
SPARROWHAWK
DELTA
HOOK TECHNOLOGY

Features

Standard Treble

- Three exposed prongs
- Barbed
- Inflexible

Delta Hook

- Three concealed prongs
- Barbless
- Flexible

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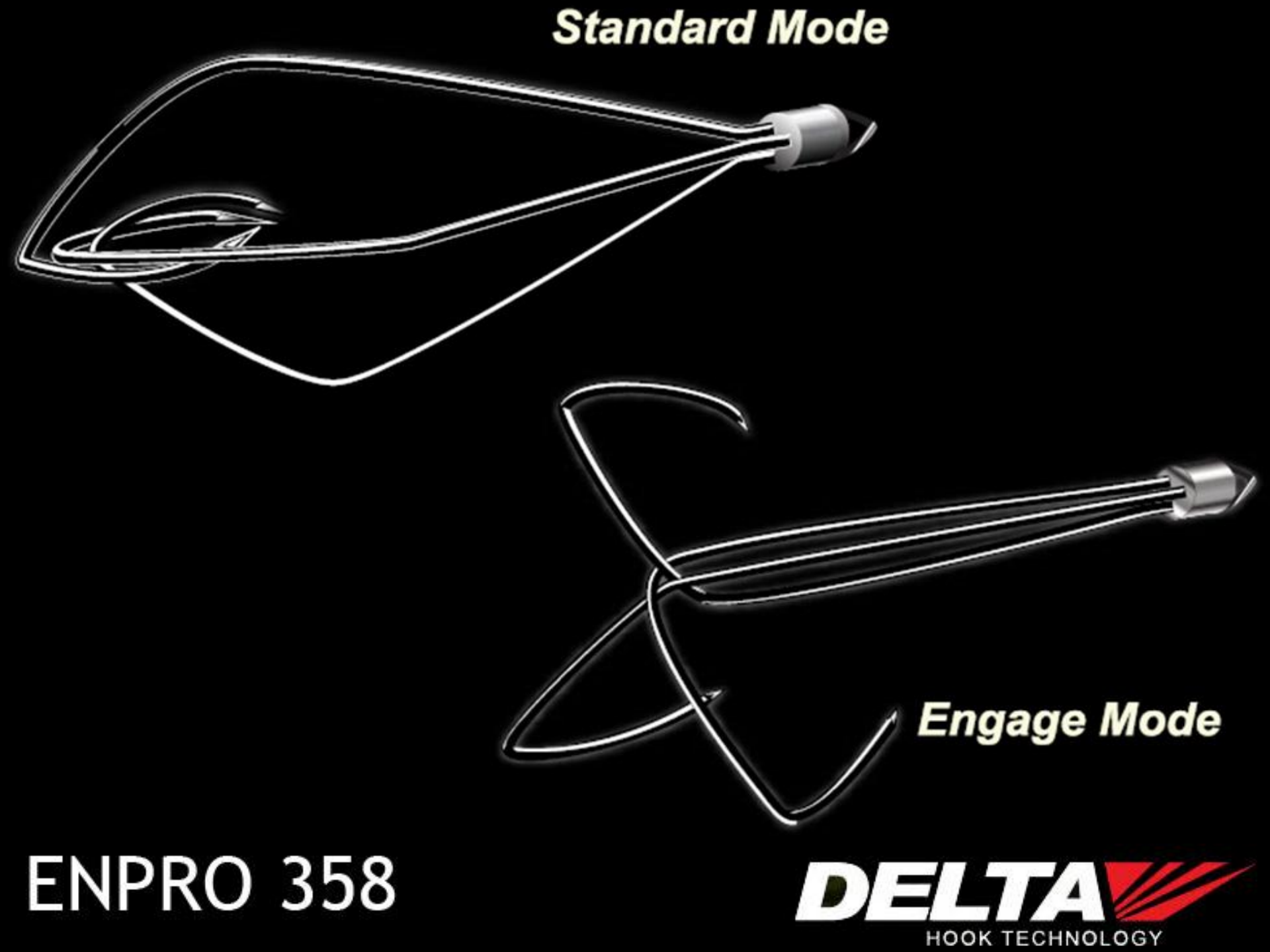
Standard Mode
Engage Mode
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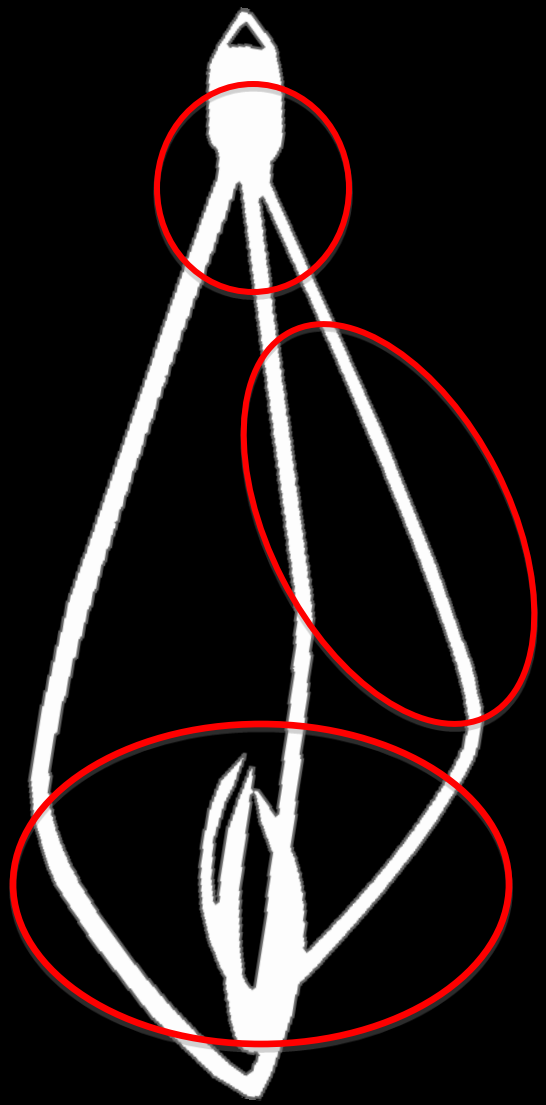
DHT Mechanical Requirements

