

**Is It Still OK To Use?**

---

Presentation to ITRS 2000

Presented by  
Seattle Manufacturing Corporation

---

---

---

---

---

---

---

---

**Damn! I dropped my carabiner.**

---

Is it still OK?

---

---

---

---

---

---

---

---

**What matters? What doesn't?**

---

Do we know?

---

---

---

---

---

---

---

---

**Lack of testing**

- Sometimes people drop carabiners.
- Sometimes they send them to us.
- Sometimes we break them.
- Rarely do we know very much about the conditions.

**Little useful knowledge has been gained**

---

---

---

---

---

---

---

---

**Our Goal**

Explore what effect dropping a carabiner has on its major axis breaking strength.

We will not be telling anyone how far it is safe to drop a carabiner.

---

---

---

---

---

---

---

---

**Outline of Test**

- Gather carabiners.
- Drop carabiners from various heights.
- Visually examine physical damage.
- Test major axis breaking strength.
- Analyze results.

---

---

---

---

---

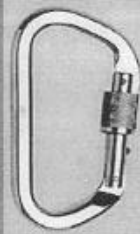
---

---

---

**The Carabiner**

- SMC Aluminum Locking D.
- Why?
  - We make them.
  - There are lots of them in use.
  - Curiosity regarding a Locking D we dropped at 1998 NATRS.



---

---

---

---

---


---

---

---

**Various Heights**

- Genie SL60 lift.
- 54' drop.
- 27' drop.



---

---

---

---

---

---

---

---

**It's not the fall....  
It's the landing.**

- We expected any damage would be from the carabiners hitting the ground.
- We therefore suspected that what the carabiners land on is very important.
- For example:

---

---

---

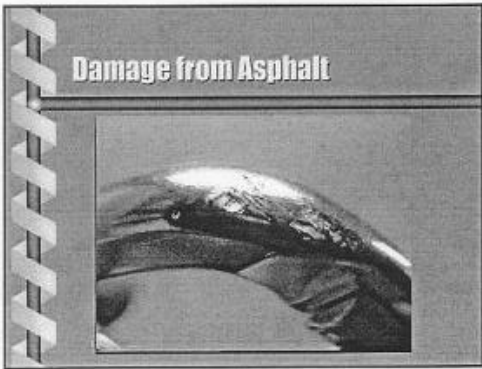
---

---

---

---

---



---

---

---

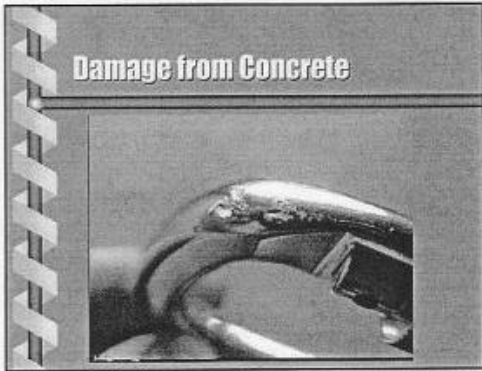
---

---

---

---

---



---

---

---

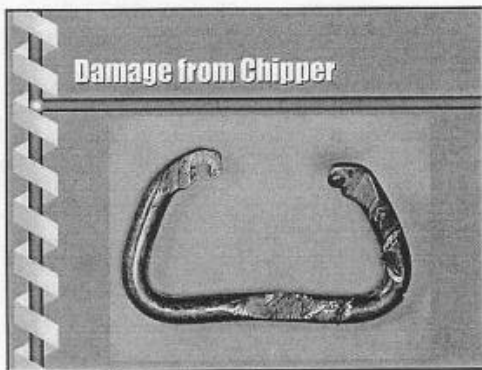
---

---

---

---

---



---

---

---

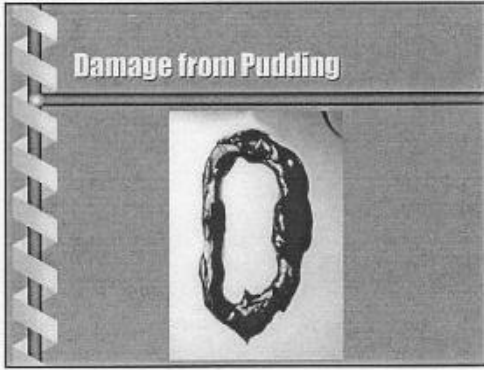
---

---

---

---

---



---

---

---

---

---

---

---

---

- Our Target?**
- Asphalt & Concrete
  - Seems a likely target for a falling carabiner.
  - Our parking area had both asphalt and concrete.

