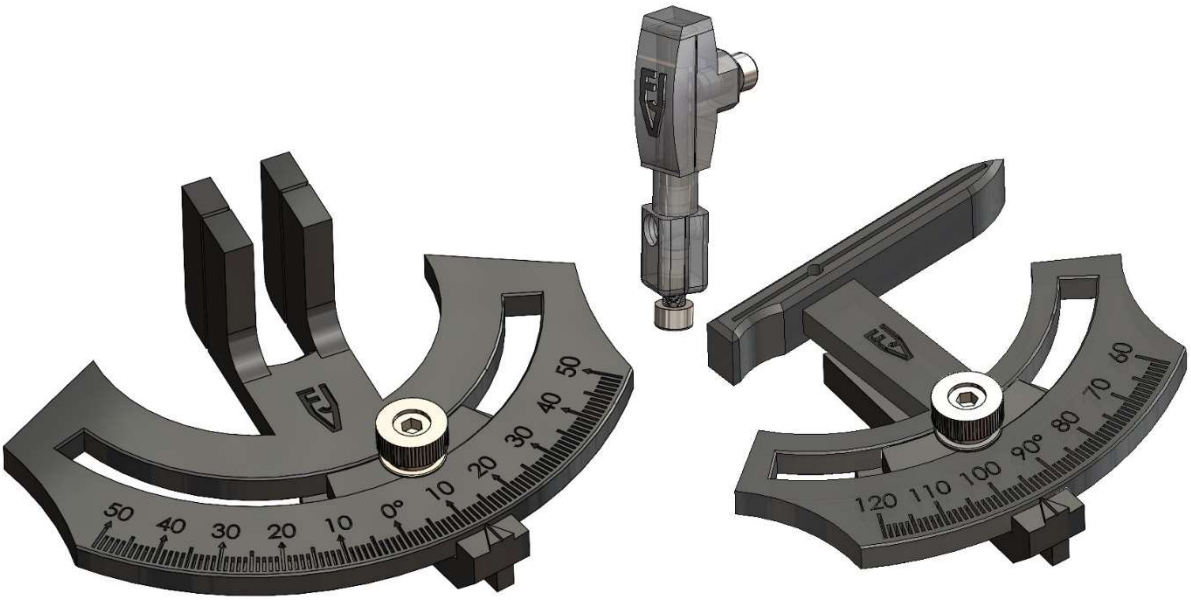
User Manual

FJV Piano Design, a Switzerland-based company, designs pianos for factories, independent piano makers, and technicians wishing to improve the design of existing pianos. We develop a range of specific tools aimed at improving piano technicians' efficiency.



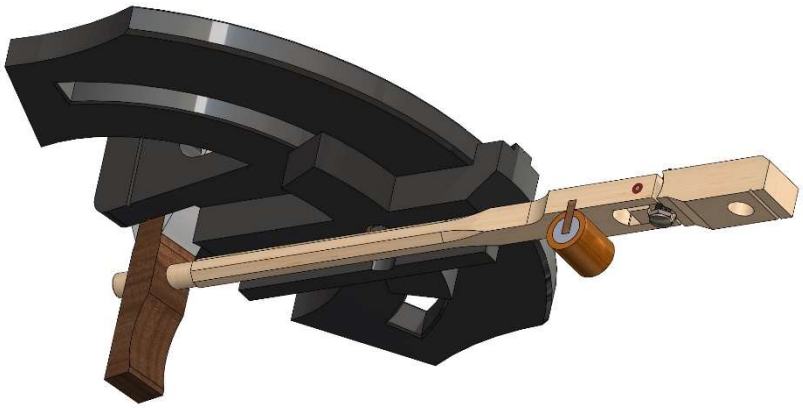
The protractor is designed to measure the boring angle according to the original hammers or to the adjustable fake hammer head (supplied in the full kit or separately) relative to your piano action frame. It works on any hammer head up to 12 mm in width, regardless of the length (bass and tenor).

