Ski damping technologies: Do they really damp your skis?

Context: Why is vibration damping important?
As the skier goes down the slope, her skis are excited by the irregularities of the snow[1]. By vibrating in bending and torsion, the skis are losing contact with the snow, which reduces the skier's control.

Hypothesis: How do ski manufacturers reduce vibrations?
1. Increase stiffness
2. Increase mass
3. Add damping device

Secondary effects:
- Less versatility
- Harsher to ski
- Harder to turn
- Slower weight
- No effect on stiffness
- No effect on mass

Method: How to characterize the dynamic behavior of a ski?
A modal analysis can capture the sample's dynamic behavior of a ski and an accelerometer can be used to measure the strain and the response of the ski which is then associated with an accelerometer. This method is used to characterize the sample's dynamic behavior and to test the effectiveness of stiffness, changes in mass and most commercially available ski damping devices.

Results: Effect of stiffness
- Low bending stiffness: Ineffective damping
- High bending stiffness: Effective damping

Results: Effect of mass
- Without mass: Ineffective damping
- With mass: Effective damping

Results: Effect of damping device
- No damping device: Ineffective damping
- Damping device: Effective damping

And the winner is?
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Although, it is often not desirable to increase the mass of skis, it is the only method that effectively improves the dynamic behavior of your skis.

Philippe Gosselin
Isocell Sherbrooke

References: