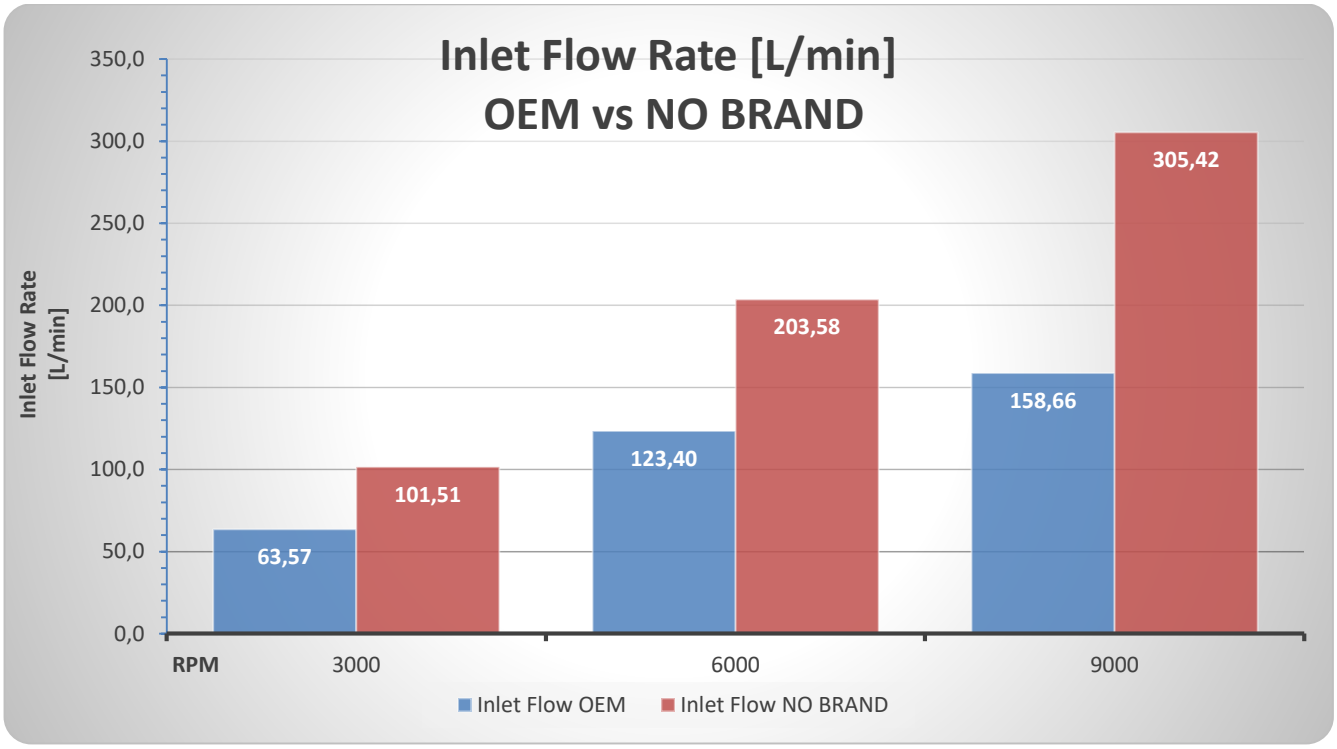
10.1. Inlet Velocity comparison



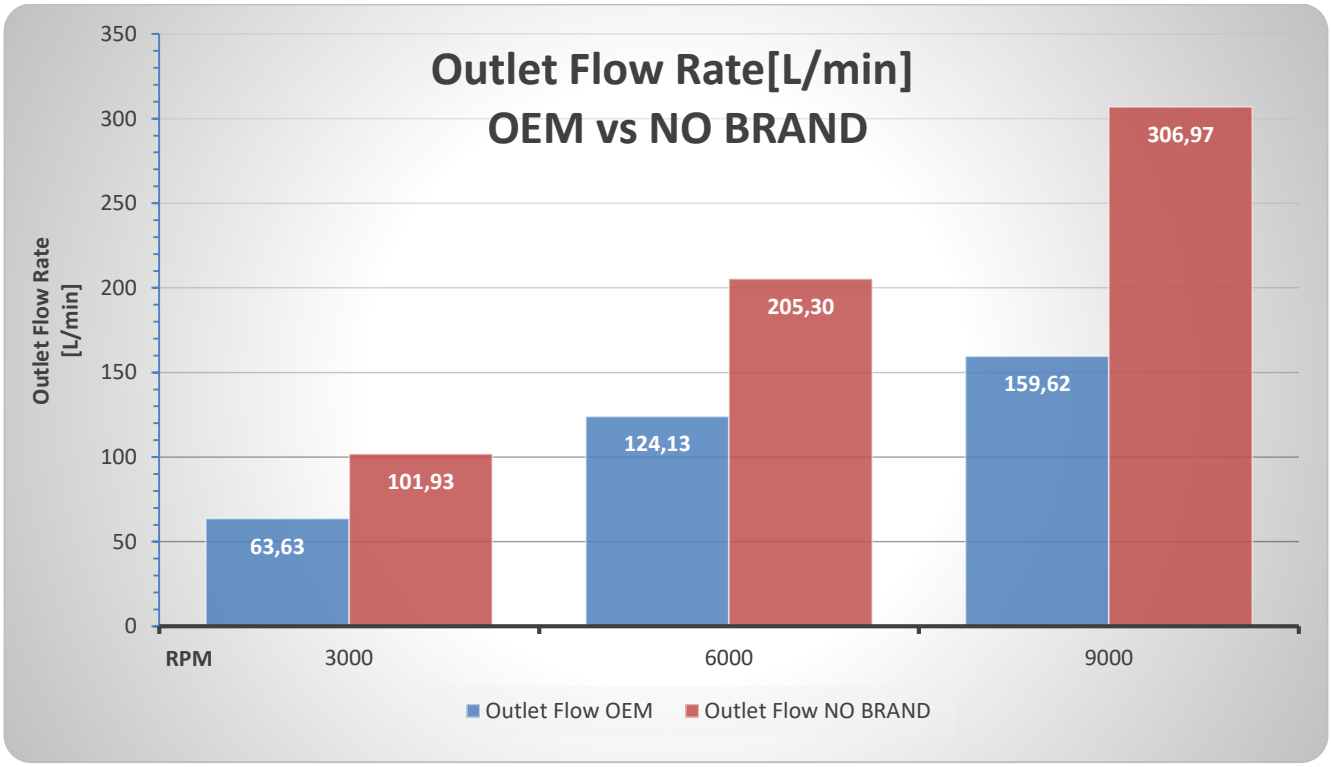
10.2. Outlet Velocity comparison



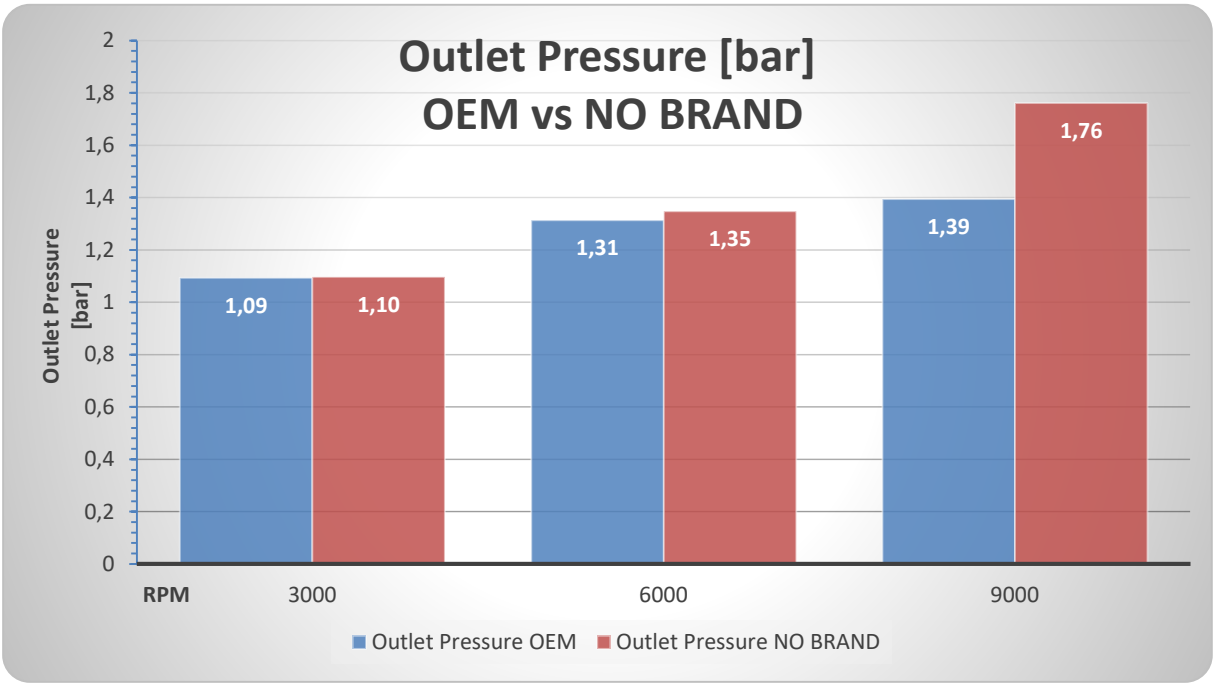
10.3. Inlet Flow Rate comparison



10.4. Outlet Flow Rate comparison



10.5. Outlet Pressure comparison



10.5. Conclusion

This study evaluated and compared the hydraulic performance between the genuine water pump (OEM) and the NO BRAND water pump kit across three rotational operating scenarios (3000 rpm, 6000 rpm, and 9000 rpm). From the analysis of critical parameters (flow velocities, volume flow rates, and discharge pressures), the following conclusions are drawn:

- **Performance of the NO BRAND Kit**
  The NO BRAND kit systematically demonstrates significantly higher volume flow rates and increased flow velocities across the entire operating range. Specifically:
  1. **Volume Flow Rate**: The NO BRAND kit delivers an increased flow rate of approximately +59.7% to +60.2% at 3000 rpm, scaling up to +92.3% to +92.5% at 9000 rpm compared to the OEM.
  2. **Flow Velocities:** Both inlet and outlet velocities are noticeably superior in the NO BRAND kit, indicating a better impeller geometrical design and modified flow cross section.

- **Behavior and Energy Balance**
  The outlet pressure increases stepwise for both systems with higher load. However, the NO BRAND kit develops a higher discharge pressure, peaking at 1.76 bar (176053 Pa) at 9000 rpm, versus 1.39 bar (139069 Pa) for the OEM. This variation indicates a greater transfer of hydraulic energy to the fluid.
- **Overall Evaluation**
  The NO BRAND kit clearly outperforms in terms of volumetric discharge and flow velocity per revolution, making it more effective for heat exchanger cooling under high load requirements.