STRENGTH



FLEXIBILITY

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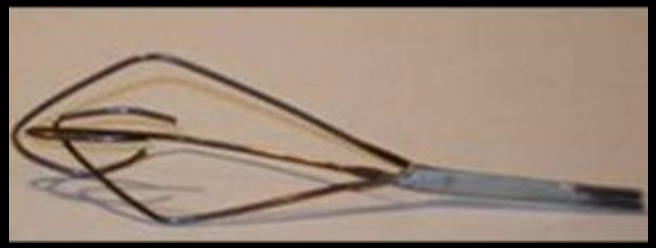
Non-Planar Motion

Weak



Bulky

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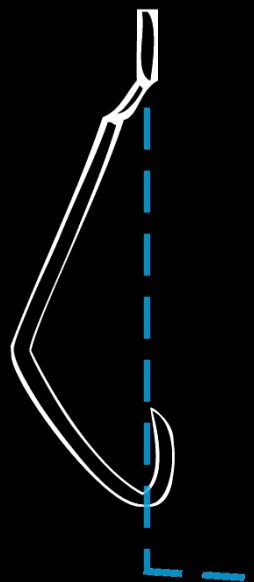
TESTING: Unbending



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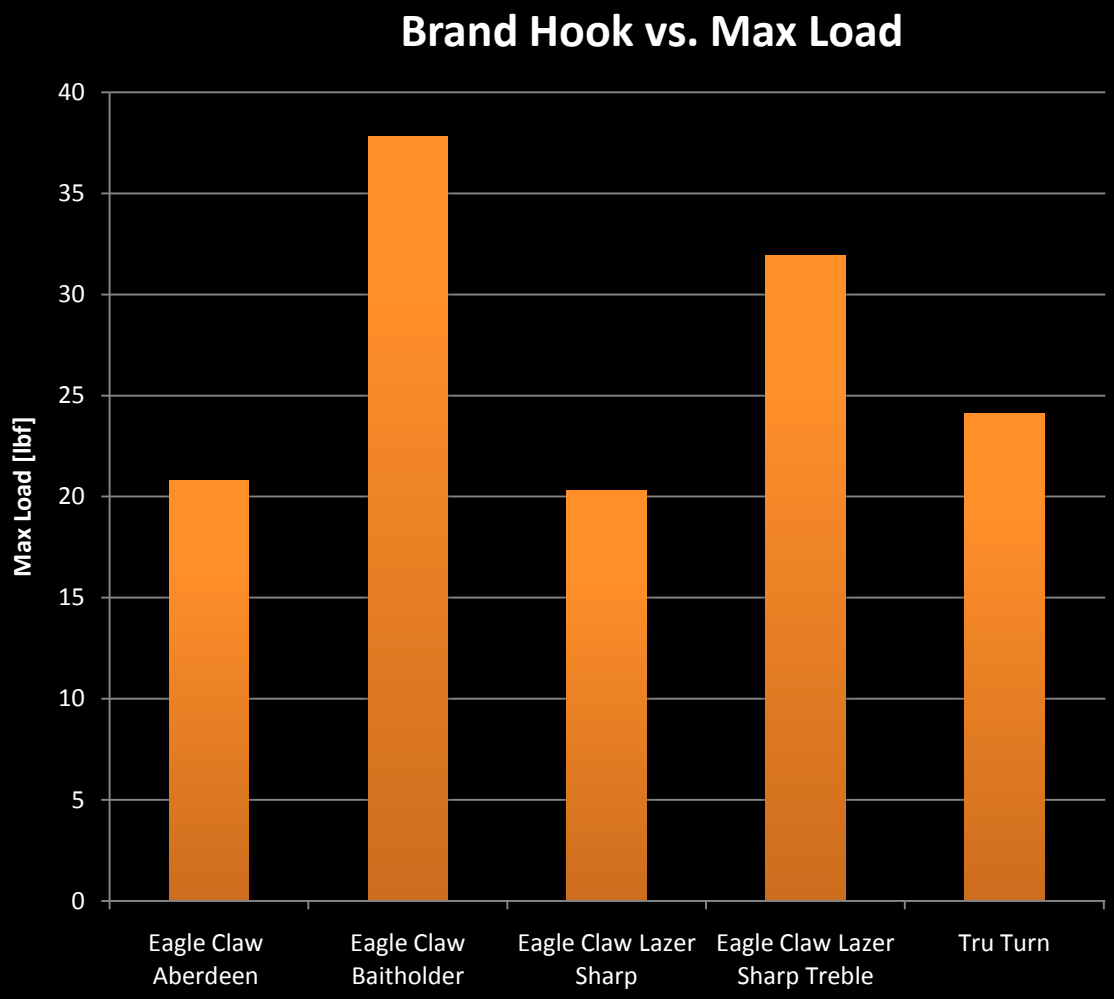
Commercial Test Results