---

---

---

---

---

---

---

---

**Test Groups**

ID	Description	Quantity
CO	No drop	6 ea.
LC	27' drop onto Concrete	29 ea.
LA	27' drop onto Asphalt	30 ea.
HC	54' drop onto Concrete	27 ea.
HA	54' drop onto Asphalt	29 ea.

---

---

---

---

---


---

---

---

**Drop Testing**

- Carabiners hit Hard!
- Carabiners Bounce
- Carabiners turn Cartwheels



---

---

---

---

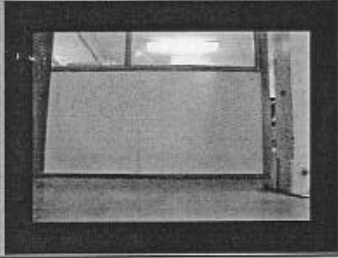
---

---

---

---

**Impact**



---

---

---

---

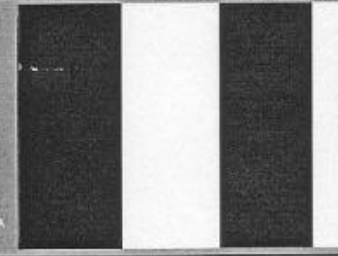
---

---

---

---

**Typical Damage**



---

---

---

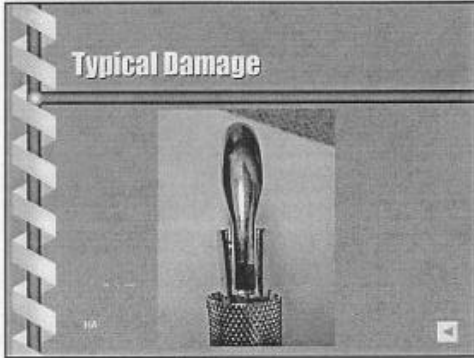
---

---

---

---

---



---

---

---

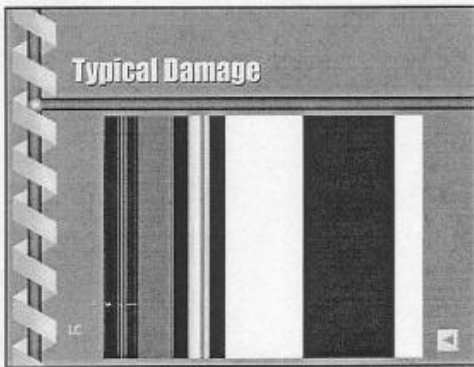
---

---

---

---

---



---

---

---

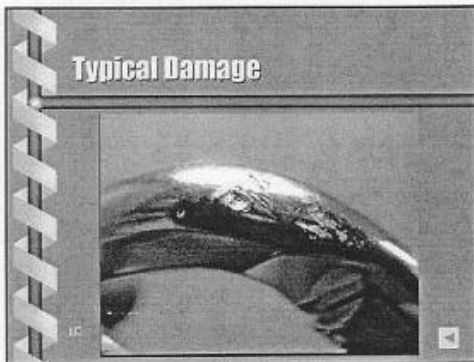
---

---

---

---

---



---

---

---

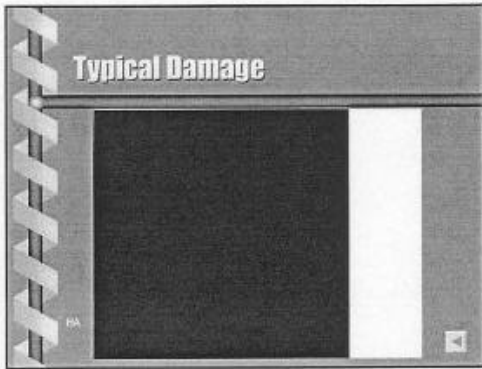
---

---

---

---

---



---

---

---

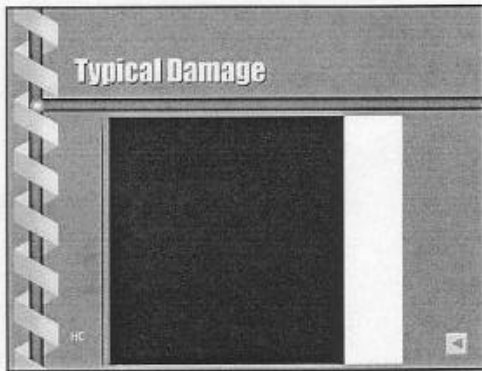
---

---

---

---

---



---

---

---

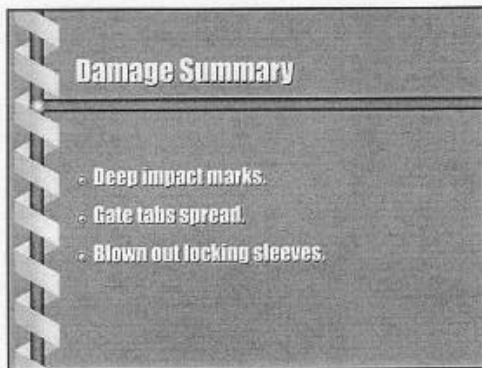
---

---

---

---

---



---

---

---

---

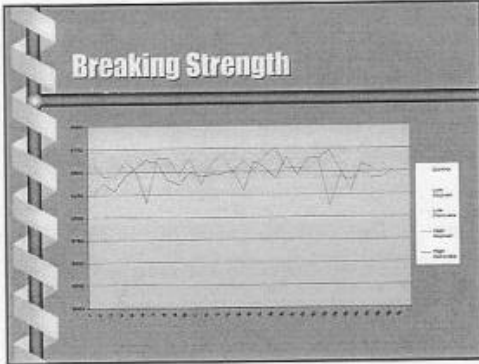
---

---

---

---





---

---

---

---

---

---

---

---

