# 29$ Violin from AliExpress 2020

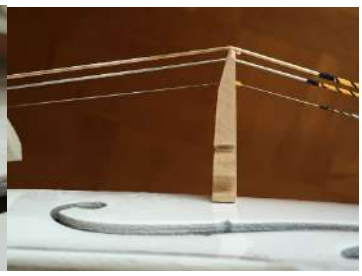

This violin was shipped to the city of Sneek (the Netherlands). The white painting makes it look like it was made of plastic and can looks like a toy.





The soundpost is crooked (de top is nearer to the tailpiece) and the distance between the soundpost and the bridge is over 12 mm. This is usually set at 5 mm.



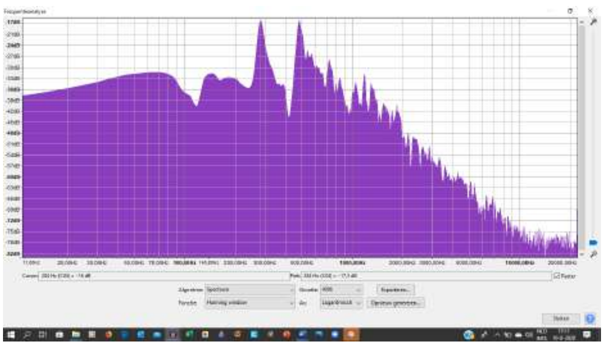
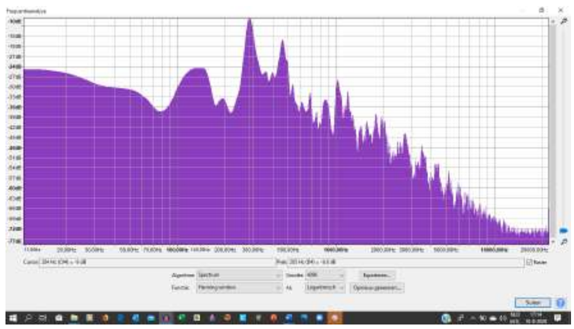


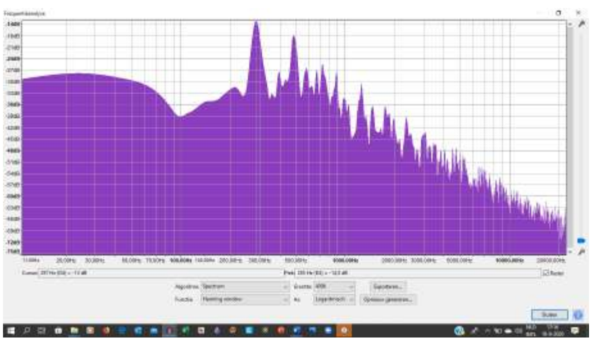
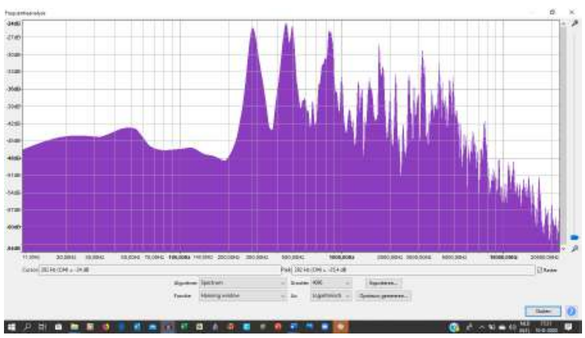
The nut has slits for the strings. The slits are spacious and round matching  the direction of the string, this causes the length of the string to change when it is pressed down with your finger while playing. It makes playing in tune fairly impossible, certainly combined with the plastic fingerboard.

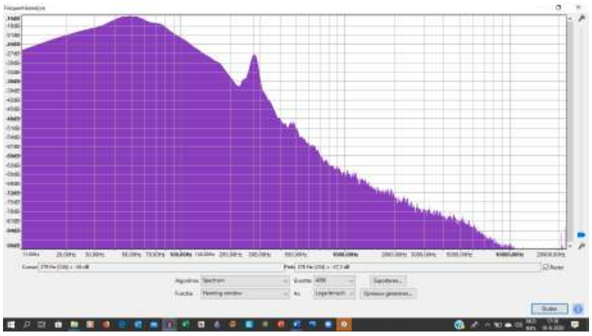
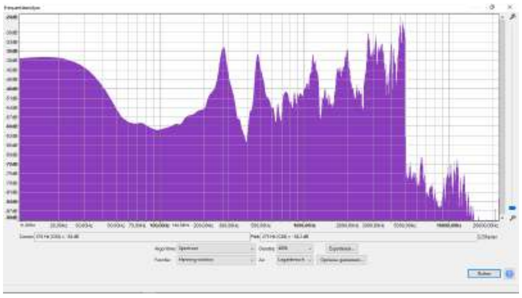
  Watch the corresponding video right here!

# The Violin

| Violin: Aliexpress $29 violin | | | Year of manufacturing 2020 | | | | Strings: Evah Pirazzi Gold | | |
|---|---|---|---|---|---|---|---|---|---|
| | Volume in dB | | | | Mass (gr) | Tap tone front | Tap tone back | B0 tone | Helmholtz tone |
| | G-string | D-string | A-string | E-string | | | | | |
| | 105 dB | 104 dB | 102 dB | 105 dB | 447 gr (Incl. 35 gr chinrest) | 284, 482 Hz | 285, 460 Hz | 270 Hz | 265 Hz |

| Tap tones Belly | Tap tones Back |
|---|---|
|  |  |
| The frequency of the belly is 284, 482 Hz | The frequency of the belly is 285, 460 Hz |

| B0, tap tone scroll | Bridge |
|---|---|
|  |  |
| Scroll 285, 485 Hz | Bridge from 282 Hz |

| Helmholtz A0 | |
| --- | --- |
|  |  |
| Helmholtz tone with blowth over the F holes 278, 469 Hz | Helmholtz tone with a sound generator 275, 475 Hz |

The base frequencies are identical to the median frequencies of many violins. However the higher frequencies lack volume in the bridge resonance. We will explore this further.