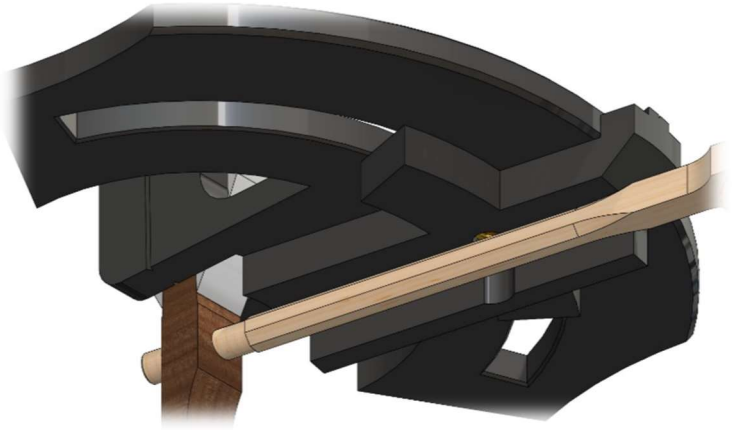
We offer another protractor to measure the vertical boring angle (rake).

These tools are made with high-quality 3D printing.

Our tools are graduated with standard 360° increments. These are also available in gradians (or gon) on request (360 degrees = 400 gradians).

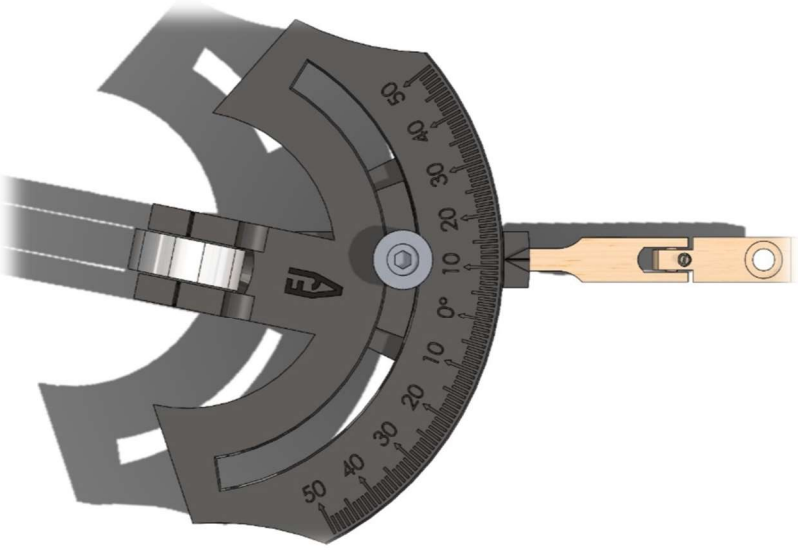
The lower part fits on top of the shank, lying on its right side, and on its top, as shown in the drawing on the right.





The accuracy of the measurement depends heavily on the adjustment of the lower part, so it is important to ensure that it is positioned correctly.

The top part aligns with the hammer head. The sides of the hammer should be aligned with the edge as illustrated here.





The angle measurement (in degrees) is simply read facing the arrow.

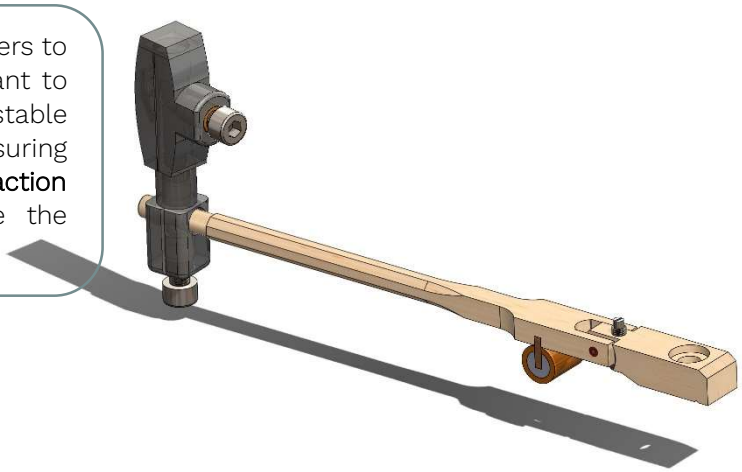
In this case, the angle is 12 degrees (bass hammer).

