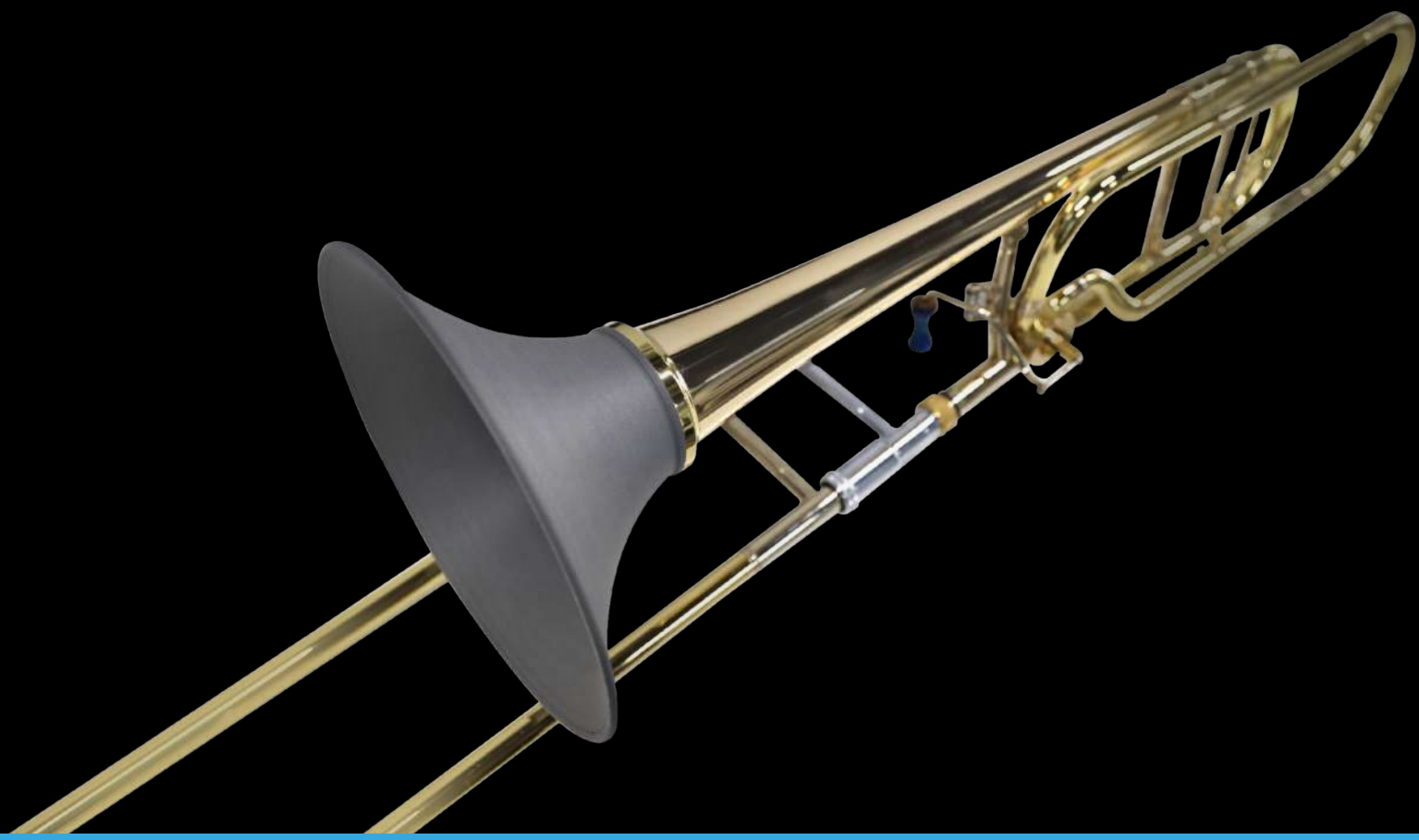
Case Study

From Brass to AM
3D PRINTED TROMBONE



LOOP 3D

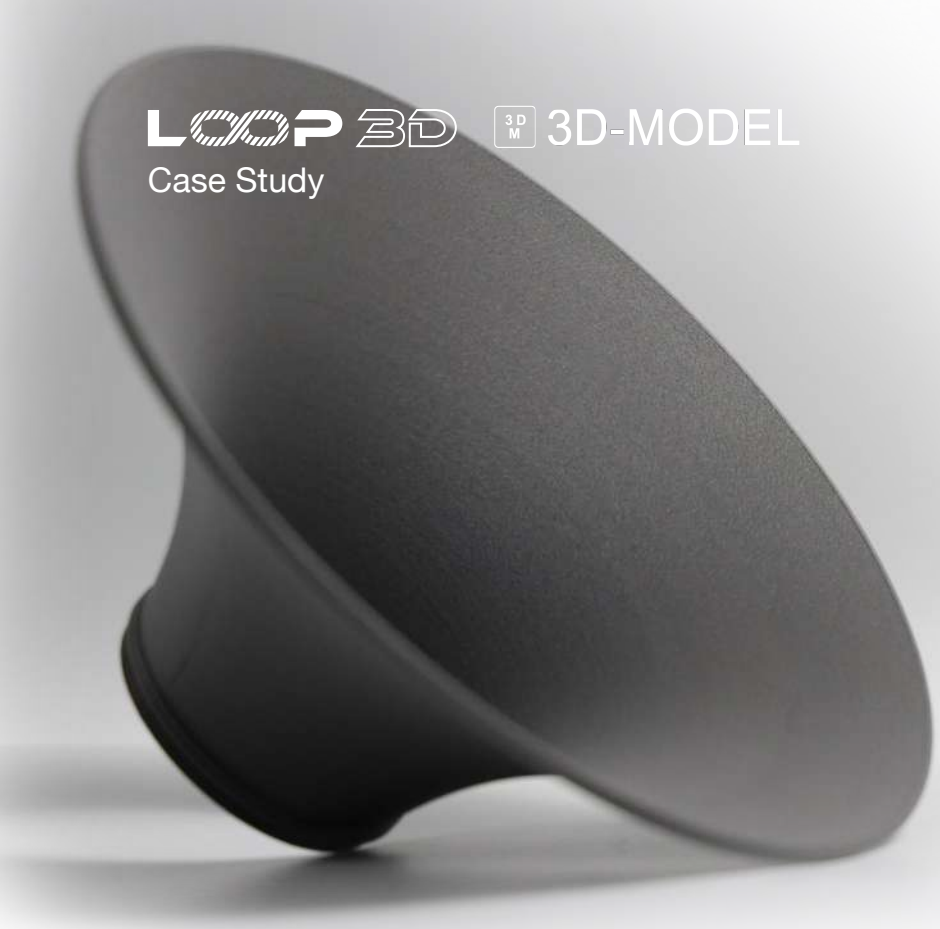
3D-MODEL

CHALLENGES

> Heaviness
> Manual labor time
> High cost

SOLUTIONS

> 70% lighter weight
> Short production time
> Cost reduction



Weight

70 % Lighter than brass

From brass to AM: LOOP 3D's 3D Printed Trombone

A real, functioning, trombone screw bell, 3D printed to perfection

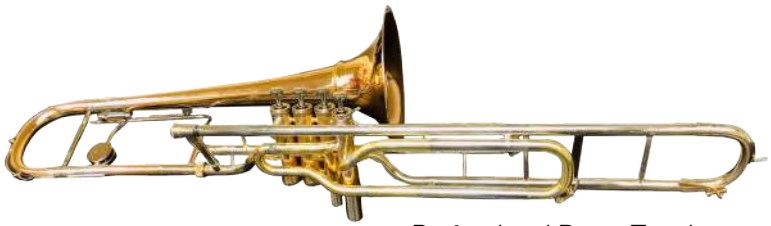
"We wanted to reduce lead times and costs to be able to reach more musicians worldwide. When we learned that the 3D printing process is a lot cheaper and more flexible for design and production, we wanted to give it a try."

Peter KÖRNER
(Assoc. Prof. Dr. at the State Conservatory of the Uludag University in Bursa, Turkey)