### Statistics

	Control	Low Asphalt	Low Concrete	High Asphalt	High Concrete
Minimum	814	824	814	814	824
Maximum	887	876	837	811	822
Average	804	879	827	815	808

---

---

---

---

---

---

---

---

### Analysis

- Some of the impact damage was easily seen with the naked eye.
- Damage sustained in our test drops was not significant enough to cause reduced major axis strength.

---

---

---

---

---

---

---

---

### Questions Raised

- Is there visually undetectable damage which may cause failures? *We don't know.*
- Based on our results, would we use carabiners subjected to our test drop? *No.*
- Does equipment in a gear bag suffer the same damage? *Possibly, possibly worse.*
- These were aluminum carabiners...

---

---

---

---

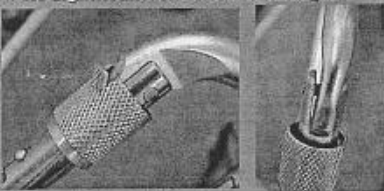
---

---

---

### What about Steel Carabiners?

- Similar physical damage.
- No significant reduction in strength



---

---

---

---

---

---

---

### Conclusions

- We can't tell you if your dropped carabiner is OK.
- Equipment subjected to significant impacts, whatever the source, should be retired.
- Inspecting equipment before and after use is important for safety.
- There is more to learn about factors that effect carabiner strength.