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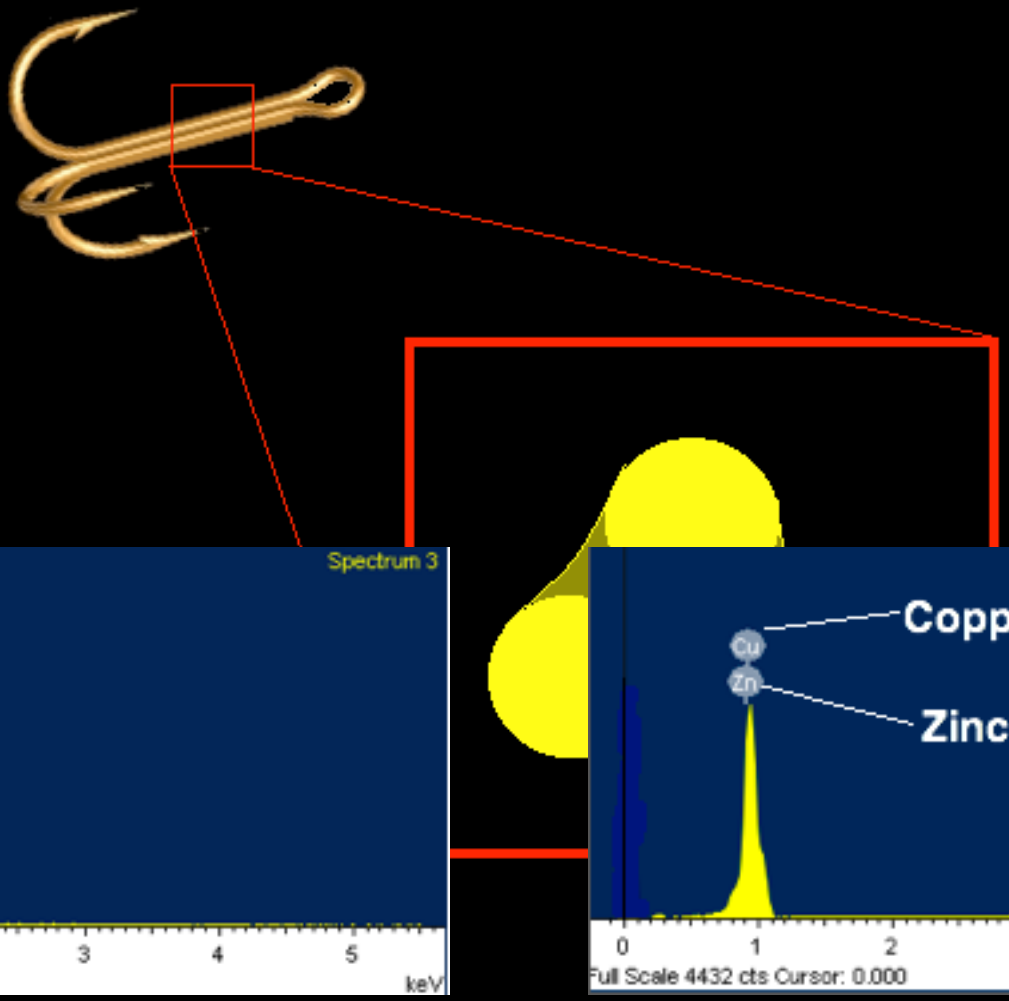
MATERIAL ANALYSIS: Elemental Composition

SCANNING ELECTRON MICROSCOPE



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Commercial Testing Results

HOOK FORMATION

BENDING

Non-Galvanized Black Wrought Iron Pipe

Crushed Charcoal

Bending

Final Bent Hook

NORMALIZING

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STRENGTHENING

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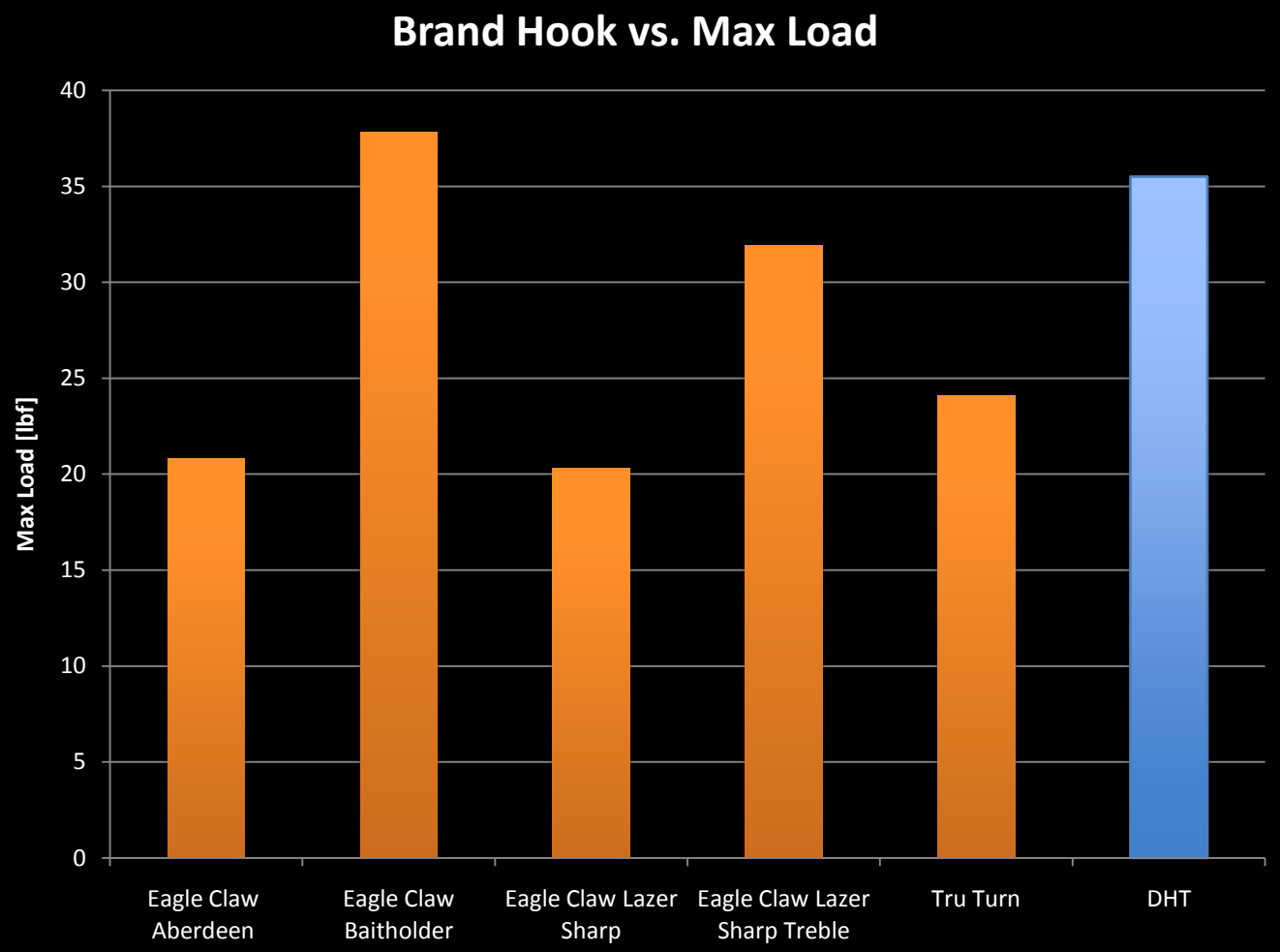
Meeting the Standard