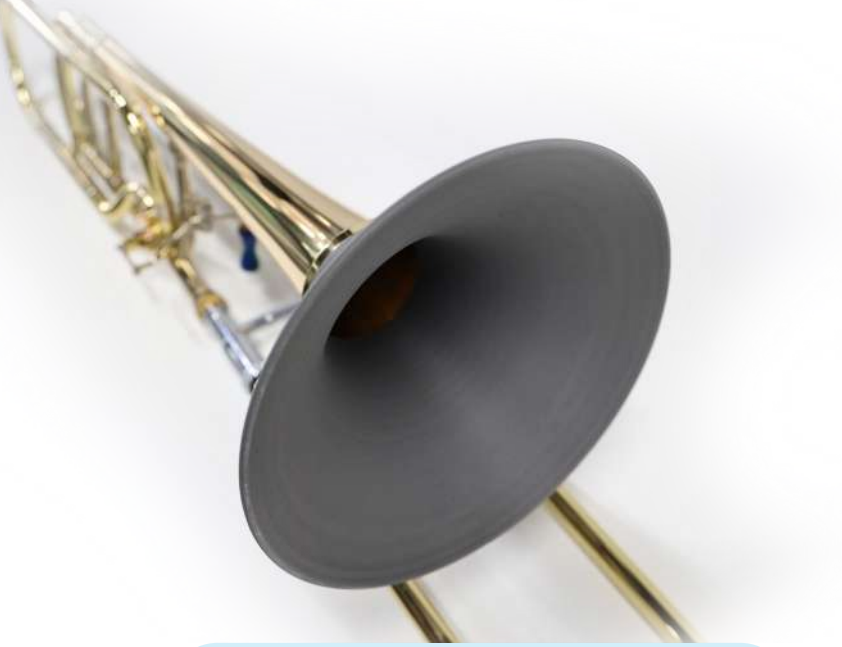
Associate Prof. Dr. Peter Körner is a famous trombonist and lecturer, born in Warendorf in 1974. He began taking trombone lessons at the age of 16, and he has been playing trombone since then. Besides playing, Peter teaches his students at the Conservatory of the Uludag University Bursa and its affiliated special music high school.

In addition, Peter Körner writes books and articles, like his doctoral thesis on breathing techniques or his book "World of the Alto Trombone" written with Heinrich Thein (published March / 2015 – Edition Martin Schmid)

He also helps developing trombone models and mouthpieces.



Professional Brass Trombone



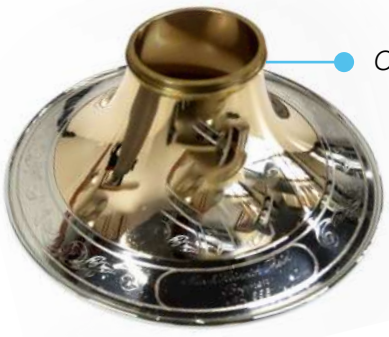
Challenge

Traditionally, brass instruments like the trombone are **crafted by hand** and **made from brass**, two factors that lead to the instrument's relatively high cost. The joint project between LOOP 3D and Körner, therefore, **sought to reduce the cost** of producing the instrument as well as the lead times by using additive manufacturing.

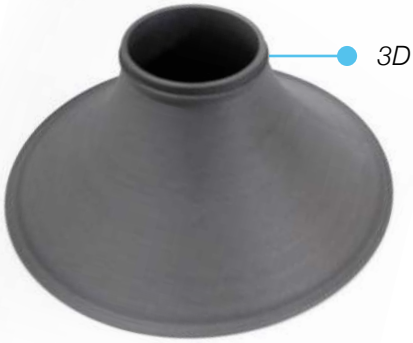
Process

The collaboration began with 3D scanning the trombone first, specifically the screw bell section, the flared end of the instrument where the sound finally emerges. The 3D scan, captured using the Artec Space Spider, was then converted into a 3D model using the reverse engineering software Geomagic Design X.

In the remodeling process, the bell's structure was optimized for 3D printing. As LOOP 3D explains, the instrument's original wall thickness was too thin to 3D print, so it had to be increased. The company says that "this made the 3D printed bell sound even better, so we kept the thicker design." LOOP 3D printed and tested a number of designs to find the optimal thickness for both durability and sound, and eventually, the best bell structure was achieved.



Original Brass Bell



3D Printed Bell

Peter KÖRNER

> “The key benefits of using 3D printing were design freedom, which led us to find the optimal design easily; the short production times, which led us to achieve end-use results within a day; and lower prices compared to traditional methods. Also, the design freedom enables us to make custom products without the limitations that the traditional methods have.”

