Timbre is music's manifestation in sound. Psychoacoustical studies have revealed its multidimensional nature, associating its perception to acoustical features (e.g., the spectrum). Yet, its operational definition often considers it as that 'residual' quality alongside pitch, loudness, and duration, not doing it much justice in its importance to music. In practice, timbre and other auditory qualities seem inherently linked, leaving open whether an independent contribution is even possible. The study of acoustic instruments during musical performance may provide some clarity, as under musicians' control, timbre can be considered a performance variable. We report a study of the covariate influence of pitch and dynamics on timbre. The investigation considers experimental data on the timbral adjustments bassoon and horn players employ in an attempt to blend during joint performances. Apart from identifying the type of adjustments, we consider their dependency on pitch and dynamics and whether the adjustments are specific to the affordances or limitations of particular instruments. The results relate timbral adjustments to spectral variation. A clear covariation with pitch is apparent, which, however, lies beyond performers' independent control, due to being predetermined by musical notation. In addition, spectral features also vary with dynamics, in a way that suggests timbral adjustments to be achieved through changes in dynamics. Horns exhibit a greater timbral variability, while bassoonists' timbral control is more constrained. In conclusion, timbre does draw inherent links to other auditory properties in musical practice, with the degree to which performers can independently control it being limited and also instrument-specific. Acoustical analysis of musical performance presents a promising approach in identifying some of the roles of timbre in music. For instance, research could be aimed at studying the expressive dimensions of timbre, as has been explored for the clarinet (Barthet, 2010), complementing an entire body of research on expressive timing.