



## Case Study:

# Using 3D Reality Capture in Carpentry and Exclusive Interior Design



SCHREINEREI HANS MITTERMAIER GMBH | [MITTERMAIER-SCHREINEREI.DE](http://MITTERMAIER-SCHREINEREI.DE)

## At the Allianz Arena, Schreinerei Hans Mittermaier's woodworking craft is displayed in excellence among the VIP suites.

From an aesthetic standpoint, fine carpentry and the game of soccer hold much in common. Throughout the course of a game, elegant, curving lines are drawn by the passes that skilled players make. Space is valuable — either to be exploited by the attacking team or sought out and pressed by the team on the defensive. A passage of play, much like a piece of timber, is both unique and also a variation on a theme that's existed in many forms before — and will continue to exist in future games or pieces of craftsmanship.

It's only fitting, then, that one of the most architecturally advanced soccer stadiums in the world — the Allianz Arena, home to Bayern Munich — contains elegant, curving architecture that mirrors the elegance of "the beautiful game" played on the pitch.

During construction of the stadium in 2005, there was fierce competition between 20 companies for the prestige of building and expanding the VIP boxes. These boxes are iconic at the stadium — for both aesthetic and financial reasons. Each box is a collaboration between top brands and the Arena, which ensures financial stability for club, no matter the results on the pitch, and brings a bespoke gameday experience to the VIP attendees.

The Allianz Arena also differs from other stadiums in that the VIP boxes are used for conferences, meetings and gatherings even when there's not a game being played below. Each box is a luxurious hospitality experience, with furnishings for eating, drinking and networking, plus a bar and the latest media technology for viewing the game or other entertainment. The placement of these screens was especially thought out and considered so that

## Using 3D Reality Capture in Carpentry and Exclusive Interior Design

everyone can catch a slow-motion replay of a Bayern goal, no matter where they might be standing or sitting in the box. Exquisite catering provides the final touch for this VIP location.



So, how did it happen that a master carpenter with a 20-person team became central to the construction and completion of this iconic feature of one of Europe's most modern stadiums, the Allianz Arena?

Christian Mittermaier attributes his carpentry workshop's success to his meticulous preparatory work, attention to his craft and incorporating precision technology into his workflow.

The Hans Mittermaier joinery, based in Pittenhart, Bavaria, Germany, was founded in 1957 by Hans Mittermaier. In the company's early years, they primarily worked as a carpentry shop, making individual pieces of furniture and other home furnishings. In 1995, Christian Mittermaier took over management and has expanded the workshop to include more than 30 employees (as of 2022). Over the company's 60-year history, Mittermaier has developed a reputation for being a specialist in interior design. Cooperating with architects, electricians, bricklayers, plumbers and other trade contractors, their projects are carried out to the highest performance standards. Their philosophy of "single source" carpentry means that they look to reduce material waste wherever possible, combining both traditional woodworking techniques with the smartest new innovations like 3D reality capture to produce a sustainable finished product. At their workshop, apprentices learn both

the traditional techniques but also get to use the most modern woodworking machines, including 3D laser scanning tools.

Leading up to the competition for working on the VIP boxes, Christian Mittermaier wanted to understand what the other stadiums across Europe were doing when it came to their interior design. After visiting the Camp Nou in Barcelona and Premier League stadiums in England, he took ideas from those boxes and merchandising areas and created his own designs, building two model boxes at his own expense.

After presenting these and a 50-page presentation, Mittermaier won the project over other larger companies and architecture firms — and as of today has received orders for two-thirds of the Allianz Arena's VIP boxes. They are the only firm that's been allowed to implement their own design alongside the official ones from the stadium architects.

But a high-profile project like this was not without its challenges. Mittermaier had to coordinate with each brand, architects, contractors, the Allianz Arena managers and up to 20 different specific trade contractors. And the Allianz Arena is known for its iconic curved architecture — which extends inside the stadium.

"Out of the 106 total boxes, none is identical in terms of floor plan," Christian Mittermaier said. "Because of the circular shape of the stadium, in each box the walls are slanted and the room shape is trapezoidal."



This presented a measurement challenge. It's one thing to measure and cut a raw material when the lines are all straight or right angles. But it's another challenge entirely when the material is curved. Additionally, working in the arena required

## Using 3D Reality Capture in Carpentry and Exclusive Interior Design

that contractors pay for use of certain elevators to transport work materials — so an incorrect measurement didn't just result in a wasteful change order, it quite literally cost Mittermaier extra to return to the job site to take the measurement again.

"The Allianz Arena was a huge learning process for us from all perspectives, but especially in measuring," said Christian Mittermaier. "After using an external service for some 3D reality capture needs, I realized that I wanted those tools to be in house. I wanted to be able to react quickly in terms of time, and I wanted us to be able to manage our own time."

After constructing some of the boxes without owning their own 3D reality capture tools, Mittermaier made the decision to fully embrace the technology and purchased a FARO® Focus<sup>s</sup> 70 Laser Scanner in 2020.

As the Allianz Arena has particularly strict fire safety systems in place, the sprinkler-heads in each of the VIP boxes posed a measurement and building challenge.



*"Now, using the FARO Focus Laser Scanner, installing the sprinklers is ten times as fast. I no longer have to do as much rework or make time consuming changes during installation."*

Christian Mittermaier  
Manager,  
Schreinerei Hans Mittermaier GmbH



In the years since their first construction project at the Allianz Arena, Christian Mittermaier has become a fixture at the 50 meter/seven-floor-high stadium. In addition to the VIP boxes, the carpenters from Mittermaier have also worked on restrooms,

furnishing the counters in the press rooms, and the Bayern Munich historical museum — which contains around 400 monitors, media terminals and life-size video walls.

"The customers noticed a leap in quality, thanks to our adoption of 3D laser scanning," Mittermaier said. "And although we have a great business relationship with the Allianz Arena, they care about results. They demand high quality. If our standards are not reliable, they will not be interested in having us work for them again. Thankfully, it also works the other way — when a contractor exceeds the others, they notice. And using FARO software and hardware helps us in this."



Soccer is a unique sport in that a well-organized, mutually supportive team that operates as a collective can always win over selfish individualism. The sport is beautiful as a microcosm for life, because it shows the possibilities of an emergent organism on the field operating in a manner that's more powerful than the sum of its parts. In the same way, Mittermaier's small but dedicated team of workers has been able to show to the world the power of traditional carpentry techniques working in tandem alongside the latest 3D reality capture tools. The result is as beautiful as any "Traumtor" on the field below.

[View more FARO case studies at www.FARO.com](http://www.FARO.com)

© 2023 FARO Technologies, Inc. All Rights Reserved. This case study is for informational purposes only. FARO makes no warranties—express or implied—in this case study. FARO is a registered trademark of FARO Technologies, Inc. in the United States and other countries.

REV 03/10/2023