



# How long does it take?

## Estimating target-specific execution times for Simulink models

### Motivation

In automotive engineering ensuring real time performance is the key to develop reliable software. At IAV, Mathworks Simulink is one of the most important tools for the software specification phase. However, even in the early development phase, engineers are facing the question whether or not software specification will meet given real time conditions.

### Concept

For this purpose and in cooperation with Otto-von-Guericke University Magdeburg, IAV developed a Matlab tool to estimate the execution times based on the Simulink model itself. With this tool, time and cost of

the overall software development process can be reduced effectively. It is no longer necessary to build and compile the model due to a predefined runtime data base. This data base includes all information required to perform an estimation. The information is gathered beforehand and includes static or dynamic analysis results.

### Results

The tool was tested on three real-world application Simulink models with different complexities. Although working on a high abstraction level, the estimation tool yields promising results. When using more complex models, frequent memory accesses lead to underestimation of the actual runtime.

Blockcount	Estimate	Runtime	Difference
160	10818*	9816*	10,2 %
366	1762*	1583*	11,4 %
756	13721*	14946*	-8,2 %

\*Clock cycles PPC750GL (800 MHz)

### Remaining Challenges

In further development, even closer estimation boundaries shall be possible by taking into account memory accesses as well as code generation done by the Simulink coder.

