

Optimizing Production Of Piano Dehumidifier

Dampp-Chaser



PROBLEM STATEMENT

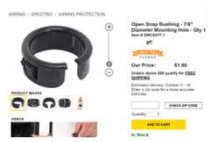
- Dampp-Chaser is interested in improving the design of their product for manufacturable and cost reasons to make it easier to process and cheaper to produce all while maximizing profits and maintaining a quality product. The production process has several manufacturability and cost issues, some of those problems include:
- The resistance wire is very thin and does not easily connect to the power cord.
- The glass the resistance wire is fed through is increasing in difficulty to source and in cost.
- The process for applying the snap-in bushing is physically difficult and demanding.

REQUIREMENTS

#	Description
1	Dehumidifier must meet domestic and international standards.
2	Humidifier must heat to temperature consistent with current production.
3	Concept must be applicable across our product catalog.
4	Outer diameter of dehumidifier must be same as the current outer diameter.

CONCEPTS

- Initial approaches included finding a new resistance wire to replace glass, alternate bushing for unit, alternate insulation, and wire holder.



FINAL DESIGN, APPROACH, PLAN

The final resistance wire was found from the current company that damp chaser now purchases from called JenTer. Once the new wire was found, the question of how will this wire be stabilized within the unit and not violate the UL standards for insulation was found.

New Resistance Wire



Photo Caption: This is the new resistance wire found from JenTer.

- Resistance wire (heating element)
- Fiberglass insulated
- 65 ohms per foot

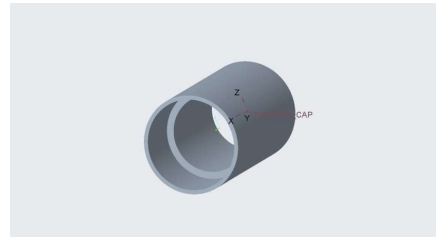


Photo Caption: The transfer cap was designed to help hold the resistance wire in place with a thin stainless-steel wire so it would not touch the inside of the walls of the aluminum tubing.

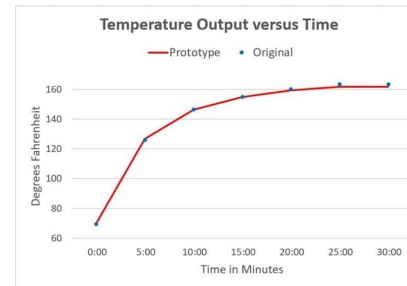


The original idea was to use fishing line or a thin steel wire inside the transfer cap to stabilize the heating element within the unit, but they proved to be too complicated to use. Then the idea of "Fly line backing" was brought to the team, it is thicker than fishing line but still thin enough to perform, more flexible than steel wire, and easily visible.

RESULTS

Team 11 did research into insulated wire as well as snap-in bushings. Team 11 were able to find an insulated wire that would be a good replacement for the glass. Team 11 was unable to find a bushing that would work better than the current one but were able to find a bushing air tool that is compatible. Team 11 created a 3D modeled transfer cap to hold the wire tight during the filling of vermiculite.

Temperature comparison chart



Old Bill of Materials

Table 3. Bill of Materials of Original Dehumidifier (BOM)

Part #	Unit Cost	Description	Vendor
70489	\$0.3426	Resistance wire	Jen-ter
10549	\$0.0398	Glass tube	LeSavance
10190	\$0.0330	0.720 OD-0.040 Aluminum alloy disc	J & L Brunner Stamping Co.
10202	\$0.0420	Aluminum alloy disc with hole	J & L Brunner Stamping Co.
10203	\$0.0196	Brass crimps	Antonics
10209	\$0.0288	Crude vermiculite 30 LB bag	Dupre Minerals
10163	\$0.0025	1/4" x 1 YD	3M
10272	\$0.0276	Thermal glass tape	3M
10273	\$0.0457	Black heat shrink tubing 3/16" x 1 1/8"	Insulation Products Corp.
10277	\$0.0254	Black plastic end cap 1/2" no hole	Radson Group
10303	\$1.3493	Black cord set 6'	Uniscale Inc.
10316	\$0.0245	Black strain relief	ITEXCO
10320	\$2.0004	0.75 OD-0.025 WT Aluminum tube	V.A.W. of America Inc.
10660	\$0.0548	Black plastic end cap with hole	Radson Group
Total cost	\$4.0651		

New Bill of materials

Part #	Unit Cost	Description	Vendor
10316	\$0.0245	Black strain relief	ITEXCO
WCS144	\$0.26	High temperature, UL approved braided fiberglass 34 AWG wire 5000' roll	Jen-ter
10190	\$0.0330	Black plastic end cap 1/2" no hole	Radson Group
10202	\$0.0320	0.720 OD-0.040 Aluminum alloy disc	J&L Brunner Stamping Co.
10203	\$0.0420	0.720 OD Aluminum washer	J&L Brunner Stamping Co.
10163	\$0.0288	Crude vermiculite 30 LB bag	Dupre Minerals
10346	\$2.0004	0.75 OD-0.025 WT Aluminum tube	V.A.W. of America Inc.
10277	\$0.0486	1/4" x 1 Black heat shrink tubing	Insulation Products Corp.
10316	\$1.3493	6' Black power cord	Uniscale Inc.
10209	\$0.0196	Brass crimps	Antonics
Total cost	\$3.8606		

Total cost savings: \$0.2045

SUMMARY AND CONCLUSIONS

Team 11 met the major deliverable of reducing the cost of overall process while increasing the efficiency of the assembly steps. The glass tubing has been removed from the bill of materials reducing the cost. The new resistance wire attests to the old wire and can be incorporated with the unit. The new resistance wire met the challenge of needing a stabilizer which is where the transfer cap is introduced combined with a wire holder.

FUTURE WORK

The transfer cap has been introduced and tested with the product and results show that it is a success. The new wire works with the current assembly methods and shows promise of a quality replacement to the old wire. Small details would need to be worked out for the change of wire and newly incorporated transfer cap within the assembly steps.

TEAM & ACKNOWLEDGEMENTS

- Nicholas Hutchens – Engineering Technology
- Devin Whitaker – Engineering Technology
- Hampton Jesup – Engineering Technology

- Sponsor – Kelly Hollifield
- Sponsor – Cody Britton
- Mentor – Scott Pierce



References

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