Problems with Breath Control when playing wind instruments on keyboards

When playing a wind controller and a breath controlled keyboard it does somehow not feel the same.
Here's why:

The key pressings and breath tonguing are not synchronized on a keyboard like on a wind controller!
Fast breath build up takes about 20ms. Hence a fast acoustic instrument attack also takes about 20ms.

1) When you press the key at the exact same time as you start blowing the sampled attack will start at a level of "0" (inaudible), then fade in and reach the full level when the attack is over. So the attack is not really that audible at all.

The recorded acoustic attack and the breath control attack are multiplied and create an exponential curve that make most of the early attack portion disappear.

When you blow first and then press the key the attack will be audible since there is no additional fade in time.
This is because you are blowing already at a stable target level.

***Linear sample attack** when blowing and holding the level before pressing the key:*
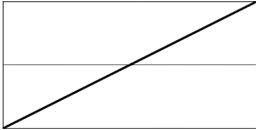
Exponential when multiplying the curve of the sample attack with the same curve of the breath attack:
(The critical initial attack part is drastically lowered by superimposing the breath control build up.)
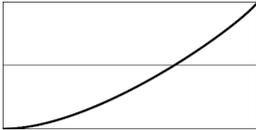
This is what it sounds like (first without and then with "full retrigger" mode):
https://dynasample.com/this&that/Keyboard_Trumpet_(XpressO).mp3

However, it's not possible to always blow before you press the key. It would also require releasing the key which ends up adding gaps in between notes. Try flutter tonguing with your fingers!
Playing with a good musical timing becomes impossible at a fast tempo when attempting to use a different timing with your fingers and your tongue.

When your tongue/finger synchronization is not quite perfect you will get a different amount of attack on each note.

2) When you re-attack a note while holding the key the note will start in the middle of the sample with no sampled attack. Additionally there will be a fade in from the breath control build up. This sounds very electronic and has nothing more to do with an acoustic instrument attack.

So you need a software that delays the note for by about 18-20 ms (breath build up time) and does not start the sample until 18-20 ms after your lower breath threshold has been crossed.

Your velocity will be taken from the current breath level and not your keyboard velocity - otherwise there would be no new velocity value when you re-attack notes at different levels (while holding the key).

(Don't mix up velocity with breath level! Velocity does not take care of the volume level like on a piano but it creates different attack times / curves and sound qualities of the attack.)

After 40 years of MIDI and breath controllers no one has ever bothered to write a software that takes care of this . . .
(Well, I actually did but only for the DynaSample instruments - not for computer / plugin instruments.)
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FYI: There is an alternative way of using key velocity for the beginning of the note and set the breath level from keyboard velocity without added latency. After 20 ms breath takes over smoothly.

The disadvantage of this method is varying latency of the initial key attacks and pure breath re-attacks.
It works fine on MIDI guitars, though. That's because you usually re-attack with the pick without interruption.

In any case it still needs a special handling software that takes care of the notes <u>and</u> the breath level at the same time. Such a software is unfortunately not included with any breath controller . . .