Ankle injuries are common among athletes and other individuals. Approximately one million ankle injuries occur each year\(^1\). Ankle sprains are the most common, making up 85 percent of reported ankle injuries. The two types of sprains that can occur are inversion or eversion sprains. Due to the severity of damage on the ankle ligaments caused by a sprain, proper rehabilitation is required to regain full support and use of the ankle. Rehabilitation can take months and requires physical therapy. Using the Thera-Band\(^\circledR\) Exercise Band as a benchmark, an innovative ankle rehabilitation device, the AnkleMaster, was conceived and fabricated to provide a patient with the proper strengthening practices while allowing the freedom to use at their convenience. This significantly decreases the duration of disability and expense to a patient suffering from an ankle injury.

### Abstract

Ankle injuries are common among athletes and other individuals. Approximately one million ankle injuries occur each year\(^1\). Ankle sprains are the most common, making up 85 percent of reported ankle injuries. The two types of sprains that can occur are inversion or eversion sprains. Due to the severity of damage on the ankle ligaments caused by a sprain, proper rehabilitation is required to regain full support and use of the ankle. Rehabilitation can take months and requires physical therapy. Using the Thera-Band\(^\circledR\) Exercise Band as a benchmark, an innovative ankle rehabilitation device, the AnkleMaster, was conceived and fabricated to provide a patient with the proper strengthening practices while allowing the freedom to use at their convenience. This significantly decreases the duration of disability and expense to a patient suffering from an ankle injury.

### Background/Problem

- Ankle injuries are common and cause minor disability
- Sprains occur as a result of stretching and tearing of the ankle ligaments
- Inversion sprains are most common

### Objective

- Determine design effectiveness compared to benchmark
- Compare force exerted per displacement using force meter
- Design delivers consistent force distribution in all directions

### Results

- AnkleMaster provided more resistance than benchmark
- AnkleMaster provided more resistance in less displacement
- AnkleMaster delivered evenly distributed forces in all directions

### Discussion/Conclusion

After testing, the following was concluded:

- AnkleMaster provides approximately twice as much resistance as benchmark ankle band.
- AnkleMaster provides resistance in all directions.
- AnkleMaster offers easy storage, transport and setup convenience.
- The cost of a mass produced product will be highly competitive to that of the benchmark.
- Improves patient’s quality of life

### Final Product Specifications

- Material: Aluminum
- Dimensions (Open): 25x12x12(in)
- Dimensions (Closed): 12x12x1(in)
- Total Mass: 8 lbs
- Time to Collapse/Assemble: 15 sec.
- Estimated Fabrication Cost: $10
- Estimated Unit Cost: $30

### References

1. Cure Research Ankle Injury Statistics
2. Illustration copyright 2003 Nucleaus Communications, Inc.
3. Illustration of Thera-Band\(^\circledR\)
4. Latex Free 6' Band 20392 Heavy Pack
5. Illustration or Exercise from PeaceHealth

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The innovative AnkleMaster will be marketed to both professional trainers and patients as an easy convenient method of ankle rehabilitation exercises.