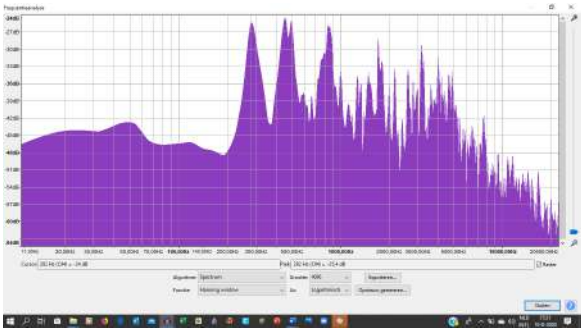
# Bridge comparison

Bridge

Original bridge

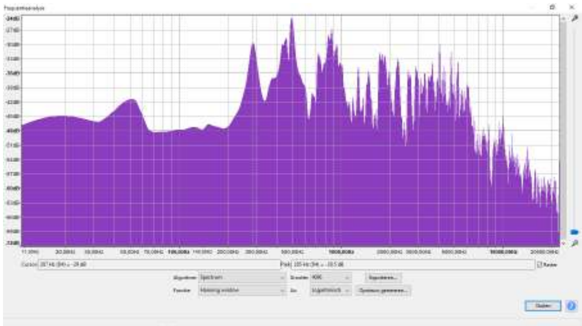
The audiogram on the right is of the AliExpress violin with the original bridge.

The peaks on the right side of the graph are relatively low. Compared to the diagram below (same violin with Rob's bridge), the AliExpress violin lacks power in the higher frequencies, which is why the sound color substantially diminishes in higher notes. Also the lower notes miss strength in the higher overtones, causing a poor sound.



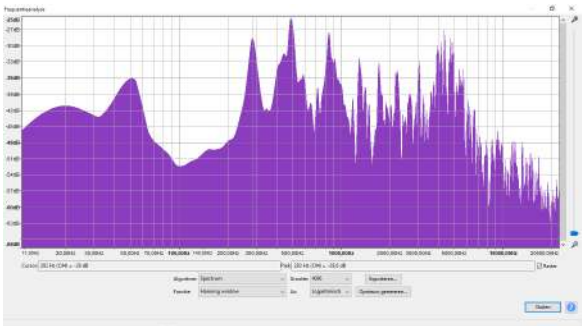
Rob's bridge

With Rob's bridge, there is somewhat more sound power than with the original bridge.



Rob's bridge and his new soundpost

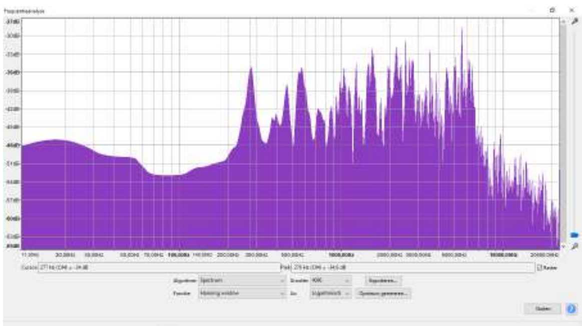
With the new soundpost, there is more power in the ranges between 3000 and 7000 Hz.