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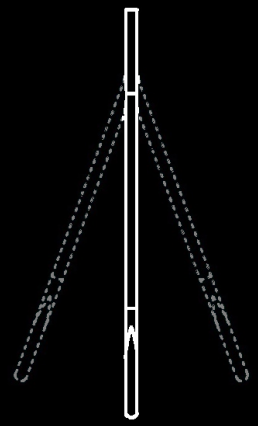
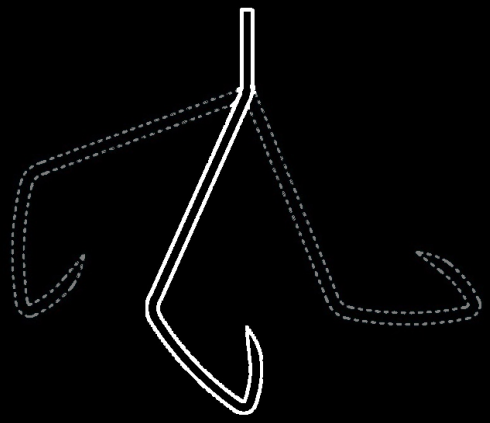
FLEXIBILITY





Out of Plane

In Plane

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FINAL MOCK-UPS

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Market Demographics

- International market

- Terminal Tackle Sales $ 399 million
- Lures and Artificial Baits $905 million
- Total Market $1.3 billion
- Source: U.S. Fish and Wildlife survey, 2006.

Competition

Gamakatsu®

OWNER®

PERFECTION IN HOOKS

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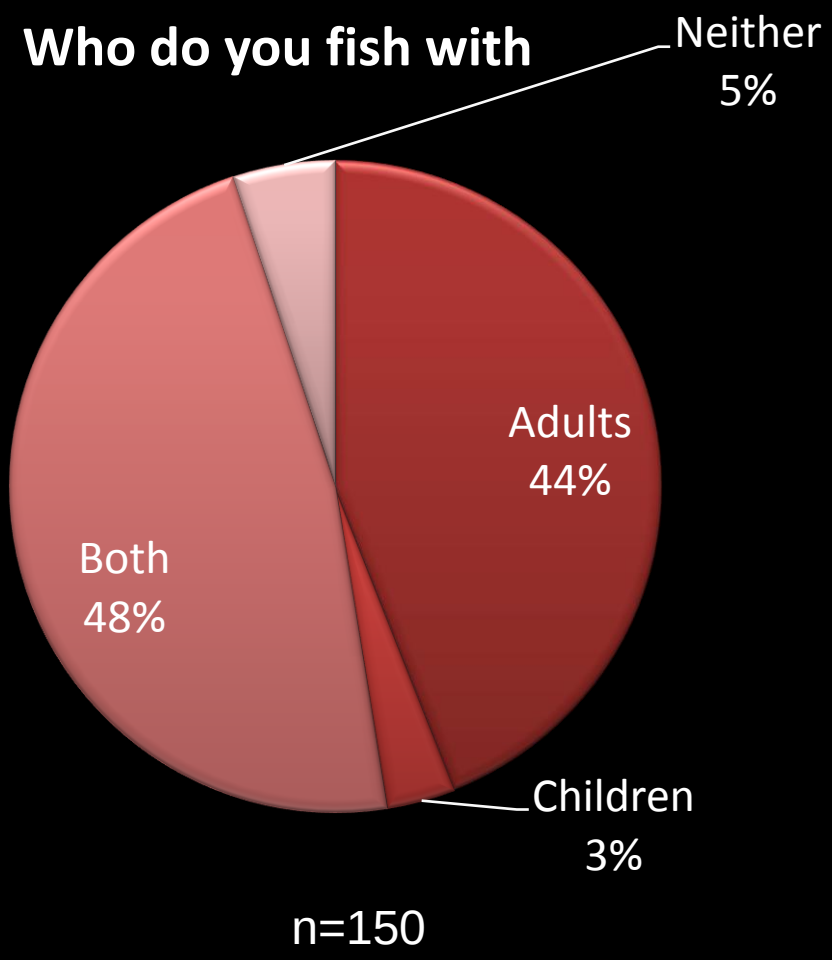
Delta Hook Varieties

- Delta Hook Product Lines
  - Pro
  - Family
  - Memento
- Marketing to each Segment (Penetration)

