



TRUMPF Laser, in Schramberg, guarantees the **quality of its software** by using Axivion Bauhaus Suite code and architecture verification

THE CHALLENGE ++ At TRUMPF's Schramberg location, Axivion's task is to protect the software developed both for embedded and PC software from software erosion. The code, on which the various systems are based, has been continuously refined over a period of years and in ever shorter innovation cycles – for greater functionality and a wider product range. During this process, the overall complexity of the software and its variants has also increased. Keeping all of this manageable represents a continuous challenge for developers. This is coupled with increasing quality requirements in the industrial sector, which have to be met – right down to code level. Manual reviews cannot be used to guarantee compliance with self-imposed and industry-wide coding/quality standards in an economical and efficient way. Therefore, the aim is to automate the code and architecture verification process as far as possible. Another reason why this is so important

is that the software development teams at TRUMPF Laser in Schramberg are growing ever larger. Software plays a key role in the high level of innovation built into TRUMPF products. However, having a growing workforce does create additional challenges. With an ever-increasing number of programmers, including new colleagues, working together on a common code base and adding a steady stream of new program sections to the software, the challenge is to ensure that the joint coding standards are maintained at all times and, above all, the software architecture is understood and rigorously implemented.

THE SOLUTION ++ At Schramberg, TRUMPF Laser has relied on Axivion Bauhaus Suite for quite some time. TRUMPF's developers use the tool suite and its automated analysis and reporting features in their regular reviews of both new software components and, via delta analysis, the existing software.

TRUMPF is a technology and market leader when it comes to machine tools for flexible sheet metal processing and industrial lasers. When developing the software for the laser systems at its Schramberg site, TRUMPF Laser uses Axivion Bauhaus Suite.

The Axivion Bauhaus Suite seeks out style violations and metric violations in the programming in a targeted way, while also localizing clones and dead code. The affected code locations are marked, and displayed for developers for further systematic processing, both directly in the IDE and through transparent reporting processes.

“Using Axivion Bauhaus Suite has brought us two outstanding benefits: during its introduction, our developers grappled intensively with the architecture, which has grown up over a period of years, and we can now optimize the code in a targeted way, based on findings from the various sprints.”

Rainer Thieringer
Head of Software Development Department,
TRUMPF Laser

The Axivion Bauhaus Suite also offers active support with the ongoing creation of product-specific software architecture. Rigorous compliance with this architecture during all stages of software development is guaranteed by the tool suite's automated architecture verification process. This immediately flags up any failure to meet specifications correctly. In this way, developers are not only able to correct possible violations immediately, but can also benefit from a personal learning effect in terms of correct implementation of the specified software architecture. The technical integration of Axivion Bauhaus Suite at TRUMPF Laser in Schramberg is conducted by experts from Axivion's professional services team. As part of this process, they not only install the tool suite and its plugins directly into the developer's workstation, but also add such things as TRUMPF-specific metrics and coding guidelines to the code and architecture verification tools. The development teams are provided with personal training, which enables them to incorporate the Axivion Bauhaus Suite into their daily working practices without any great delay.

THE SUCCESS ++ The success of Axivion Bauhaus Suite at TRUMPF Laser is reflected by its increased developer productivity. Automating the code and architecture verification process, which used to be a time-consuming manual task, has permanently reduced the employees' work load. Another reason for using the tool suite is that it also displays potentially problematic coding, which could never be detected by manual means. For example, the "cycle detection" function homes in on cyclical dependencies across several components in a precisely targeted fashion. Thanks to its direct analysis, the Axivion Bauhaus Suite also improves developers' understanding of the architecture models. Swift feedback means that the architecture is clear and easy for individual users to understand, and can be implemented correctly and immediately, with increasing frequency, thanks to the automatic learning process. Moreover, the architecture documentation

can be much more precisely formulated and kept up to date without any great effort. All this greatly benefits new members of the development team: the Axivion Bauhaus Suite's clear, easy to understand rules and transparent documentation ensure that software developers quickly become familiar with the system. Thanks to the regular automated feedback from the tools, they pick up and internalize the coding standards and architecture models in no time at all, so that they can be relied upon to integrate them into their programming work. Reducing workload for the TRUMPF development team at Schramberg via the automated code and architecture analysis process frees up capacity and thus allows the personnel to focus once again on the content of their software implementations. The time saved in this way also allows the software architects to concentrate more on conceptual software planning. All in all, the software developers at TRUMPF Laser regard the Axivion Bauhaus Suite as an additional "safety net". The regular analyses and reports make the growing code quality visible, which boosts the team's confidence in its own development work.

For TRUMPF Laser, this guarantees long-term development success in an environment marked by high performance and quality requirements over ever shorter innovation and product cycles.

ABOUT TRUMPF ++ The high-technology company TRUMPF offers production solutions in the machine tool and laser sectors. It is driving digital connectivity in manufacturing industry through consulting, platform and software offers. TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, and also for industrial lasers. In 2016/17, the TRUMPF Group – which has about 12,000 employees – achieved sales of 3.11 billion euros. With over 70 subsidiaries, it is represented in nearly all the countries of Europe, North and South America, and Asia. It has production facilities in Germany, France, Great Britain, Italy, Austria,

Switzerland, Poland, the Czech Republic, the USA, Mexico, China and Japan. For more information about TRUMPF go to www.trumpf.com

ABOUT AXIVION ++ Axivion, based in Stuttgart, Germany, is a provider for innovative software solutions for static code analysis and for protection from software erosion. The core product of Axivion is the Axivion Bauhaus Suite, a tool suite for the improvement of software quality and maintainability of software systems implemented in the programming languages Ada, C, C++, C#, and Java. In addition to static code analysis, the tool suite includes innovative software tools for architecture verification and clone management. Moreover, the tool suite detects software erosion factors such as cycles, dead code and violations of programming rules. Axivion's MISRA checker covers 100 % of all automatically testable MISRA rules for the standards MISRA C:2004, MISRA C:2012, and MISRA C++:2008. Furthermore, the AUTOSAR C++14 styleguide as well as the CERT® programming rules for secure software development are supported.

The Professional Services Team of Axivion offers methods and training concepts as well as service and consulting to support customers to assure an effective and efficient rollout of the tools. Axivion's customers are companies that develop innovative technical software across different industries, e.g. industrial automation, automotive, railway, electronics, information and telecommunication, avionics, medical, mechanical engineering, as well as measurement, control and regulation technology. Since its foundation in 2006, Axivion maintains close research links to the University of Stuttgart, Germany, and to the University of Bremen, Germany to keep up with the newest trends in programming and code analysis research.

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