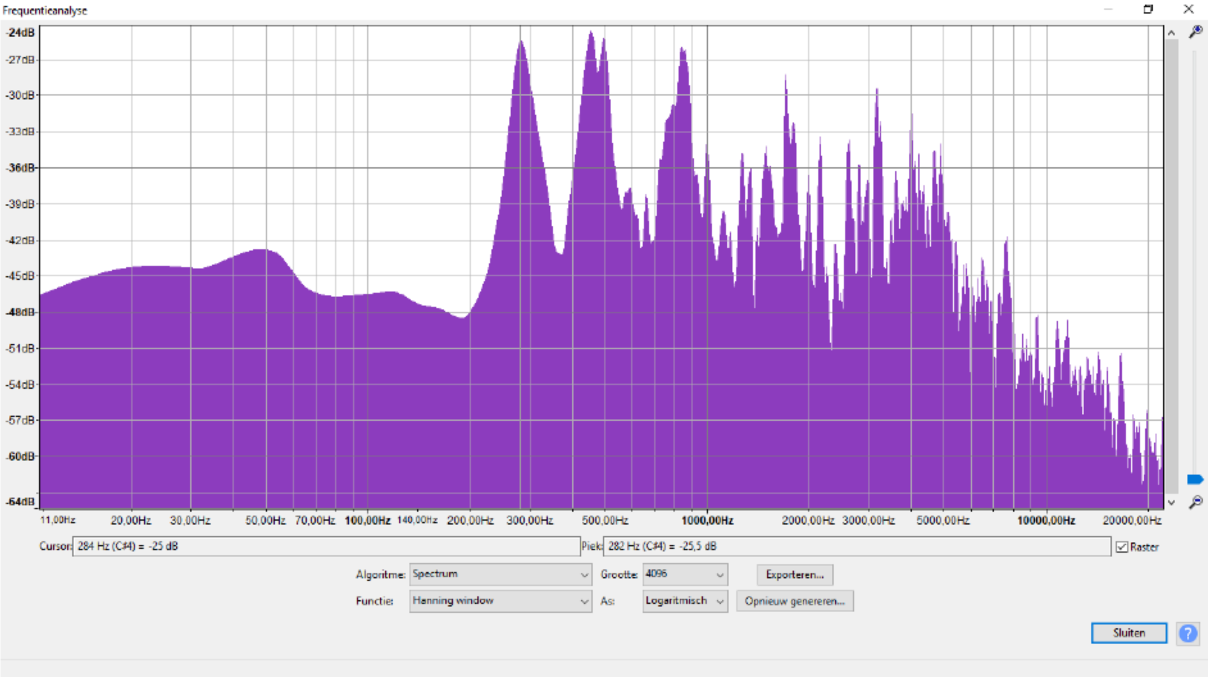
For comparison: a violin built by Rob

In the audiogram of a violin built by Rob on the right, we see a large area of frequencies displayed.

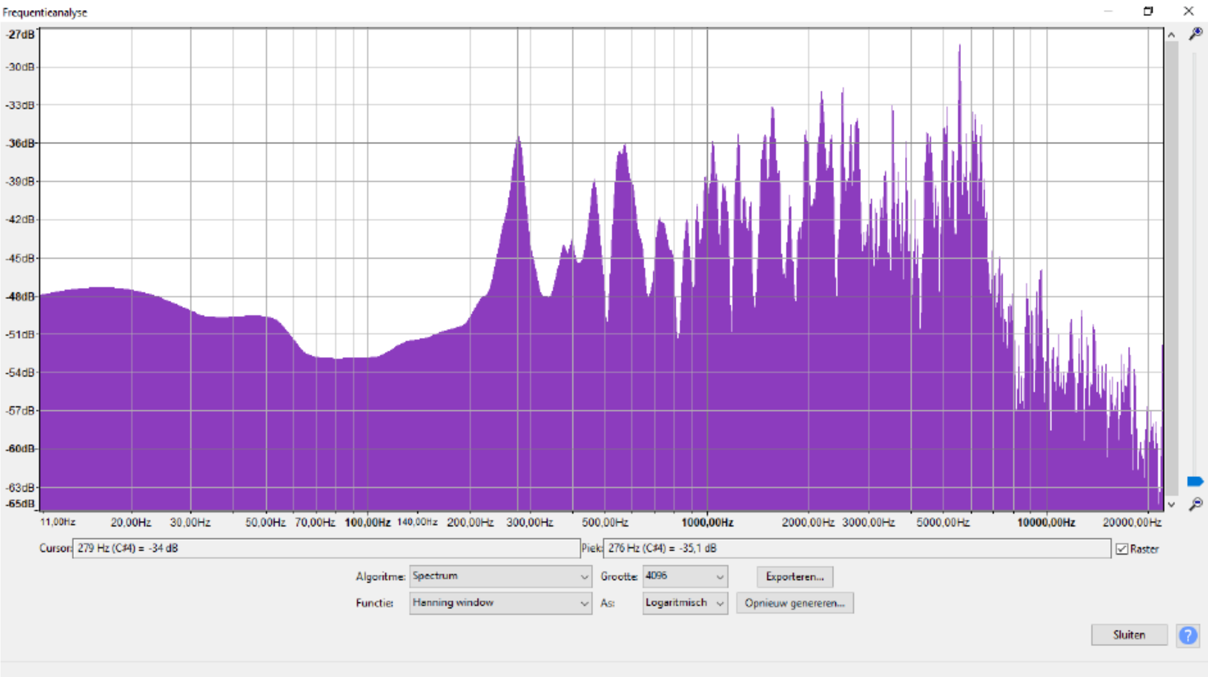
Please note: the volume is displayed along the vertical axis. The scale is not the same everywhere. This is why I speak about the form of the graph and not absolute values



Bridge knock AliExpress violin




Bridge knock Messiah (a violin built by Rob)

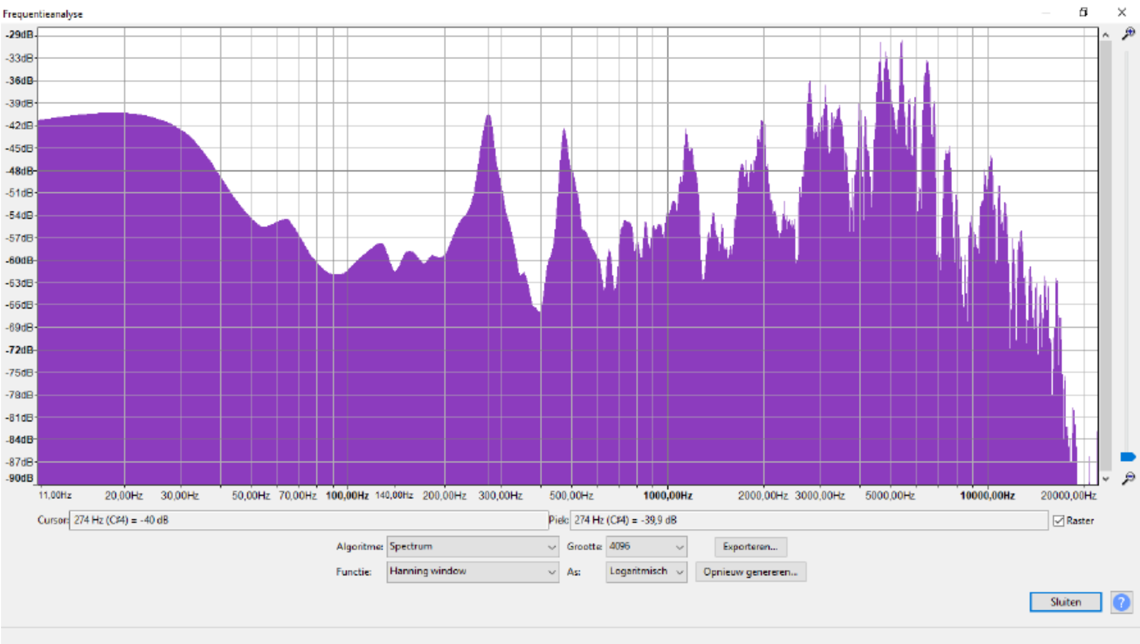



Conclusion based on the bridge response: The violin lacks power in the high frequency area.