Sales by Segment

- Sparrowhawk Pro
  - Year 1: $585,000
  - Year 2: $730,000
  - Year 3: $915,000
- Sparrowhawk Family
  - Year 1: $65,000
  - Year 2: $81,000
  - Year 3: 102, 000



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Mock-Up Costs

Features	1080	Ti-6al-4v	Ball 1080	Ball TI-64	Spring
Wire	0.024	0.720	0.024	0.720	0.090
Brass Crimping	0.042	0.042	0.000	0.083	0.042
Rubber ball	0.000	0.000	0.250	0.250	0.000
Cost	0.0655	0.7615	0.274	1.053	0.1315

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Corporate Profitability

- Revenue
  - Year 1: $650,000
  - Year 2: $725,000
  - Year 3: $ 1,000,200

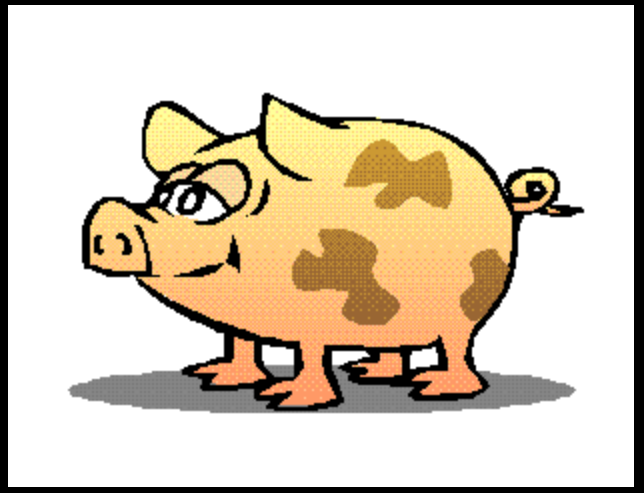
Profit/Year	Net Profit/Sales
Year 1: $115,500	17.77%
Year 2: $159,950	19.72%
Year 3:$211,085	20.76%

Sparrowhawk

	Revenue	Profit	NetProfit/Sales
Year 1	$650,000	$115,500	17.77%
Year 2	$812,500	$159,950	19.72%
Year 3	$1,017,000	$211,085	20.76%

Exit Strategy

- Acquisition Target
- Value generators

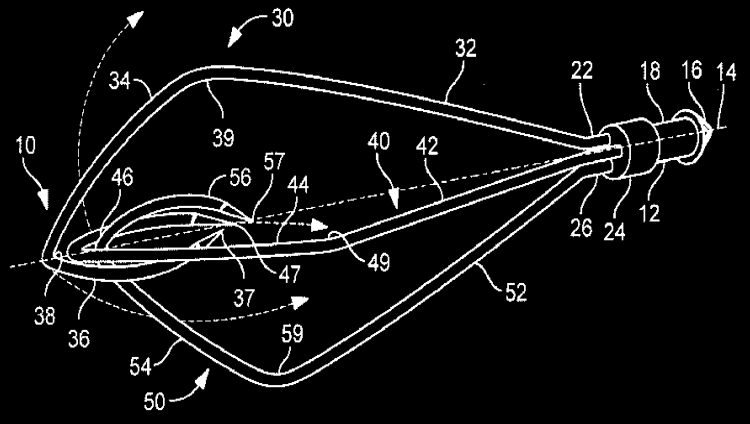


Strategic Advantages

- Manufacturing Contracts
- Sophisticated Marketing
  - Spokesman
  - Strategic partnerships (SOG knives, tournament sponsorship)

Patent

- Utility patent pending
- Application published 18 months after filing (June 18th, 2009)
- Prosecution by Brinks, Hofer, Gilson & Lione of Chicago



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Acknowledgements

- Craig Johnson
- Sheldon Mostovoy, Ph.D
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- Phil Nash, Ph.D
- MMAE Graduate Students

Thank You

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Appendix

- Test Data
- Chart
- Finite element analysis
- Delta Hook Design
- Microstructure