Here are some measurements taken on a grand piano:

N°	1	10	20	21	26	31	36	41	46	51	52	57	62	68	69	74	79	84	88
Notes	A0	F#1	E2	F2	A#2	D#3	G#3	C#4	F#4	B4	C5	F5	A#5	E6	F6	A#6	D#7	G#7	C8
Angles	8.5	8.0	8.0	8.5	8.0	7.5	6.0	5.0	4.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.5	1.5	1.0

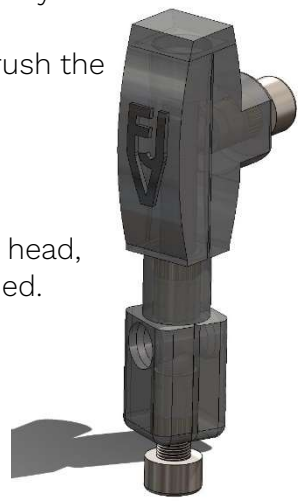
Measuring the angles without the original hammers

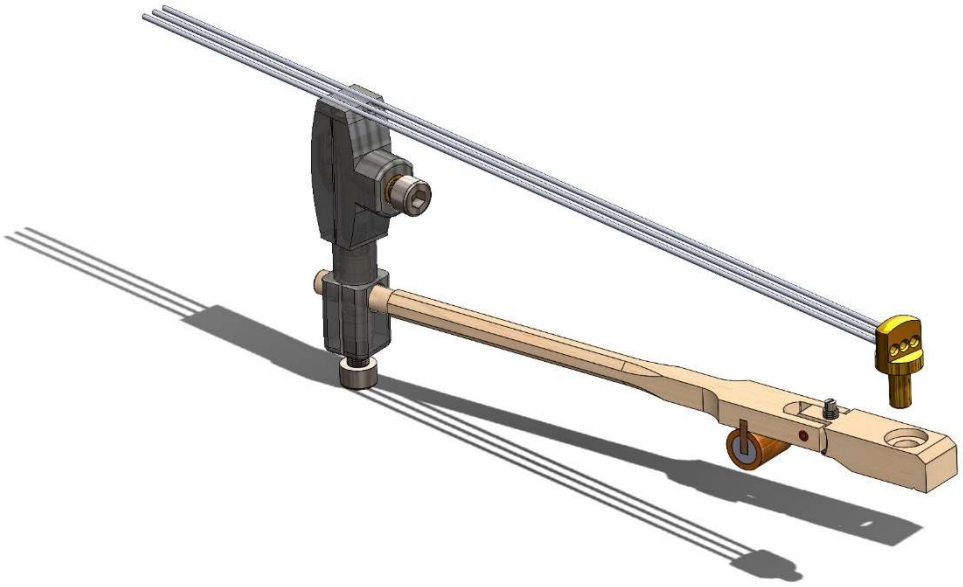
When we cannot rely on the existing hammers to know the angles of boring or when we want to optimize the action, we use our fake adjustable hammer head. The operation involves measuring **the angle of the strings relative to the action frame,** which is the ideal way to take the measurement.



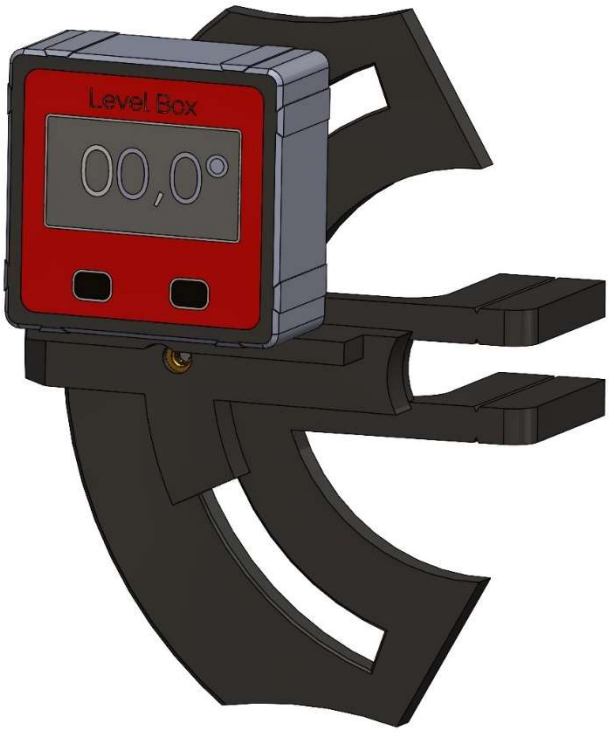
Instructions:

1. Unscrew the original hammer.
2. Screw on a new hammer shank and flange.
   (If needed, trim the shank slightly or adjust the backcheck).
3. Screw on the adjustable fake hammer head on the shank, at approximately the right shank length (usually 130 mm on most modern pianos).
4. Secure the head with the lower screw (moderately, taking care not to crush the shank).
5. Set the top part in approximately the same orientation as the strings.
6. Insert the action into the piano and install the sliding blocks.
7. Ensure that the fake hammer head is correctly aligned with the strings.
8. If needed, remove the action and change the angle of the fake hammer head, tightening or loosening the upper screw until the desired angle is obtained.
9. Put on the hammer head protractor and read the boring angle.

