

H E E L U X E™

SoleAir Insoles

InnerSole Group

HULK Impact

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Approved By:

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ESTABLISHED 2010

Hulk Impact Testing adheres to ASTM F1976.

This system utilizes a weighted piston impacting the shoe, insole, or test foam sample.

Data provides insight to the vertical cushioning that your customer would experience.



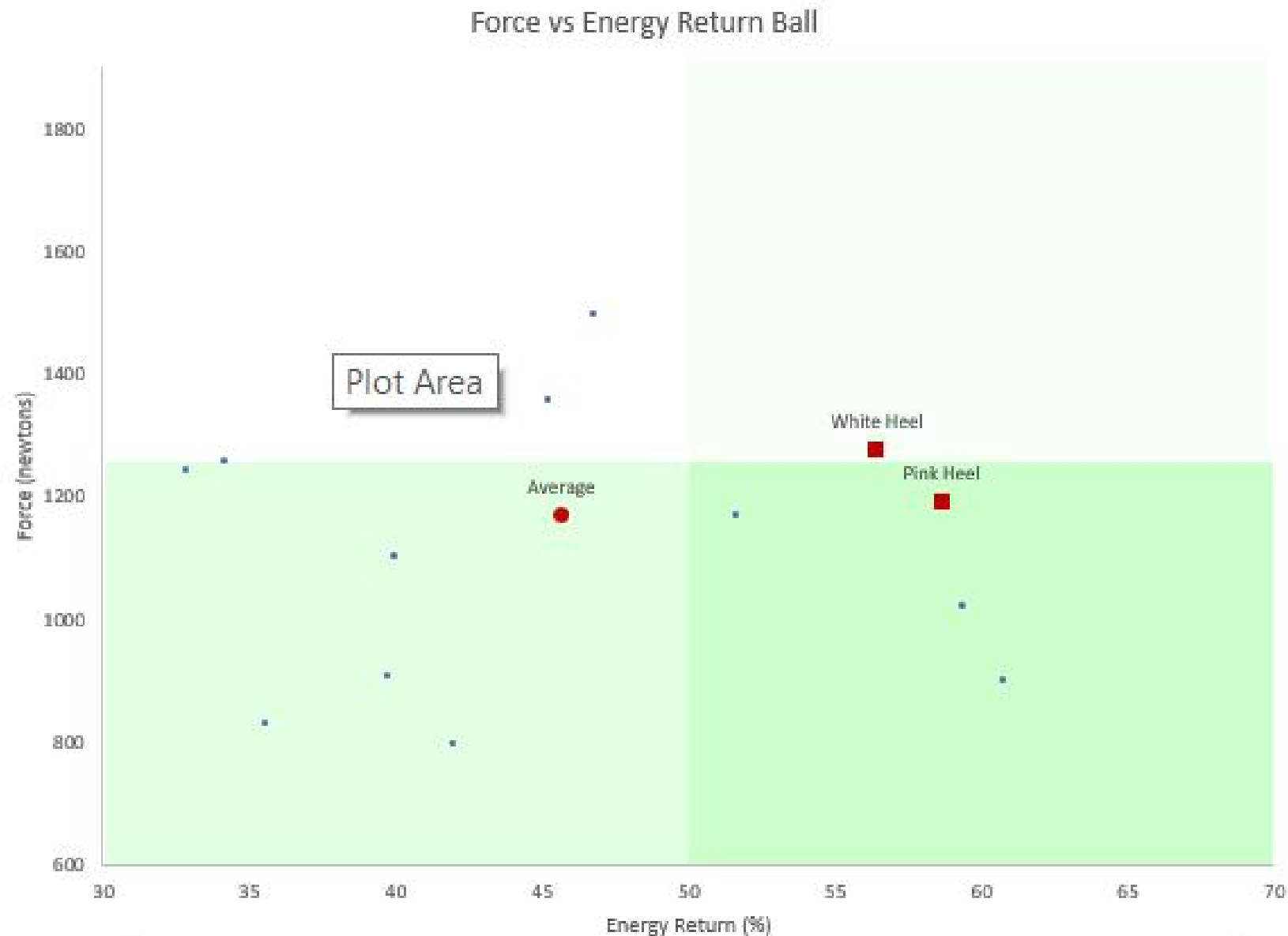
Hulk Impact Measures the Following:

- ✓ • Force (N)
- ✓ • Energy Return %
- Max Penetration %
- Total Impact (J)
- Acceleration (g)
- Peak Time
- Velocity (cm/s)
- Max Penetration(mm)
- V- Post
- Drop HT
- Peak Pressure
- Dwell Time

Force vs Energy Return Ball

SoleAir insoles have very high energy return compared to competitor insoles and Heeluxe's Data Base Average (on the graph).

The Cushioning performance of these insoles is below average.



Firm Cushion Low Energy Return:
Undesirable
Soft Cushion Low Energy Return:
Walking, Casual Shoes

Firm Cushion High Energy Return:
Court Shoes/Performance
Soft Cushion High Energy Return:
Running, Endurance, Occupational

Full Hulk Impact Data Results

	Shoe Name	Location	Thickness (mm)	Accel (g)	Peak T (ms)	Press(psi)	Force (N)	Max Pen(%)	Dwell T (ms)	Vel (cm/s)	E Ret (%)	Max Pen (mm)	V-Post	Total Imp
1	White Heel	Insole	17.93	15.31	8.80	802.65	1276.56	25.05	22.33	63.11	56.43	4.49	-42.16	2.08
2	Pink Heel	Insole	18.25	14.26	10.00	747.34	1188.59	27.46	24.87	61.28	58.64	5.01	-42.98	2.12
3		AVERAGE	19.32	14.01	11.29	734.01	1167.40	30.92	30.86	63.30	45.65	5.99	-33.48	2.22
4		TOP 10%	25.69	17.93	15.58	939.77	1494.64	37.48	40.74	67.58	59.08	8.25	-25.64	2.57
5		BOTTOM 10%	12.95	10.08	6.99	528.25	840.15	24.35	20.97	59.02	32.23	3.73	-41.32	1.87

Glossary:

Measurement

Accel (g)	Also known as Peak (g), is the peak acceleration during the impact expressed in "g's" or gravitational force.
Peak Time (ms)	Also known as time to peak force, the time in ms from zero force until peak impact force (Force (N)).
Peak Pressure (kPa)	Calculated from the peak impact force (Force (N) divided by the know area of the base of the tup (missile head) in m ² .
Force (N)	Average peak impact force in Newtons.
Maximum Penetration (%)	Also known as Max. Displacement (%), or Pen. (%). This parameter expresses the normalized penetration of the missile head into the sample material during impact.
Dwell Time	The total time that the tup is in contact with the sample during impact and rebound.
Velocity (cm/s)	The peak velocity in cm/s of the falling missile near the moment it makes first contact with the sample and begins to decelerate.
Energy Return (%)	The percentage of impact energy returned to the missile as it rebounds after striking the sample material.
Maximum Penetration (mm)	The maximum penetration in mm of the missile into the sample material measured by the LVDT
V-Post	The peak negative velocity of the missile as it rebounds after impact.
Total Impact Energy	Calculated by the drop mass (kg) times g (9.80665) times the total falling distance which is the measured drop height in m plus the maximum penetration in m.
Drop HT	Distance that the impact piston travels downward before impacting the foam sample.



Path to Greatness:

- SoleAir insoles are best used where responsiveness/energy return is desired. Lack of cushioning may reduce the comfort of these insoles compared to competitor products.