

A Study of Heat Transfer in Finned Pots

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Finned Pots

- Increase the surface area to increase the heat transfer.
- Heat transfer efficiency important is reducing fuel use.
- *The best way to increase the efficiency of a stove may not be to deal with the stove, but to deal with the pot!!*

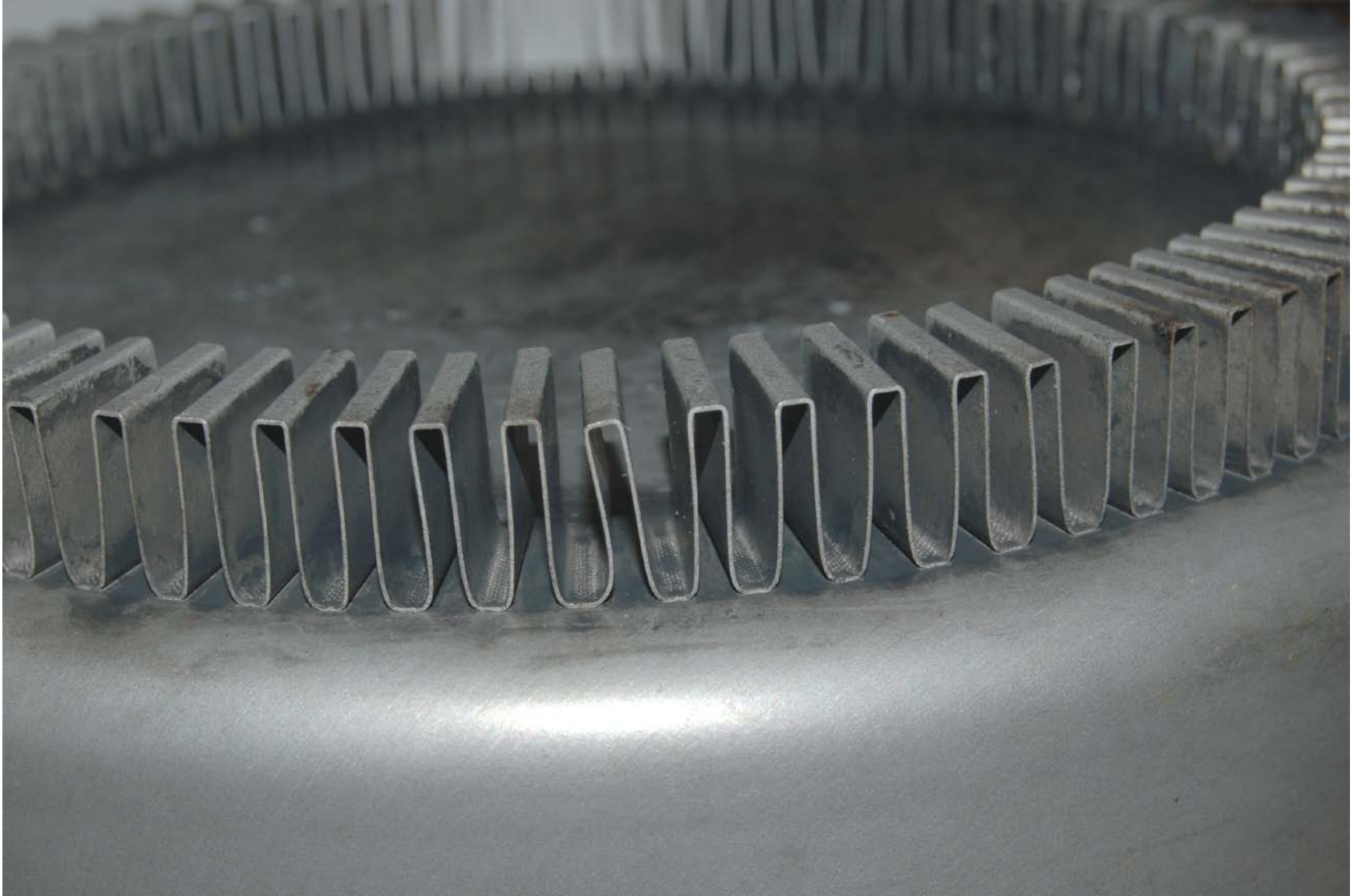
Many advantages

- Generally simpler, with fewer interacting factors.
- Should work well under all conditions.
- Zero or few changes by operator.
- Cheaper?
- Pots are very portable.

Jet-boil Pot (\$50)



Close up of fins



Results

- Increases heat transfer per unit area by about 100%.
- Is it possible to achieve similar results with a lot less money?