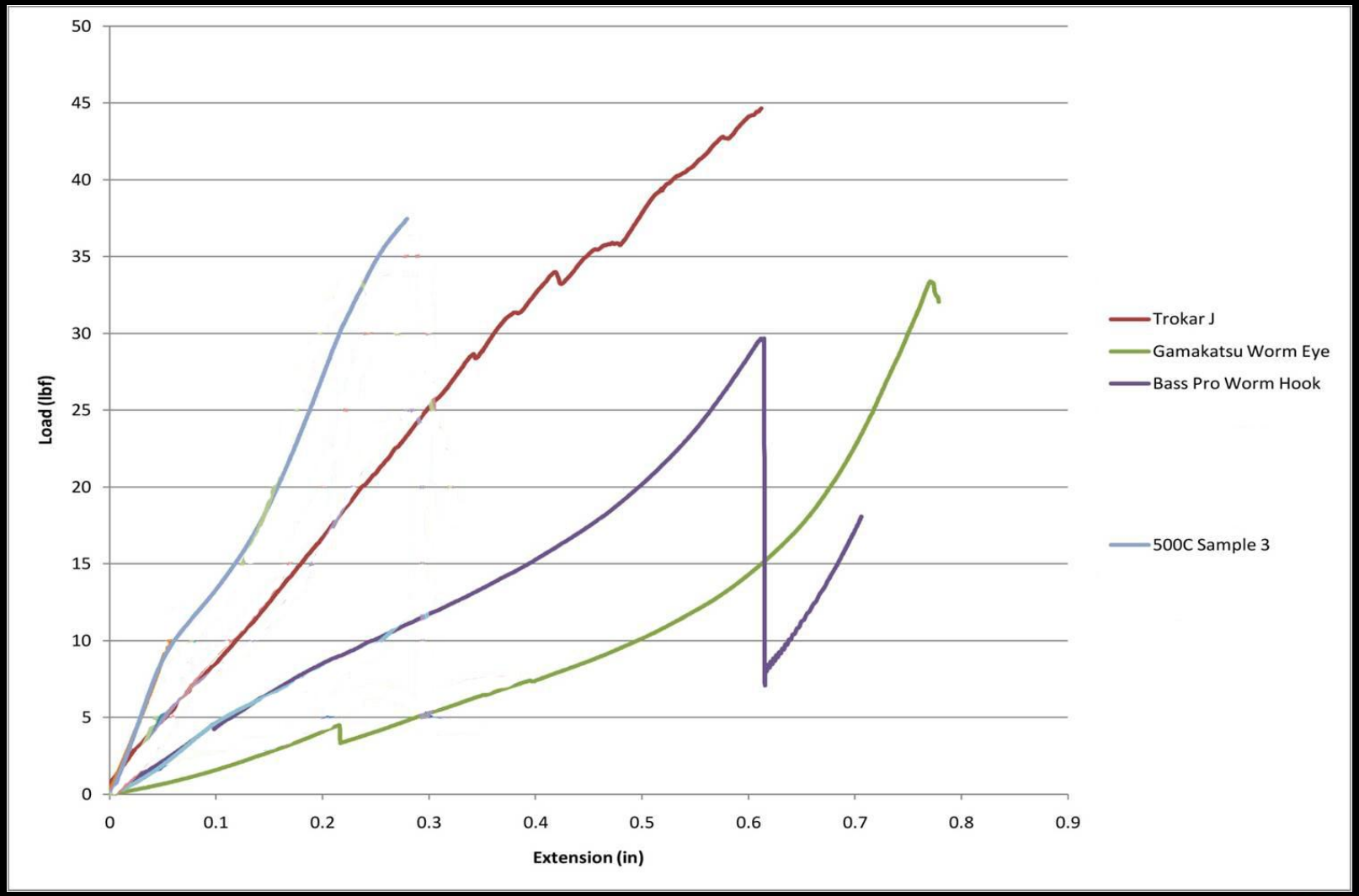
TESTING

Appendix A-1

Name	Shank Shape	Category	Chord Length	Wire Diameter	Max Load (lbf)	Mode of Failure
Trokar J				0.0602	44.64	Bend 90
500C Sample 3	Standard	2	1.09375	0.0441	37.46	Bend 90
500C Sample 4	Flattened	2	1.4375	0.0441	35.62	Bend 90
500C Sample 5	Flattened	2	1.34375	0.044	33.43	Bend 90
Gamakatsu Worm Eye				0.042	33.4	Bend 90
Bass Pro Worm Hook				0.0747	29.67	Bend 90
500C Sample 1	Standard	3	1.03125	0.0454	25.19	Bend 90
500C Sample 2	Flattened	3	1.125	0.0404	13.13	None (slip from vise)
300C Sample 2	Standard	3		0.044	11.93	Fracture
300C Sample 1	Flattened	2		0.0449	11.41	Fracture
U-Clamp				0.0394	6.76	

TESTING

Appendix A-2



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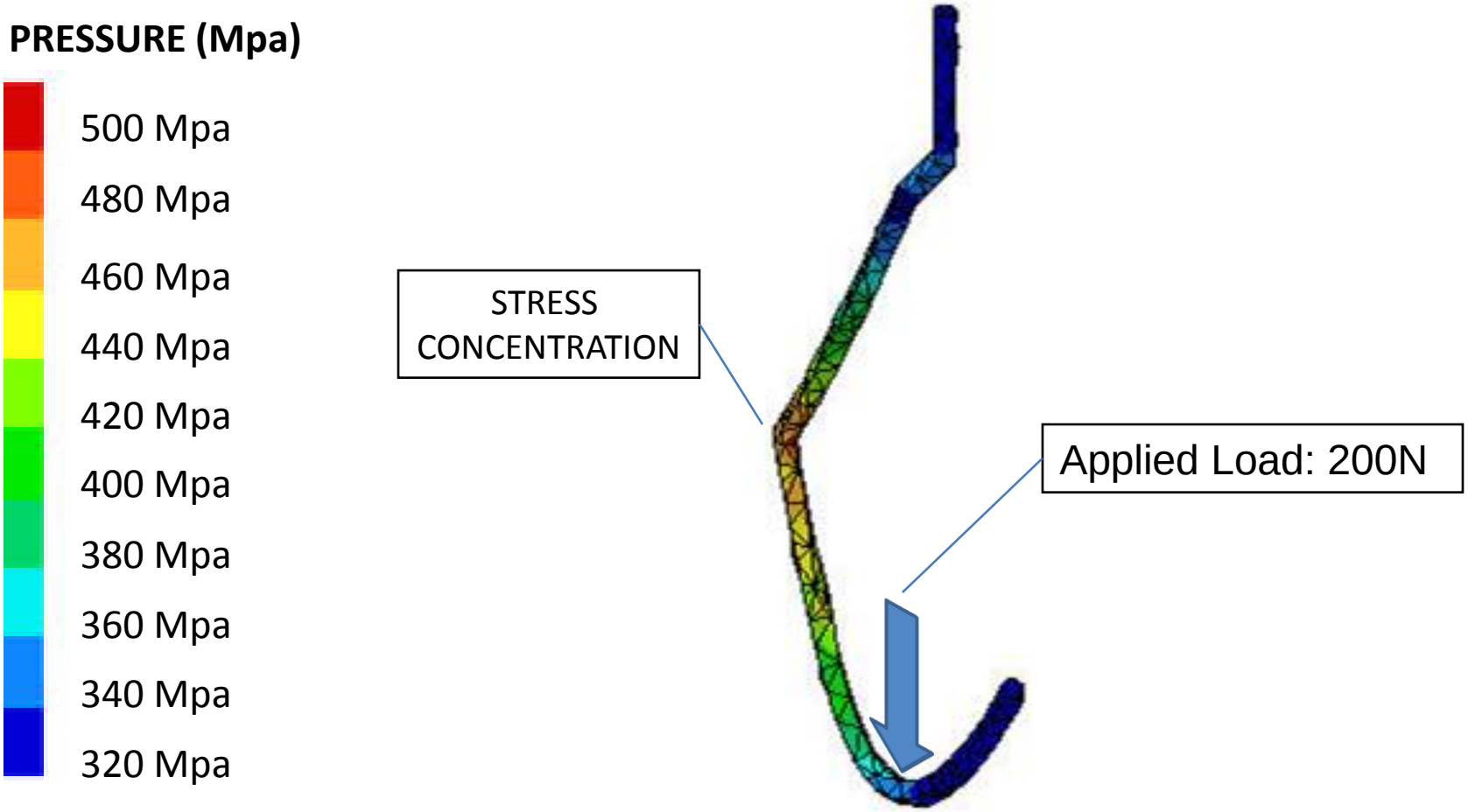
Finite Element Analysis - FEM