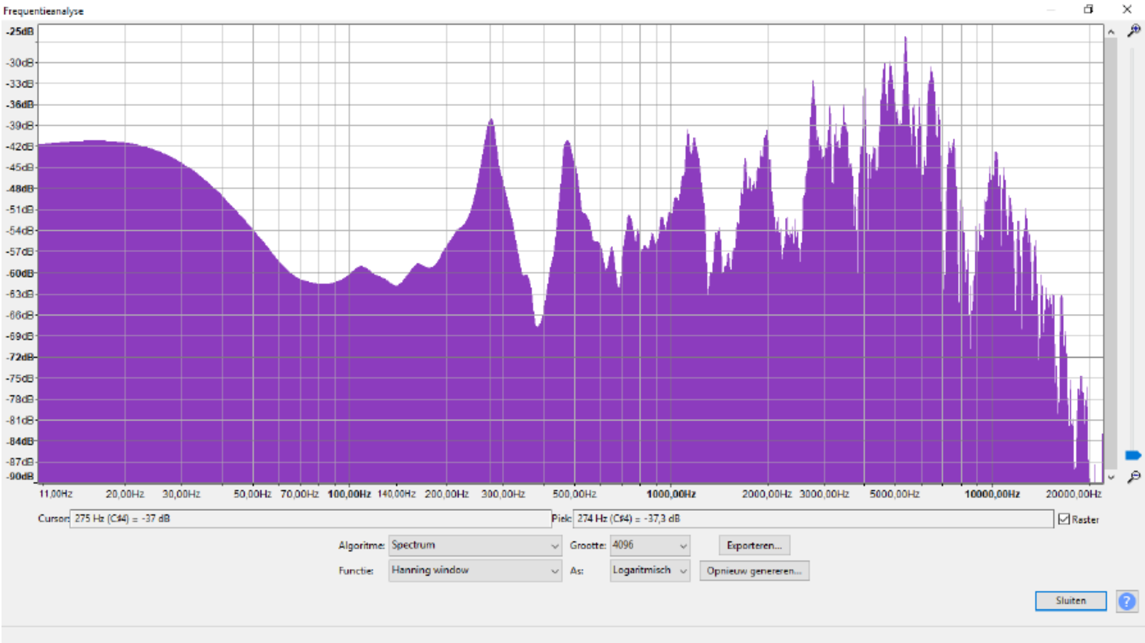
The next step is to look at the response of the sound box (and enclosed air) with the sound generator. The measurements were carried out in a corresponding manner (same sound generator and settings, same microphone and same distance microphone to sound box), so that the values of the volume in dB can be compared here, in contrast to the Bridge knock measurements.

## Sound generator measurement

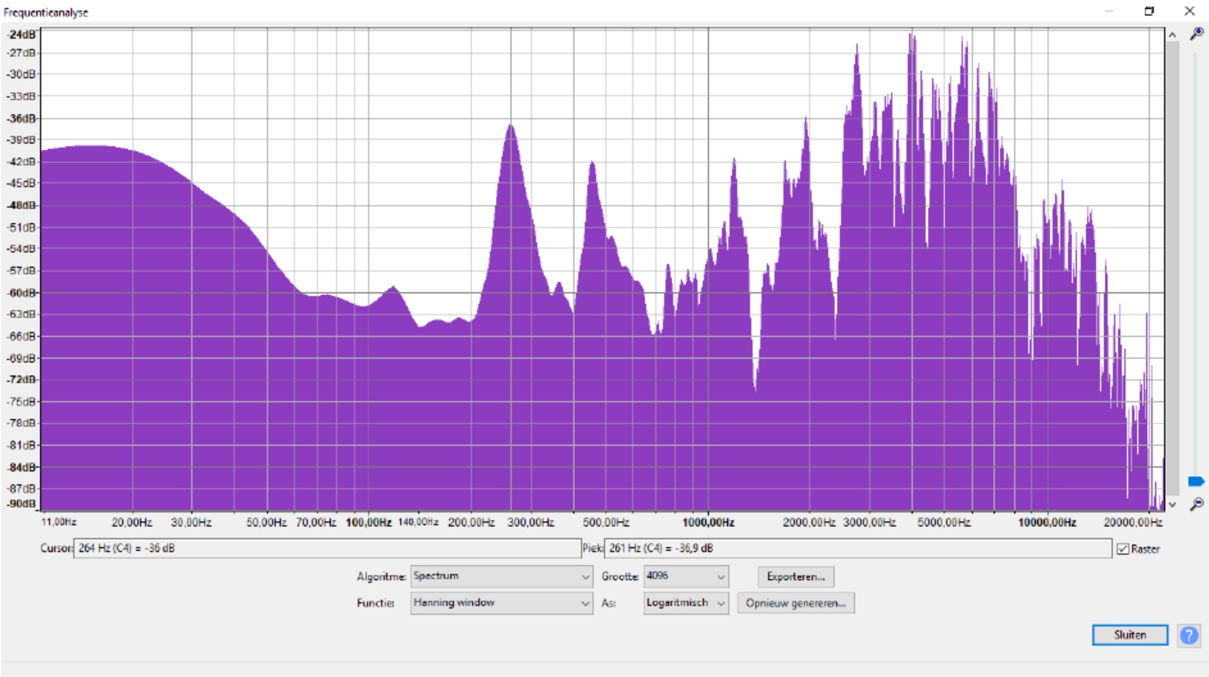
AliExpress violin with original bridge (90-30 dB)