Integral fins

- Ideally, fins would be attached to the pot, cast in place, brazed or soldered.
- For prototype purposes, use aluminum tape to stick fins to pot.

Early design (2004)



Typical Fin-140 of these were used.



Results

- Heat transfer was increased by about 100% vs. standard pot.
- It took a lot of fins to do this, over 4 times the bottom area of the pot.
- More smaller fins are better than fewer larger fins.

Slit fin under construction



Detail of clamping system



Final shape



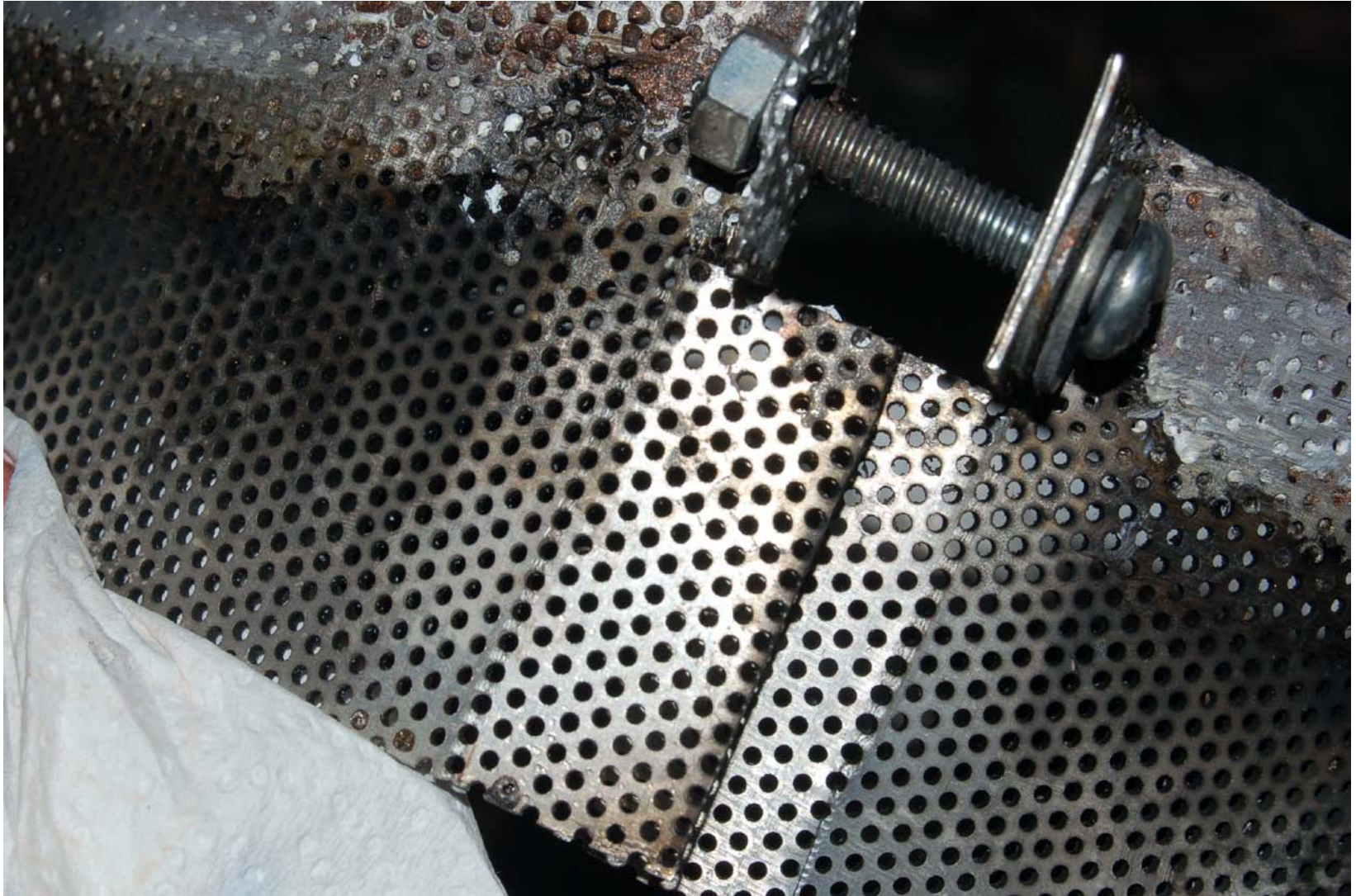
Results of slit fin design

- About 40% heat transfer improvement.
- About \$5 of materials and an hour of time.
- Could be improved with better heat transfer between fins and pot.