---

---

---

---

---

---

---

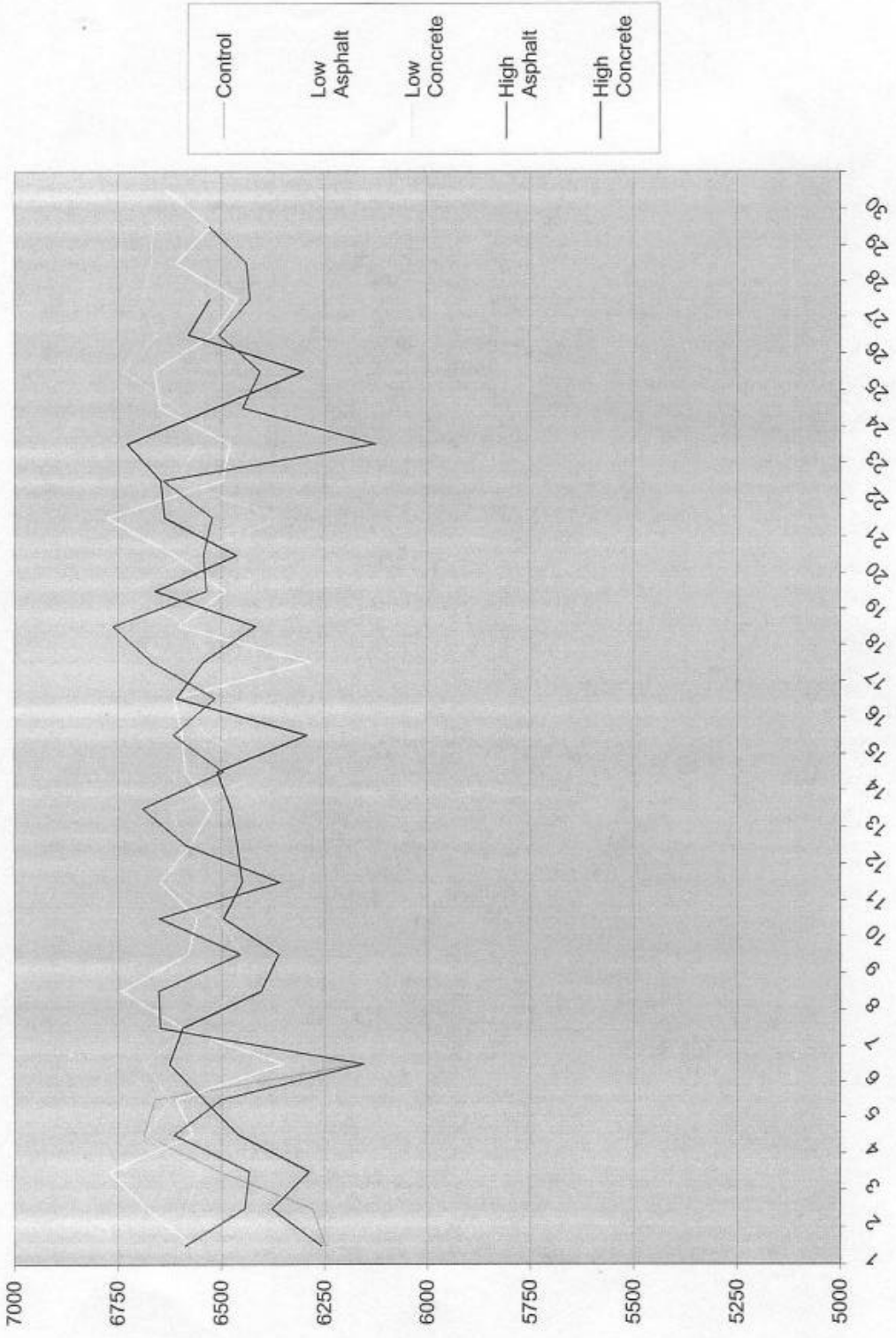
	Load (lb.)			
	Control	Low Asphalt	Low Concrete	High Asphalt
Minimum	6164	6284	6356	6126
Maximum	6687	6776	6737	6761
Average	6424	6579	6587	6515

High Concrete

6258

6727

6489





## SMC's Adopt-A-Biner Program

At SMC we have a tendency to pamper our biners. From their infancy as steel or aluminum rods, we nurse them through the rigors of bending, milling and drilling, hoping to prepare them for the harsh realities of the outside world. Once they have matured into formed and finished biners, many of them are brutally and intentionally broken in order to assess the strength of their peers, and possibly improve the performance of the next generation.

After passing a scrupulous double inspection, they leave the fold and we are left with only our own perception of the abuse, tenderness and neglect inherent in their new everyday lives. To this end, we have established the SMC Adopt-A-Biner Program. We are hoping that everyday biner users will come forward and offer to "track" the use of a single biner throughout a six month period. You will be asked to record the different weights and frequency of loads your biner is used with, as well as knocks, scrapes, "damage," and the various temperatures/environments you subject it to.

Our goal is to learn more about how "normal" use over a period of time and in varying environments can affect carabiner strength. We may discover it has no effect on strength at all. We will be presenting the results of this research at ITRS 2001, and also using it to provide better answers to questions we are asked everyday.

Thus we are looking for volunteers who are willing to adopt one of both our steel and aluminum carabiners and closely monitor and record their lives for six months. If you are interested, please fill out the form below, and return it to Garin or Kevin, or mail/fax it back to SMC. Within a few weeks, we will mail you your two Adopted Biners and their User Logs. After six months we will request the return of the two biners and filled-out User Logs, and in exchange, we will send you a \$35 (retail value) SMC Gift Voucher to thank you for participating in our research. If you have any questions regarding the program, or its outcome, please don't hesitate to call or email us.

12880 NE 21<sup>st</sup> Pl, Bellevue, WA 98005 tel 800 426-6251 fax 425 869-7152 smc@smcgear.net www.smcgear.net

tear off here -----

### SMC Adopt-A-Biner Program

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Tel: \_\_\_\_\_ Email: \_\_\_\_\_

Employer/Organization: \_\_\_\_\_

Your role as a biner user: \_\_\_\_\_  
\_\_\_\_\_

12880 NE 21<sup>st</sup> Pl, Bellevue, WA 98005 tel 800 426-6251 fax 425 869-7152 smc@smcgear.net www.smcgear.net