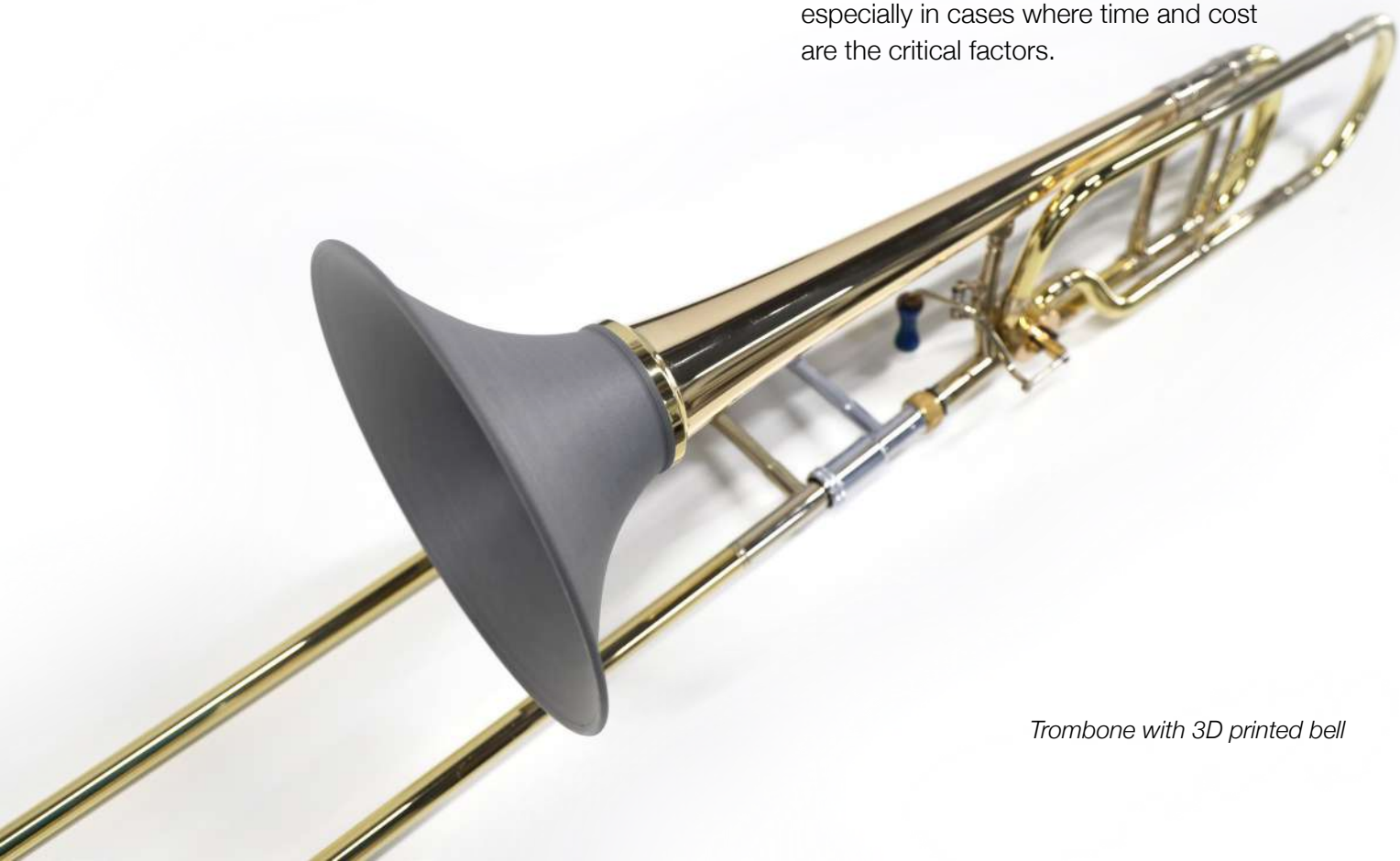
Mehmet Erkan USTAOĞLU
(Founder of LOOP 3D)

Solution & Results

The trombone component was ultimately 3D printed using the LOOP PRO X 3D printer and the company’s DYNAMIDE® GF material, an industrial composite filament with glass fiber reinforcement. Notably, the bell section was printed as a single component and without the need for any supports, which facilitated the post-production process.

According to LOOP 3D and Körner, the 3D printed bell had a good sound compared to the traditional all-brass instrument. The response and quality of the sound were even more convincing than the original. The 3D printed part was significantly cheaper to produce. Also, the 3D printed bells are 70% lighter than traditional brass bells, which is an important factor when musicians have to play for long periods of time.

All in all, the 3D printing experiment conducted by LOOP 3D and Körner demonstrated that the technology has the potential to be used for brass instruments, especially in cases where time and cost are the critical factors.



Trombone with 3D printed bell