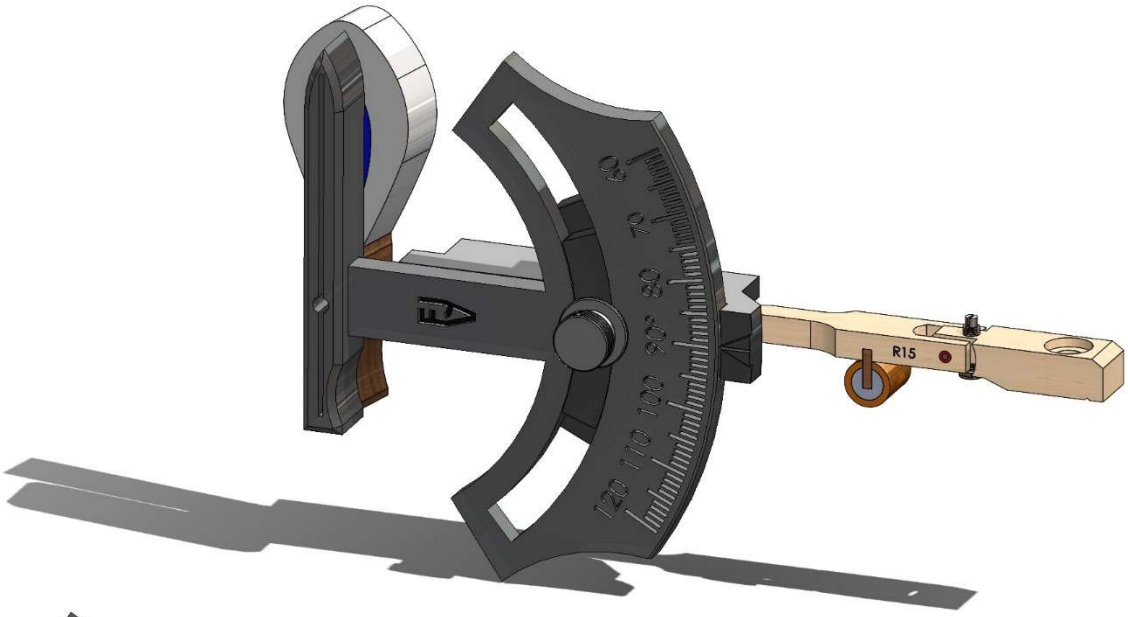


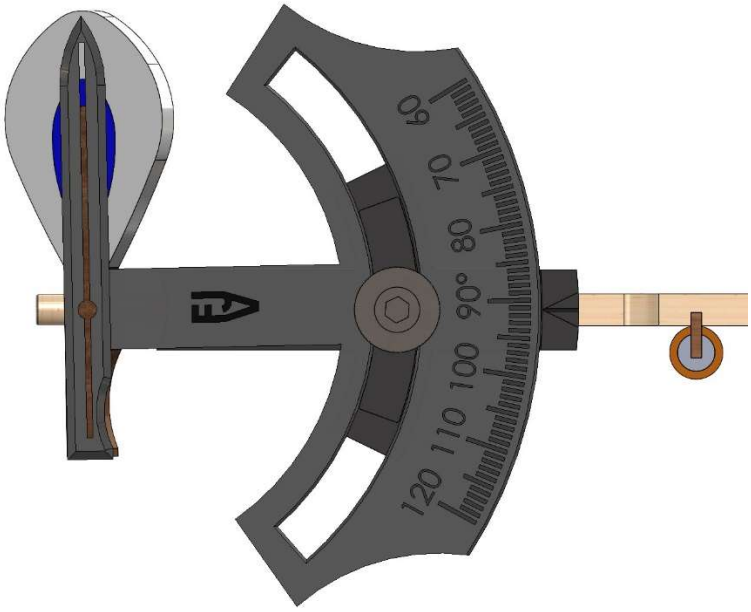


For even greater accuracy and precision, it is also possible to use a digital level (not included).









To measure the vertical boring angle, simply use our protractor. The angle is usually between 87° and 93° on a grand piano (91° as the industry standard), and sometimes wider on an upright.

