Masonry Heater Association Of North America

MHA News

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MainTitleHere

LOPEZ LABS 93 TESTS — PRELIMINARY REPORT

by Norbert Senf

Executive Summary:

Top-Down GOOD.

Underfire BAD.

Jerry Frisch and I have just completed a months worth of emissions and combustion testing at Jerry's lab. We set the lab up in 1992 at Jerry's Marysville, WA, shop. MHANews reported on some testing we did at that time as a "dry run" to set up the equipment.

Since then Roger Bighouse, OMNI's lab techie, was hired to check out the setup and the quality control procedures. We took a page out of OMNI's book and set up a quality control manual as the very first step. One thing that becomes immediately obvious is that even a slight uncertainty in the quality of the data has a kind of avalanche effect — its a very short distance between good data and meaningless chaos.

There are so many variables in the woodburning process that you have to get control over as many as you possibly can. Everyone with experience in the woodstove tuning business told us the same thing — you make one small change at a time and repeat the burn, preferably two or three times. Make two changes and you're back to guesswork. There is one saving grace, however, when working with masonry heaters. As the OMNI field testing showed, the heater is typically doing identical runs day after day — the load is the same, the stacking is the same as is moisture, time of day, operator intervention, etc. Compared to the extremely complicated world of burn-rate controlled appliances, we have the luxury of living in a much more manageable situation, even in the real world.

We did a total of 24 days of testing on three different systems — an experimental HeatKit with various air setups, a TuliKivi TU-900, and a prototype Frisch-Rosin fireplace with airtight doors. With ultimate in-field AWES testing in mind, it made sense to repeat field conditions as much as possible. This meant that the Heat-Kit could only be fired once per day. We couldn't even take a day off, lest it got stone cold and another unwanted degree of freedom entered the "parameter space" (a currently fashionable term).

We learned a lot, and the results actually exceeded our expectations. Our efficiencies, etc. were calculated from formulas that were developed by Skip Barnett, and I believe that these numbers would be compatible with current OMNI methods.

We had a couple of shockers — actually a big one and a little one. The little one was that the current contraflow underfire air setup delivered an overall efficiency of only 38%. This wasn't totally unexpected, since we had seen Canadian EMR (Energy Mines and Resources) numbers on a similar unit from another manufacturer of 40%. This is the result of two things: high stack temperatures and too much excess air. Excess air is in the region of 1000%, or about 3 times higher than necessary. We think that we're seeing several positive and negative feedback mechanisms at work in the various setups. With the underfire air, your high stack temp increases your draft, fanning the fire (because of the grate), which increases your burn rate, which raises your stack temp, etc.,etc. The fastest burn possible isn't necessarily where it's at.

The significant thing here, in my opinion, is that what we're looking at here is the most common masonry heater setup build in North America today. I hate to say it, but very probably all those heaters are operating significantly below par.

Now for the good news. As we need to keep emphasizing, as heat storing appliances we are in the unique position of being burn rate independent — we can use whatever burn rate works best since our heat output is a function of fuel charge weight only (and, of course, efficiency — 40 lbs. at 38% efficiency and 20 lbs. at 76% efficiency give you identical amounts of heat).

In This Issue

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Membership Policy:

Membership is open to anyone with an interest in masonry heating .

Annual membership dues:

Voting	200.00 (US)
Associate	100.00 (US)

IMPORTANT NOTE: Please check the membership list in the current issue and notify us immediately of any errors in your address, phone numbers, or dues status. Voting members are entitled to a set of in print back issues of MHA News.

Contact the Editor if you haven't received your back issues or if the information published in this issue's membership list needs correction.

O.K., the big shocker: Below you'll find a summary of the 23 test runs on the contraflow. What we did was the following: do a burn, plot the exhaust gas curves, wait 24 hrs., weigh the filters; then, we'd take our best guess at the next change (unless we were doing a repeat verification run), and repeat the process. We has a chimney leak on the first run, so we had to throw it out. On the second run, we decided to establish a baseline for Norbert's top- down burn by simply closing off the whole underfire air system and cracking to door open about 1/8 — ¼ inch. As you see in the summary, we got an unbelievable overall efficiency of 79%, with an average stack temp of only 140F. We were condensing quite a bit of water in the flue, so the efficiency was probably even a bit higher. So much for the theory that the contraflow has too short a heat-exchanger!

That was the first run, befinner's luck. Toward the end of the test series, we held a workshop and invited everyone we could think of. About a dozen MHA members showed up,

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and a couple of other interested parties. We did six runs on the three systems over two days, and several people stayed for all six.

Here's a short summary of the other more interesting results: (First, a word of caution: what you see is what you get — we obviously need to do a lot more testing before any of this becomes definitive. However, we do feel that this is the first time that the combination of PM10s and efficiency on individual runs with real fuel have been tested to this level of detail and quality in masonry heaters — an MHA exclusive.)

1) We were able to repeat the high efficiency runs with a couple of other extremely basic air setups. One of our design goals was to develop an air system that is as simple as possible, ie., no operator intervention. Chances look good that this is feasible. A good one seems to be slightly leaky doors with a 2x2 front slot. With a top down burn and certain stacking schemes, it appears that an airwash is not needed.