Appendix B



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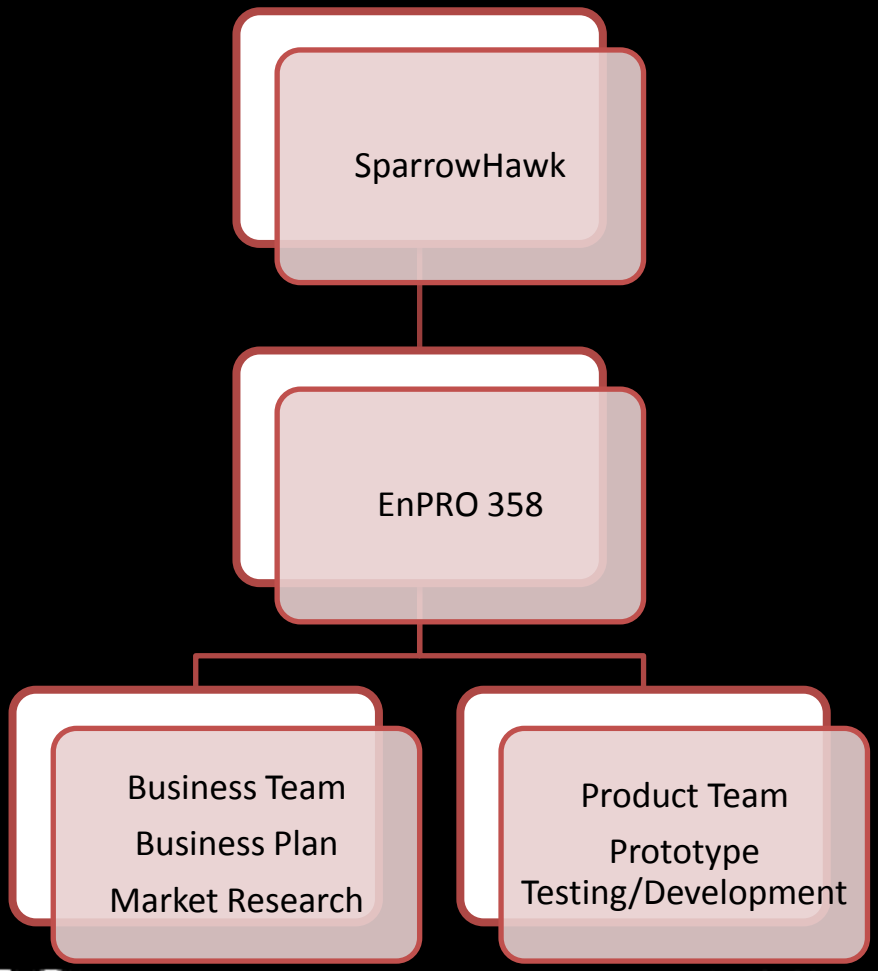
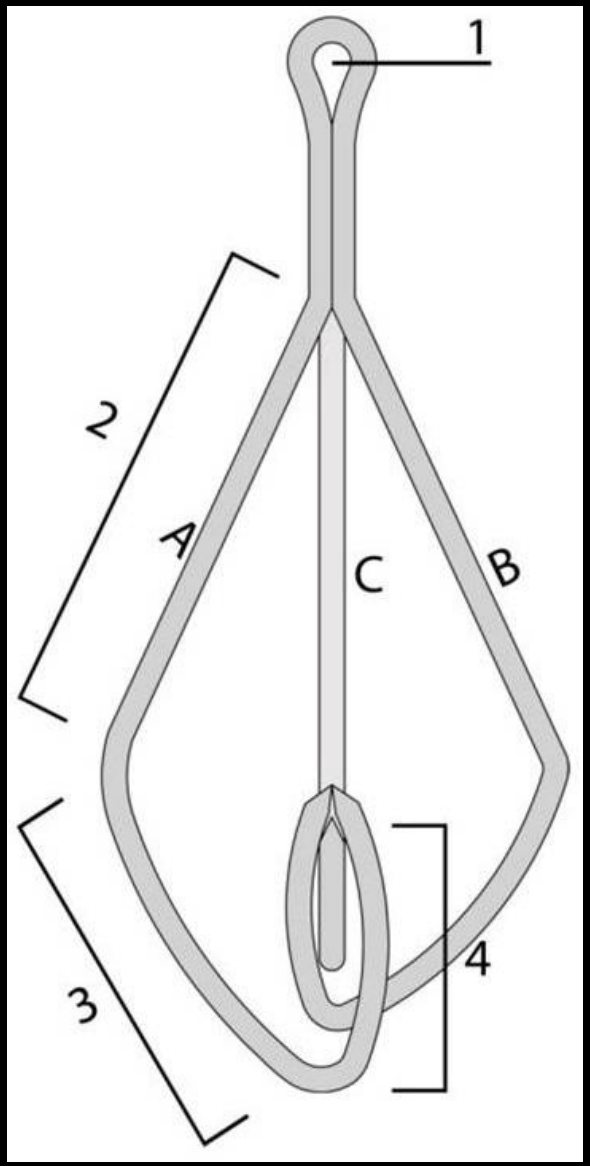


