Physiological studies have shown that noise-induced sensorineural hearing loss (SNHL) enhances the amplitude of envelope coding in auditory-nerve fibers. As pitch coding of unresolved complex tones is assumed to rely on temporal envelope coding mechanisms, this study investigated pitch-discrimination performance in listeners with SNHL. Pitch-discrimination thresholds were obtained for 14 normal-hearing (NH) and 10 hearing-impaired (HI) listeners for sine-phase (SP) and random-phase (RP) complex tones. When all harmonics were unresolved, the HI listeners performed, on average, worse than NH listeners in the RP condition but similarly to NH listeners in the SP condition. The increase in pitch-discrimination performance for the SP relative to the RP condition (F0DL ratio) was significantly larger in the HI as compared with the NH listeners. Cochlear compression and auditory-filter bandwidths were estimated in the same listeners. The estimated reduction of cochlear compression was significantly correlated with the increase in the F0DL ratio, while no correlation was found with filter bandwidth. The effects of degraded frequency selectivity and loss of compression were considered in a simplified peripheral model as potential factors in envelope enhancement. The model revealed that reducing cochlear compression significantly enhanced the envelope of an unresolved SP complex tone, while not affecting the envelope of a RP complex tone. This envelope enhancement in the SP condition was significantly correlated with the increased pitch-discrimination performance for the SP relative to the RP condition in the HI listeners.