2) Stacking seemed to be one of the main variables. It seems likely that the tradeoff will be between degree of tuning and sensitivity to stacking — ie., if you want to max out your efficiency without a microprocessor-controlled air system, you can't just toss your wood in any which way. (Somehow, that doesn't seem like a big surprise).

3) The best results were obtained with large pieces of wood. This was a big surprise to everyone, and contrary to orthodox masonry heater wisdom. With the air and stacking systems investigated there were crossover points with woodsize, stacking tightness, and moisture (or rather, lack thereof) where a rich condition and a characteristic, large, CO bump occurs during initial flaming of the virgin wood surface, before a char layer forms. The combination of top

down ignition and large wood size seems to be what makes it all work without trick air setups. If confirmed, this is good news for real world heater use and may allow us to increase the safe maximum fuel charge from the present 50 — 60 lbs.

3) Best overall results were obtained with a very small amount of bottom air.

3) Rick Crooks suggested an interesting future project: since the contraflow was the same model field tested by OMNI (and lab tested by VPI), it would be an interesting excercise to return to the same unit, and with 10 minutes of operator instruction and a 5 minute retrofit, be able to increase heat output by at least 50% and cut PM's a further 75%. This would be a powerful demonstration of our industry's potential to offer environmental payoffs from basic research. It would also bolster the assertion that the AP-42 numbers we have are truly worst case scenario, since they were skewed by the two underfire air heaters in the program.

Operation Education

by Stan Sackett

Sackett Brick Co., Kalamazoo MI

(you can find contact information for Stan on the MHA Voting Member list)

The masonry heater industry needs an aggressive and comprehensive public relations publicity package to make masonry stoves a mainstream construction product. We all know that it's too expensive to rely only on paid advertising. Therefore, we need to take advantage of opportunities to publish interesting editorial and educational articles and programs, in order to maximize exposure at a minimum investment. For greatest impact, we need to plan and produce an integrated package that is easy for MHA members to use in their local area.

Here's an example of my concept of a planned, integrated campaign: Publicize installations beforehand and invite local builders, masons, architects and fireplace companies. Send the local newspaper editor a package of masonry heater editorial content along with a cover letter telling him of the local interest. Invite him to do a story on the upcoming installation; after all, this is a newsworthy event. Submit an educational video to the local cable access stations, and tie these activities in with your invitations.

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I'd like to get started by inviting feedback from other industry professionals (where do we go from here?) Some good articles have been published in the last few years. I'd like to see us plan much more publicity to help our industry's growth. We'd most likely need to consult with a public relations firm in order to produce a quality package. I'm willing to put time into this, if some other MHA members are willing to take this project on also. (ed: How about it, troops?)

Please review the attached outline.

Action Plan

A. Produce direct mail package: To succeed, we need to establish awareness of the masonry heating concept in the local construction professionals who deal directly with clients who are building or remodelling or who are in the market for a fireplace or stove. We need to target them specifically. One

effective and low cost method might be to use picture postcards of the finished product.

1.) Manufacturers need to make postcards available for their dealers to use for this promotion.

2.) MHA needs to produce one for custom heater builders to use, as well.

B. Commission several editorial articles that can be run together or in a series for local and national publications on the full family of masonry stoves.

1.) Fireplaces of the Future: an overview of the environmental and efficiency advantages.

2.) The U.S. is Many Years Behind in Construction Technology: A history of masonry stoves and the need for us to catch up with European ideas. Some of Mark Twain's comments could also be used in this story.

3.) Efficient Product Update: profile masonry heater design concepts in comparison to conventional wood and gas burning fireplaces and stoves.

4.) Old Concept New to the Area: a boilerplate masonry stove concept story in which dealers can fill in a few blanks and customize the article for the upcoming local installation.

5.) Fireplace Dealer Learns Old Way: Each manufacturer, dealer and heater builder needs to publicize their own story. I have a good personal story and believe that most people in the industry do. Let's write them and exchange with one another and keep our media editors' desks full with good personal interest stories.

C. The production of an educational video: Cable access stations offer the equipment and can provide volunteers free for producting programs to air free on their stations. Once produced, it can be copied or circulated to any cable access station, or for our own personal use. It is prohibited to make it a commercial or an advertisement. Because of this, we must present the concept and educate people about the advantages.

Listed below are some ideas pertaining to a video production:

Fireplaces of the Future

1. Find people interested in contributing time and resources to the project. As mentioned, it can't be a commercial; however, it can be sponsored and credits would include all contributors, as well as who to contact for more information.

2. Prepare a program format outline; consider what to feature and how to make it interesting.

3. Accumulate videotape footage of North American and European installations of custom and standard masonry stoves. We can transfer photographs to videotape, as well.

4. Videotape installation workshops of custom and modular heater kits in new construction remodelling and retrofit installations - like "This Old House", with someone in the masonry heater industry taking the role of Bob Vila. Incidentally, Bob Vila got his program started as a cable access production.

5. Tape studion sessions with key industry professionals for background and educational dialogue. Use graphs and visual aids.

6. Video a historical masonry heater tour from ancient Roman bath houses to modern masonry heater production lines.

7. In-home interviews of happy masonry stove owners to give third-party endorsement.

8. When complete, distribute the video to MHA members and masonry stove dealers (future MHA members -ed). Once in the dealers' hands, the video could be edited by adding local and personalized information and installations.

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