DESIGN



1 - Eye
2 - Flexible shaft
3 - Rigid arm and
engaged section
4 - Acute angle
Sharp hook point
Corrosion resistant

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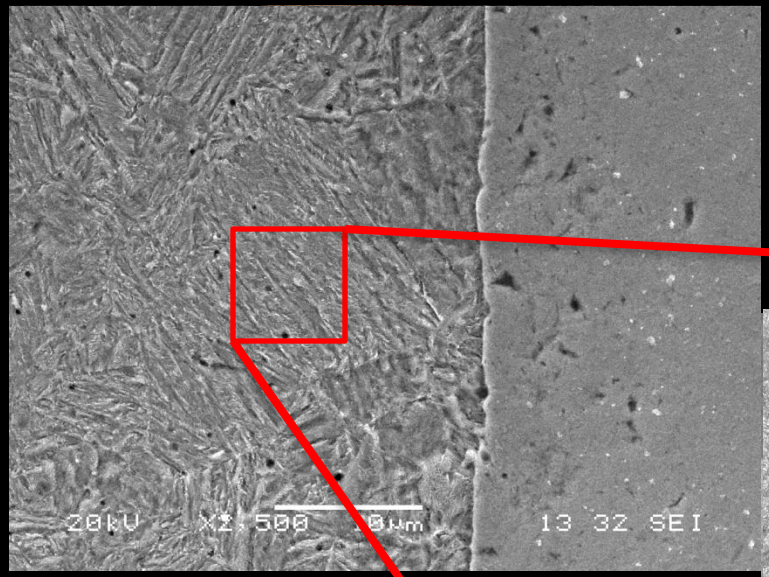
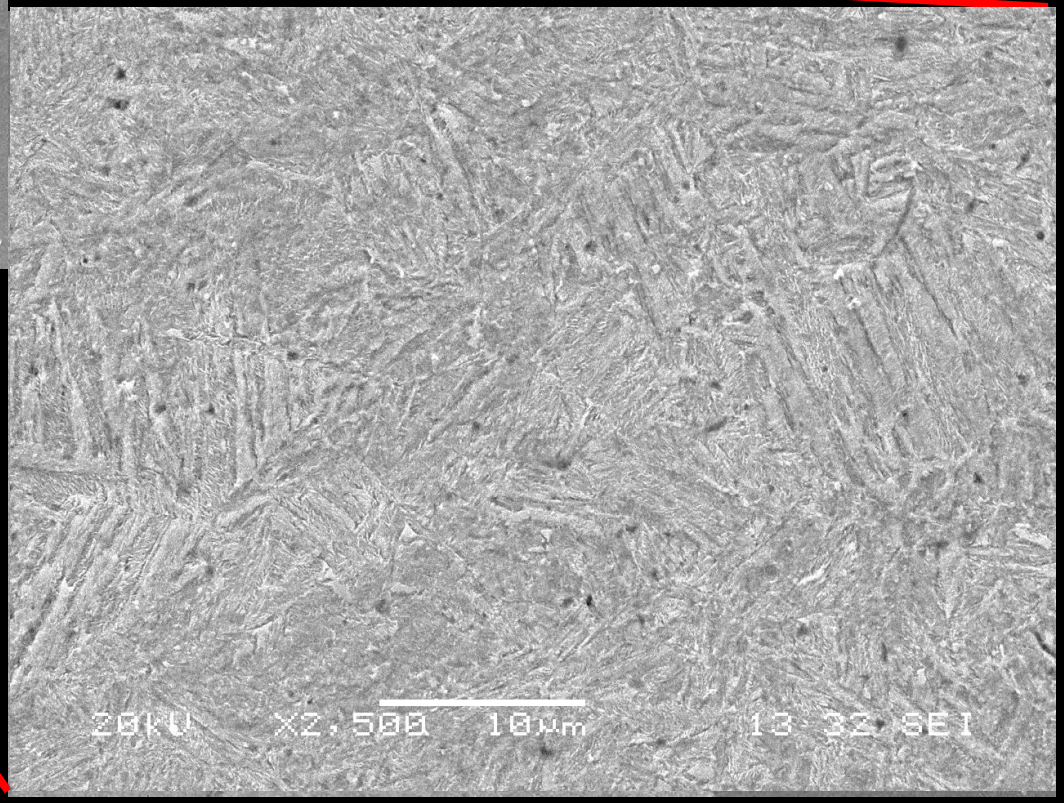
MATERIAL ANALYSIS: Microstructure

SCANNING ELECTRON MICROSCOPE





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Cost

Material	Cost	Units	Notes
Steel wire	0.003	$/in	http://www.mcmaster.com/#9666k33/=6s0yax
Ti-64	0.09	$/in	TI is 30 times more expensive per ton
Brass	0.083	$/ft	http://www.mcmaster.com/#brass/=6s0zfe
Rubber ball	0.25	$/ball	$.52 per ball from mcmaster $.04 for raw rubber so I split the difference

Cost

Features	Units	1080	Ti-6al-4v	Ball 1080	Ball Tl-64	Spring	Notes
Wire	in	8	8	8	8	30	spring assume .35” diam coil and 20 coils
Brass Crimping	in	0.5	0.5	0	1	0.5	
Rubber ball	unit	0	0	1	1	0	
Corrosion resistance							Ignore cost probably less than the accuracy of this exercise