Solutions for 3rd World Countries: Improved Pipe Spanner

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Abstract

In many parts of Africa and East Asia spanner wrenches are used to remove the string of pipe when maintenance on water pump systems is needed. The wrenches create dents and gouges that shorten the thin-walled tubing’s life significantly. The main focus is to improve these wrenches to not damage the pipe. S3WC was able to create a spanner wrench that does not damage the pipe when supported with a max load of 325 lbs.

Engineering Challenges

Pipe sections cost about $100 per 3-meter section, which is a huge expense in a region where the average income is only about $1 a day. The main challenge was to create a spanner wrench that inexpensive and performs without damaging the pipe.

Design Development

- Identify the Problem - Damage done by the wrench.
- Performance requirements - Spanner wrenches that protect the pipe, are easy to use and economical.
- Gathering Information - Availability of materials and manufacturing facilities in Mali.
- Preliminary design - Testing and evaluation of the benchmark determined new performance requirements for new design.
- Detailed Design - Trade study of various designs was conducted to determine optimal prototype.
- Design validation - Tests performed with selected prototype determined design requirements were met.

Results

After performing tests with the final prototype, the pipe was not damaged by the spanner wrench when supported with various loads that ranged from 25-325 lbs. No dents or gouges were created. The manufacturing of the final prototype was simple and economical. The materials used are readily available in areas with limited resources.

Materials

Benchmark: Galvanized steel (handle) and mild steel (mouth).

Prototype: Galvanized steel (handle and mouth), synthetic rubber, natural rubber, fabric and wire (mouth grip).

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