

Carets engaged Taber Industries to independently evaluate the abrasion resistance of four leather materials used or considered for their premium safety boot line. Since 2013, Carets has built a reputation for handcrafted American-made footwear and introduced safety boots in 2024. Their customers— tradespeople, warehouse workers, delivery drivers, mechanics, machinists—require boots that withstand harsh terrain, repeated scuffing, and long-term physical wear.

The company was creating a product video for one of their products, and wanted to highlight how the new leather significantly outperforms the previous leather in abrasion resistance, as verified through standardized Taber testing. The introduction of the **Determination 2.2 Safety Boot** targets professional-grade durability at the premium tier. Abrasion resistance was identified as a critical performance requirement based on customer feedback from earlier boot generations.



Four materials were evaluated:

1. Nubuck – Original leather used on the Determination 1.0 Safety Boot
2. MATRIX Leather (TPU layer over leather) – Used on the toe and heel of the Determination 2.2 Safety Boot
3. Waxed Roughout – Used on the remainder of the Determination 2.2 upper
4. Untreated Roughout – Not used in production; included as an uncoated control material

The original testing was performed at Caret’s partner lab in Mexico using Taber abrasion equipment. Caret did not independently test MATRIX leather prior to this study; instead, they relied on the supplier’s technical sheet. Taber testing was performed to validate material performance before full-scale production.

Results confirm that MATRIX leather exhibits the highest abrasion resistance, with the lowest mass loss and best surface integrity retention across all test conditions.

Boot Performance Requirements

To meet Caret’s durability objectives, candidate materials were evaluated against the following criteria:

- Wear Resistance: ≤ 150 mg total mass loss after 1,000 abrasion cycles
- Surface Coating Retention: Finish layer must remain intact and functional
- Terrain Durability: Must withstand repeated abrasion from rock, aggregate, and concrete
- Consistency: Low variance between replicate specimens

Test Objectives

1. Quantify mass loss of four leather types using ASTM D7255

Material ID	Material Name	Comments
L-1	Matrix	TPU-coated leather
L-2	Waxed Roughout	Replacement candidate
L-3	Untreated Roughout	Uncoated control (no coating)
L-4	Nubuck	Original Leather

2. Compare MATRIX and Waxed Roughout against the previous Nubuck leather
3. Evaluate surface condition at intermediate and final cycle counts
4. Provide data-backed recommendations for Caret’s Determination 2.2 boot line

Methodology

Standard: ASTM D7255 – *Abrasion Resistance of Leather (Rotary Platform, Double-Head Method)*

Equipment: **Taber Rotary Abraser**

1. **Specimen Preparation:** Circular 100 mm specimens were cut from each leather type. Three replicates per material. All specimens were conditioned at 23°C ±2°C and 50% ±5% RH for at least 24 hours.
2. **Initial Mass Measurement:** Each specimen was weighed to 0.1 mg precision to establish baseline mass (M_0).
3. **Wheel Preparation:**
 - CS-10 wheels resurfaced using S-11 refacing discs
 - H-18 wheels resurfaced using Taber Model 350 Wheel Refacer
4. **Test Parameters:**
 - 1,000 cycles
 - 500 g load
 - 100% vacuum
 - 7 mm nozzle height
 - CS-10 wheels (primary comparison) & H-18 wheels (secondary comparison)
 - Visual damage and mass loss evaluation



Analysis

Nubuck—the original leather—recorded mass loss values of 150.5 mg (CS-10) and 205.3 mg (H-18), exceeding the performance threshold.

MATRIX leather delivered the strongest results, with exceptionally low mass loss:

- 9 mg (CS-10)
- 27.2 mg (H-18)

Waxed Roughout also performed well, remaining below the 150 mg limit for both wheel types.

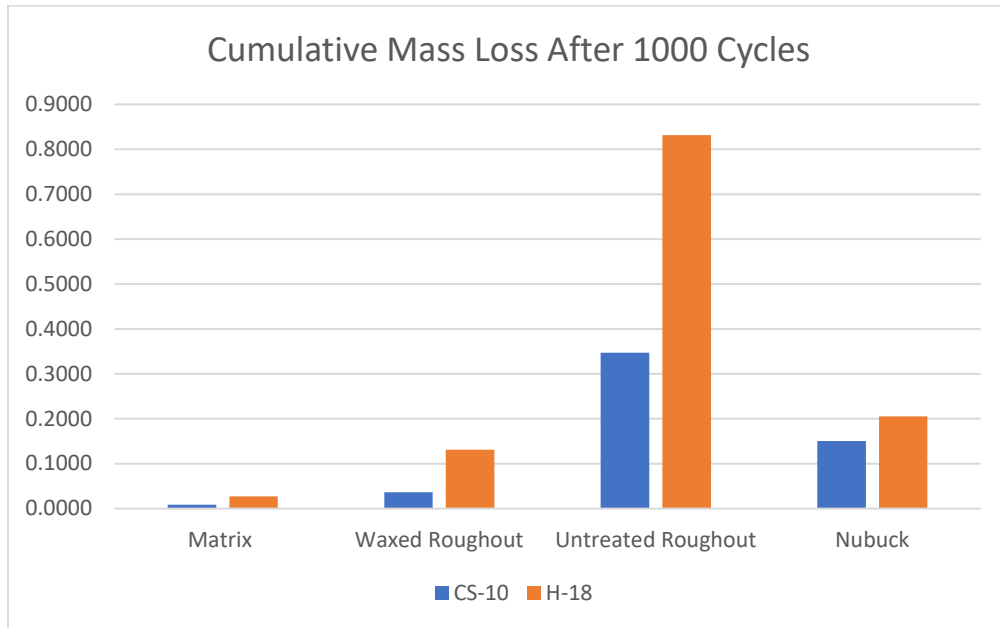
Untreated Roughout, as expected for an uncoated material, showed the highest mass loss and did not meet performance requirements.

Mass Loss (mg) by Cycle Count (CS-10)

	0-500 Cycles	500-1000 Cycles	Total	Meets ≤150mg @ 1000
Matrix	0.0045	0.0045	0.0090	✓
Waxed Roughout	0.0168	0.0195	0.0363	✓
Untreated Roughout	0.2059	0.1411	0.3469	✗
Nubuck	0.0898	0.0607	0.1505	✗

Mass Loss (mg) by Cycle Count (H-18)

	0-500 Cycles	500-1000 Cycles	Total	Meets ≤ 150 mg @ 1000
Matrix	0.0172	0.0100	0.0272	✓
Waxed Roughout	0.0653	0.0656	0.1309	✓
Untreated Roughout	0.5468	0.2849	0.8317	✗
Nubuck	0.1301	0.0752	0.2053	✗



Recommendation

MATRIX leather exceeded all performance requirements, delivering the lowest mass loss across both abrasive wheel types.

At 1,000 cycles, MATRIX achieved:

- 9 mg (CS-10)
- 27.2 mg (H-18)

Surface integrity inspections confirmed that MATRIX's TPU finish layer remained fully intact with no delamination, cracking, or wear-through.

Based on standardized Taber testing, MATRIX leather is the optimal material for high-performance safety footwear applications. Its superior abrasion resistance and finish durability make it well-suited for Caret's Determination 2.2 boot line and any future products requiring enhanced surface wear protection.