Perforated metal ring fin



Close up of metal and clamp



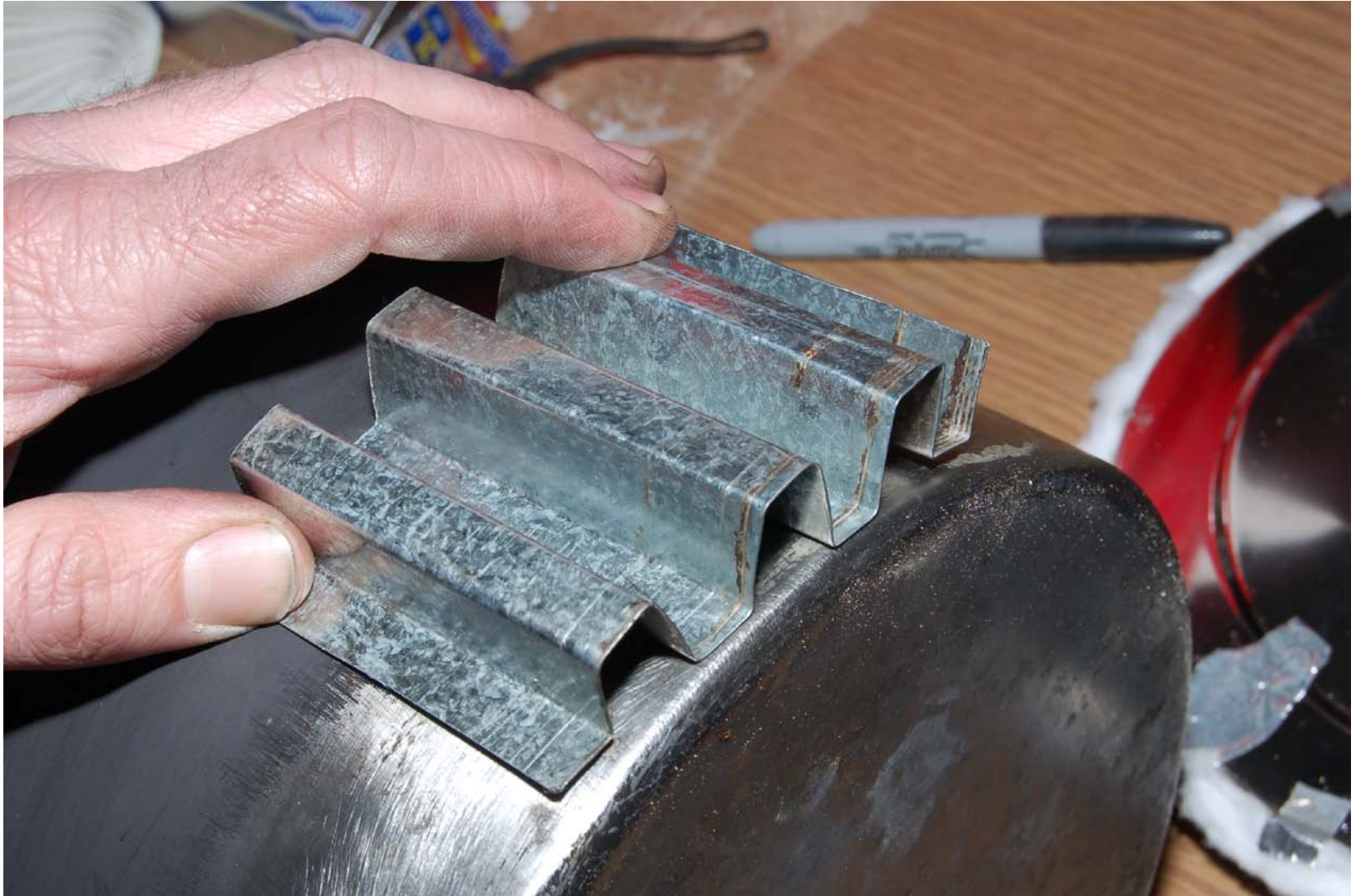
Perforated metal fin results

- Increased heat transfer by about 40%.
- About \$5 of materials and less than an hour of time.
- Could be improved further by optimizing metal hole pattern, and by improving heat transfer between metal ring and pot.