AliExpress violin met Rob's Bridge (90-26 dB)




A violin built by Rob for comparison (90-25 dB)

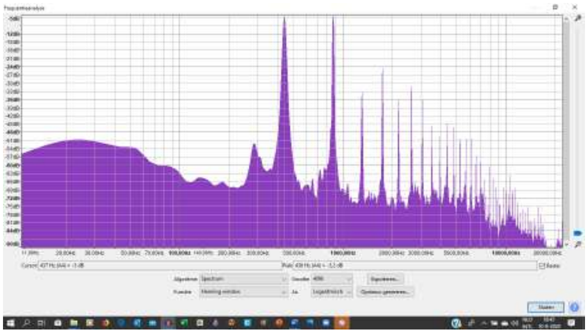
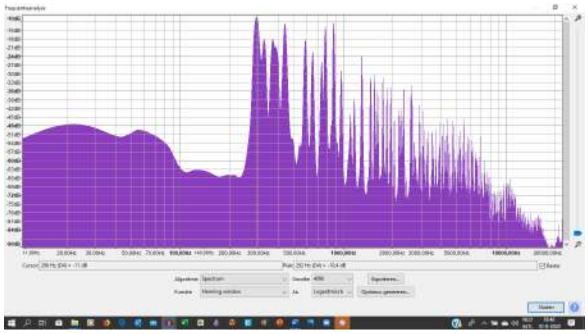
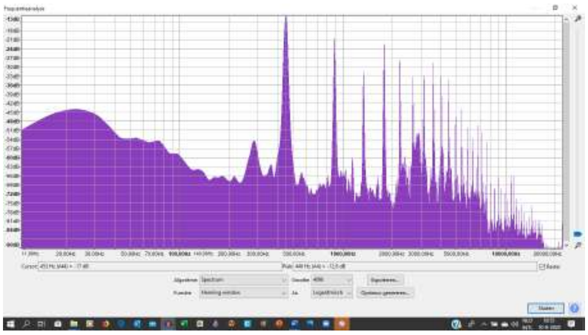
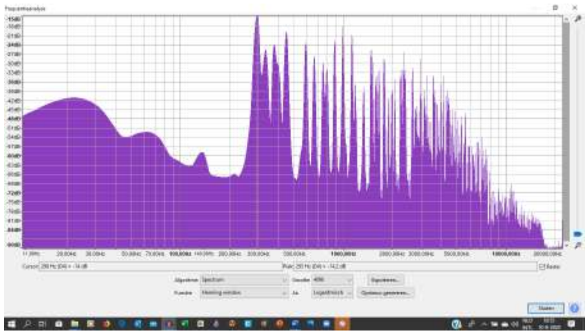


It can be seen here that the reproduction with the original bridge is clearly less strong than with Rob's bridge. The volume of the AliExpress violin with Rob's bridge is quite up to the level of the violin built entirely by Rob.

It can also be seen that the shape of the graphs differ. With Rob's violin there is clearly a wider range in the frequencies between 3000 and 7000 Hz.

Conclusion: The results of the sound generator experiment confirm the results of the bridge experiment and show that the overall power of the instrument is also smaller.

As a third and final experiment with the aim to get an impression of the sound power and timbre, we compare some audiograms of tones played on the AliExpress violin, with those of a self-built violin, the RVDH 2020 "Messiah".

| Below are the audiograms of the A and the D-string. | |
|---|---|
| A-string on the AliExpress violin  | Spectrum of the D-string AliExpress violin  |
| For comparison: Messiah violin built by Rob  | For comparison: Messiah violin built by Rob  |
| With the AliExpress violin, the peaks in the audiogram of the played A from 1500 Hz are much lower than with the Messiah. | Also in the spectrum over all (played D, E, F #, G and A on the D-string) the volumees at frequencies from 1500 Hz are clearly lower with the AliExpress violin than with the Messiah. |

Based on the bridge response, the sound generator response and the audiograms of played notes, we can say that the sound output stays behind in the higher frequencies.

In short: The violin lacks power in general and especially in the area of the higher frequencies, so that the timbre is "thin".

## General sound quality

To get an idea of the sound quality of a violin I analyze the sound of a violin on all strings on the basis of the audiograms, using three criteria.

