

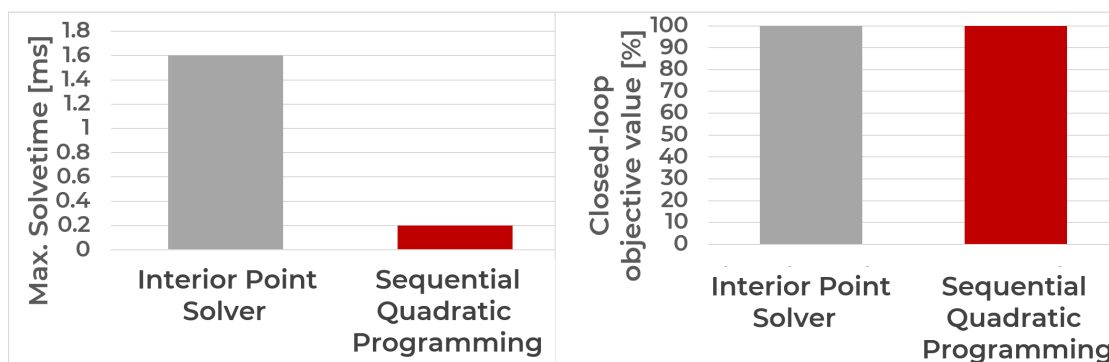
## FORCES PRO 3.0 Release

# FORCESPRO

### Lower computation times for reference tracking NMPC with our new SQP option

- **SQP Feature:** The 3.0 release comes with a new Sequential Quadratic Programming (SQP) solver. It allows users to design powerful solvers, especially suited for nonlinear model predictive control (NMPC) reference tracking problems that require fast feedback rates. Based on tailor-made SQP algorithms, real-time implementation can be achieved even for small available computation time or computational power. The SQP option achieves a feedback rate of 0.2 ms for a nonlinear reference tracking problem of a [DC motor](#).

NMPC with SQP vs. Interior Point for a DC Motor



Together with our established state-of-the-art nonlinear Interior Point algorithm, a very broad spectrum of real-time optimization-based control tasks can be tackled. While the SQP option is favorable for simpler optimization problems and low computation times, the nonlinear Interior Point option is especially suited for very complex optimization problems and medium available computation time,

such as motion planning problems for autonomous driving and robotics.

low	Complexity of control task	high
Sequential Quadratic Programming		Interior Point Solver
low	Available computation time	medium

- **Automatic differentiation tools:** FORCES PRO now offers support for various automatic differentiation tools to generate C code for problem formulation functions and derivatives. In addition to the CasADi version 2.4.2 supported so far, the latest CasADi version 3.5.1 as well as [MathWorks® Symbolic Math Toolbox™](#) can now be used as well.
- **Compact option:** A new option is offered for the nonlinear Interior Point solver to create more compact, smaller code, while at the same time reducing the solver generation time for long horizon problems. This enables FORCES PRO to solve MPC problems with more than 1000 stages.
- **Updated licensing system:** With the latest improvements in our licensing system, we no longer require solver regeneration after license changes in the customer portal, for instance after renewal of the license. Additionally, the stability of the machine fingerprinting system has been increased notably, especially on Windows platforms.

A **full list of the 3.0 changes** can be found [here](#).

Existing users can easily switch to the new version by using our [auto-update function](#).

Alternatively, you can use the **new server** at:

<https://forces-3-0-0.embotech.com/>

**Note:** Version 1.9.0 will go offline as of May 15, 2020.

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