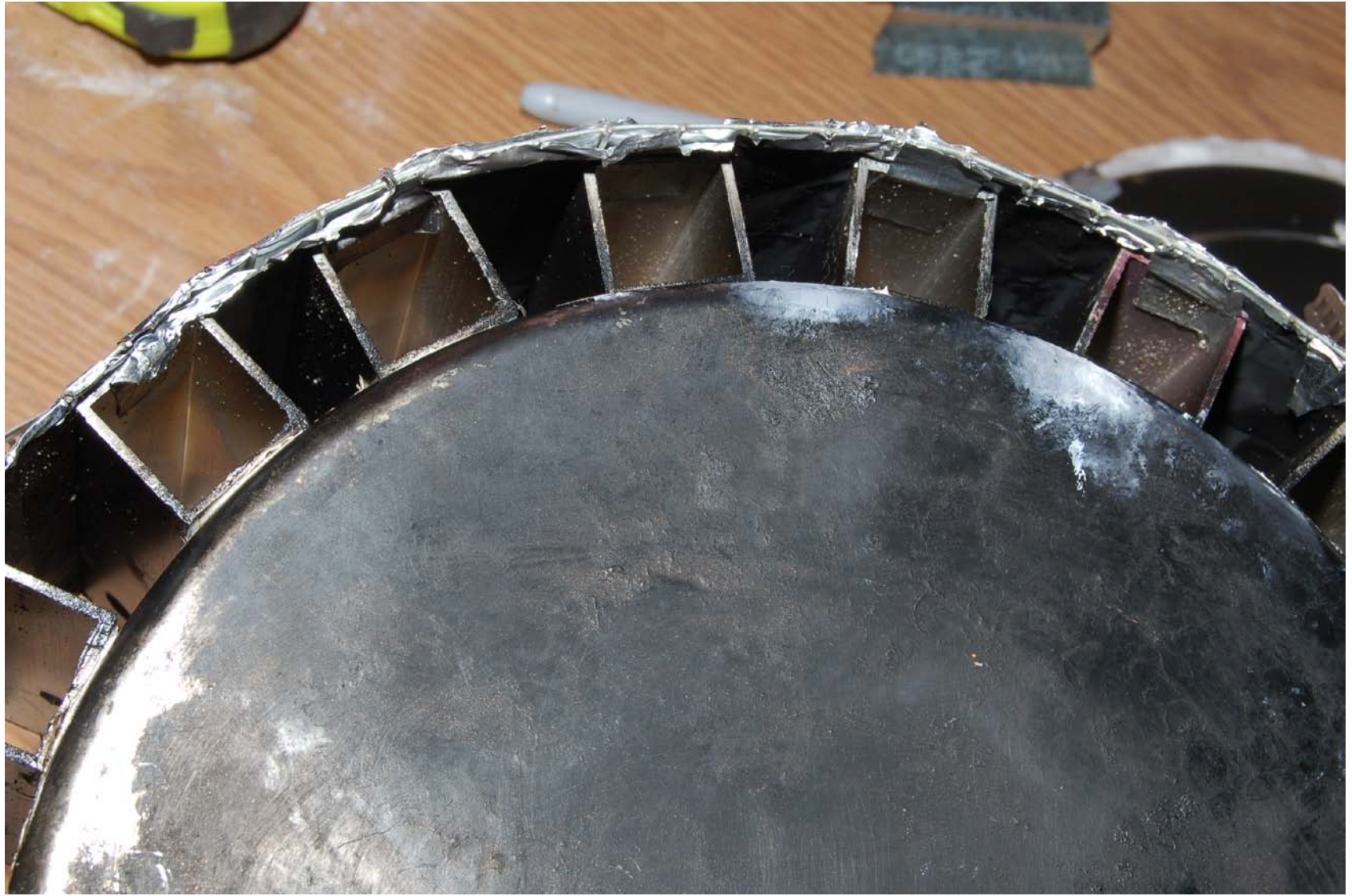
Corrugated metal fins

- Use a band of corrugated metal, with a second band holding it to the sides of the pot.

Section of corrugated metal



Prototype corrugated metal



Close up



Corrugated metal results

- Heat transfer increased by about 50%.
- About \$5 or less in materials, less than an hour of time.
- Would be tough to do as well with real corrugated metal.

Emissions

- Emissions = products of incomplete combustion.
- Fins probably will increase emissions per unit of fuel burned.
- May increase or decrease emissions overall.

Applications-finned pots work well with:

- Low power stoves, reduces time to boil and reduces heat loss while heating to boil.
- Expensive fuels (usually clean burning).
- High turndown stoves.

Summary

- Finned pots work.
- Many possible designs, that work more or less well.
- The key to high efficiency is the pot, not the stove.

(For increasing heat transfer)

It's all about the pot!