Criterion 1: The fundamental tone is stronger than the overtones

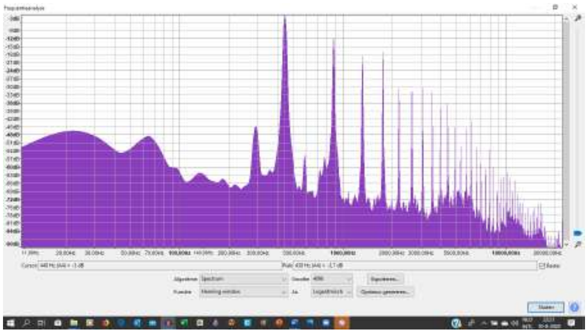
Criterion 2: The volume of the overtones decreases with higher frequency

Criterion 3: The instrument also emits frequencies above 10,000 Hz

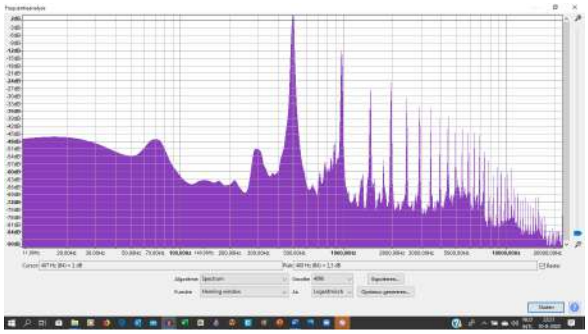
On the following pages I make an analysis only for the A-string, for the different situations. The first with the original bridge and soundpost, the second with the new bridge and soundpost.

A-string Original bridge en soundpost

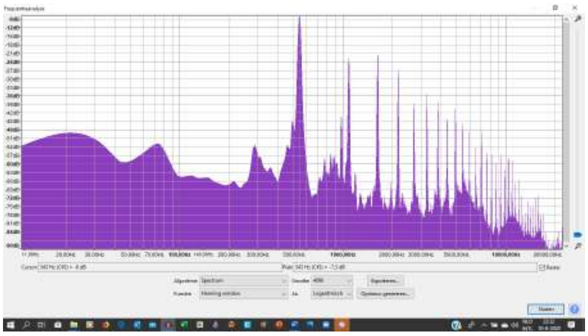
A -90 tot -3 dB 87 dB



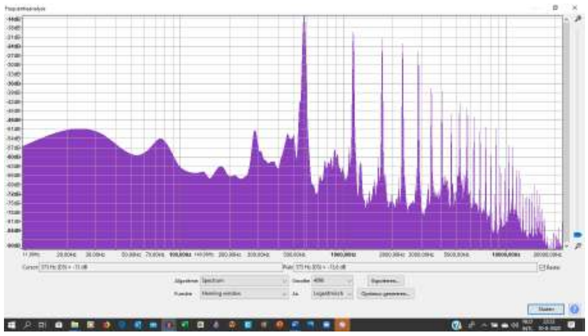
B



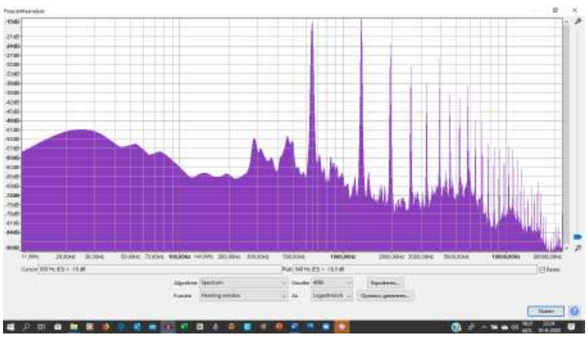
C#



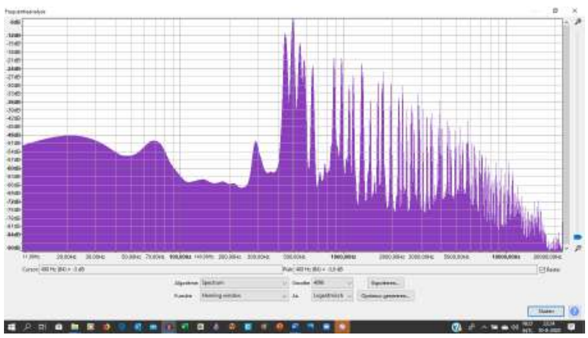
D



E



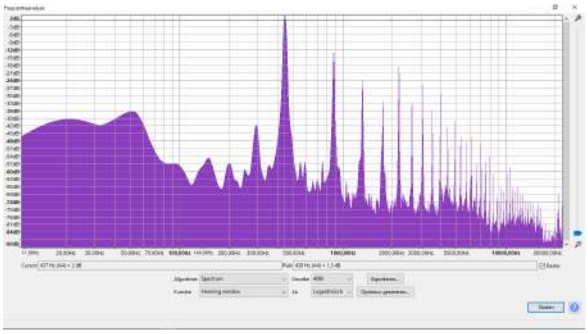
Spectrum over the A-string -90 tot -6 dB 84 dB



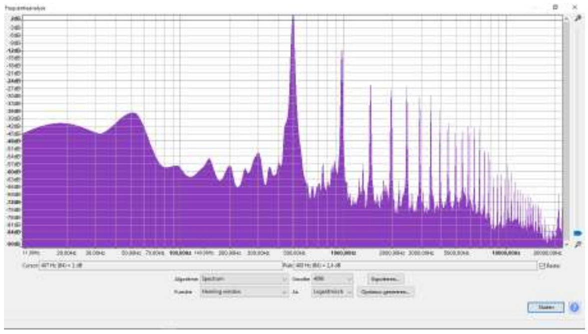
Criterion 1: The fundamental tone is stronger than the overtones; This is clearly the case on the A string, except for the E.
Criterion 2: The volume of the overtones decreases with higher frequency; This is the case on the A string.
Criterion 3: The instrument also emits frequencies above 10,000 Hz; Clearly visible.
The spectrum across everything on the A-string shows a balanced pattern, with the fundamental tones well represented.

A-string with Rob's bridge and new soundpost

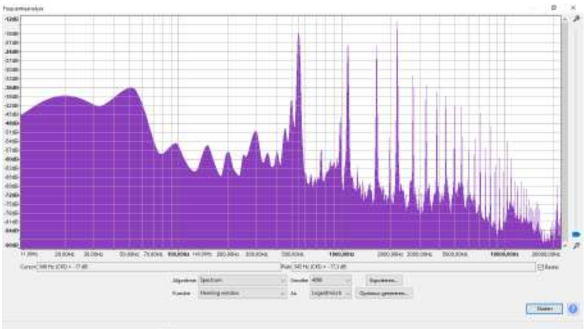
A -90 tot 2 dB 92 dB



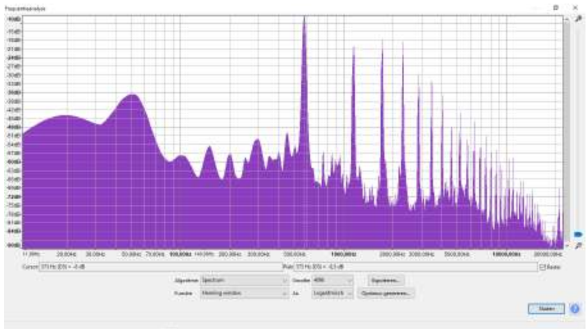
B -90 tot 2 dB 92 DB



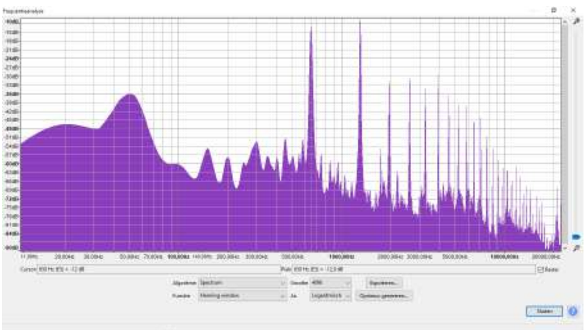
C#



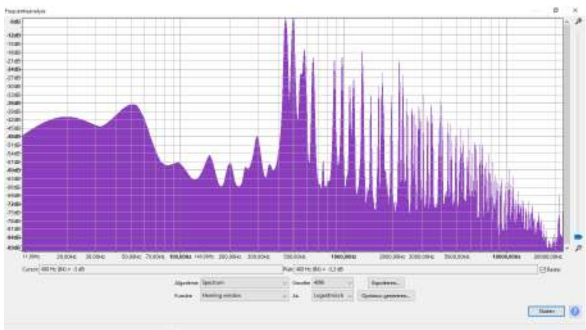
D



E



A-string spectrum -89 tot -6 83 dB



Criterion 1: The fundamental tone is stronger than the overtones; This is clearly the case on the A string, except for the E.
Criterion 2: The volume of the overtones decreases with higher frequency; This is also the case on the A string.
Criterion 3: The instrument also emits frequencies above 10,000 Hz; Clearly visible.
The spectrum across everything on the A-string shows a balanced pattern, with the fundamental tones well represented.

With the played A on the A-string (open string), the volume has increased from 87 to 92 dB.

That is a clear increase.

## Comparing the volume of the strings

In the volume measurements at the beginning (original soundpost and bridge), the A string lagged behind the other strings in strength. We repeat these measurements with the new bridge and soundpost and compare the values in the following table.

| AliExpress violin august 2020 | Volume in dB | | | |
|---|---|---|---|---|
| | G-string | D-string | A-string | E-string |
| Original bridge en soundbox | 105 dB | 104 dB | 102 dB | 105 dB |
| New bridge and soundbox | 107 dB | 106 dB | 108 dB | 107 dB |

The volume measurements are not absolute. It can be seen that in the old situation the A string lagged behind the other strings. With the new bridge and soundpost, both the A and E strings have increased in strength compared to the G and D strings.

## Conclusion on the whole test

- ***Criterion 1: The fundamental tones is stronger than the overtones****. This violin complies to a reasonable degree.*
- ***Criterion 2: The volume of the overtones decreases with higher frequency.*** *This violin complies to a reasonable degree.*
- ***Criterion 3: The instrument has a wide range of pitches****. The violin complies with this in a reasonable sense, with the remark that the higher overtones within the tone are lacking.*
- ***Criterion 4: The instrument sounds equally strong on all four strings.*** *The volume of the different strings is quite similar. The differences between the G, D, A and E string are not big.*

**Characteristics of the sound box:**

The frequencies of front and back and B0 are close to each other and do not deviate from the average values (measured over approx. 75 violins). The Helmholtz frequency does not deviate from the average either.

The graphical representations of the bridge response and the sound generator response show that the instrument does not produce a strong sound at the higher frequencies (overtones).

**Summary:**

The violin has a fairly warm sound. This is also evident from the audiograms. The fundamental tone is well present and generally the volume of the overtones decreases. A good audiogram is visible with various tones, with the caveat that the higher overtones are weak.

**Zlata's question was:**

I bought a 29 $ violin, of which I replaced the strings with a set of over 100 $. The sound has improved because of those new strings and by using a different bow.

**Can you make this violin sound even better?**

My answer: I determined the basic frequencies of this violin and made several audiograms. On that basis, I have concluded that the violin's weak point is the lack of power in the higher frequencies and the higher overtones. This makes the sound timbre rather thin and poor.

I was able to partially reduce that shortage by replacing the bridge and soundpost by my own.

I now pass the violin back to Zlata with the request to judge it in terms of sound.

**Another question was:**

Can properly adjustment and set up of a violin (good strings, bridge, soundpost) make it sound good?

My answer: A violin has many factors that influence the sound. Think of the quality of the tonewood, the shape of the soundbox, the thickness distribution of the front and back, the quality of the strings, of the bridge, the soundpost, the location of the bridge and the soundpost and I would can go on for a while.

My definition of a good violin is that it must be able to produce all frequencies properly.

If one of the factors is not good, for example the thickness distribution of the top, the violin will give a shrill sound. You can partially eliminate that shrill sound, for example by choosing a soft bridge. But then the bridge is too soft to produce a powerful tone.

**Only when all factors are good, you will get a really good violin.**

Rob van der Haar

Sneek, August 2020

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# Appendix: an introduction to sound analysis of a violin

The sound we hear consists of the fundamental tone and the overtones. Together they determine the sound color.

Some definitions:

- The **strength of the tone**, how loud it sounds, is called **volume**. This is measured in dB. A tone of 89 dB sounds louder than a tone of 85 dB. Decibels go in a logarithmic scale. For example two violins of both 85 dB together produce 88 dB.
- The **hight of the note** is expressed in Hertz or Hz. This is a linear scale. 880 Hz sounds twice as high (and octave higher) as 440 Hz.
- The **sound color** of an instrument is determined by the ratio of the fundamental tone and the different overtones.

In this report we researched the sound of a violin by asking the following questions:

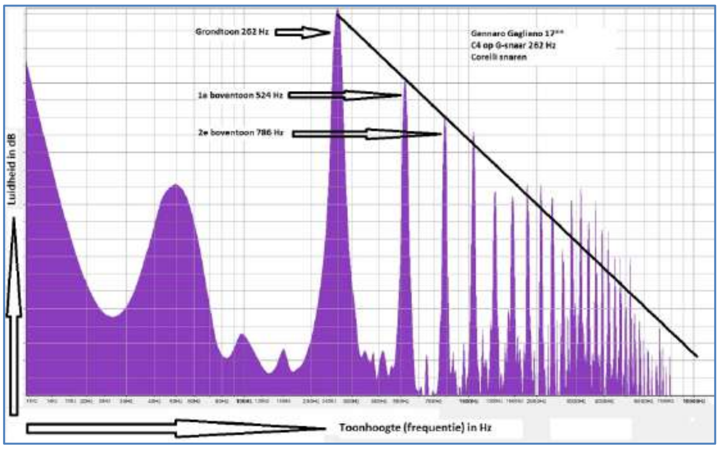
1. How strong in the fundamental tone on a certain string in ratio to the overtones? A strong fundamental tone gives a full warm sound.
2. How strong are the overtones? A lot of sound in the area of the human ear (1,000 to 3,000 Hz) gives a full sound. Little volume between 1,000 and 3,000 Hz and a lot of higher frequencies, gives a shrill sound.
3. How wide is the range of the violin in the higher frequencies?
4. Does the violin sound just as strong on each string?

After numerous measurements, it appears that a good sounding violin has the following characteristics:

- The fundamental tone is louder than the overtones.
- The volume of the overtones decreases the higher the frequency.
- The violin produces sound in the area above 10,000 Hz.
- The volume off all four strings is similar.

**<u>How I work</u>**

With the help of a computer and special software, I make recordings of the violin. I analyze the sound for each note. From that we get a graph that shows the volume of the note in dB as a function of the frequency (see the graph on the right).




**<u>How to read the graphs</u>**

Along the vertical axis we have the volume in dB (decibel). The higher, the louder the sound. Along the horizontal axis we read the frequency. The higher the frequency in Hz, the higher the note sounds. In this example a C4 note (262 Hz) is played in the G string of a violin. In the graph the highest peak is the fundamental tone. Right from that we see a number of overtones, of which the 1st and 2nd are pointed out by arrows. The overtones decrease in volume. The line connects the peaks as much as possible. If the peaks are below the line, the overtone is a bit weak. If the peak is above the line, this overtone is somewhat louder. The area left from the fundamental tone is not important to a violin. These are just side noises from the computer.

A good sound is not necessarily a beautiful sound. Sound is also a matter of taste. Some like a warm sounding Guarneri, while others prefer the bright sound of a Stradivarius.

**Do all strings sound equally loud?**

In my measurements I look at the volume in decibels of the four strings using a decibel meter. For each string I record the volume of the open string at least three times. I use the average of these measurements in my analysis. In this example I measured the volume of four open strings of a violin:

| Volume in dB | | | Example | |
|---|---|---|---|---|
| Violin | G-string | D-string | A-string | E-string |
| Kessels 1904 | 91 dB | 93 dB | 93 dB | 89 dB |

The differences in this example are quite large. By the human ear 93 decibels is experienced twice as loud as 89 decibels. As mentioned above: doubling the strength of the sound (two violins instead of one) gives as an increase of 3 decibels.

Other measurements:

1. The mass (weight) of the violin
2. The tap tone of the belly (with my index finger I knock the front of the violin)
3. The tap tone of the back (same for the back)
4. The tap tone of the scroll, B0 (knocking the scroll with my knuckle)
5. The Helmholtz tone, A0, by blowing over the F holes
6. The bridge knock (with a tiny hammer I knock against the side of the bridge)
7. The CBR knock (with a hammer I knock against the side of the violin at the C shape)
8. On the G, D, A and E string I bow on five notes:
    - The open string (for example the A)
    - One tone higher (B)
    - Another tone higher (C sharp)
    - A semitone higher (D)
    - A tone higher (E, which is equal to the next higher string)
9. On the E string I play another five notes from the B (in position) on whole, whole, half and whole intervals. I call this the B string.
10. On each string I look at the total spectrum. Which frequencies are strongest and stand out in the analysis?