

THE LAZOLA – A NEW BOX-COOKER OF HIGH PROFESSIONALISM

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ABSTRACT

The LAZOLA – an advanced solar box-cooker made from sheet metal for approx. 6 people in two versions:

LAZOLA 2: A light metal cooker for higher requirements available as high-tech manufactured kit or assembled. Improved efficiency up to 40 %. Apt for use with shiny pots.

LAZOLA 3: Cheaper alternative to the LAZOLA 2 of galvanized sheet metal similar to LAZOLA 2. Also larger versions for up to 12 people.

Designed for serial handmade production demanding no special skill. Whole production process explicitly documented on step-by-step DVD / Video. Additional explanations and advices in drawing and writing. Facilitated production by available templates and (technical documentation of) many kinds of simple jigs. Project excellently suited for vocational training.

Keywords: lazola, metal box-cooker, improved efficiency, serial handmade production, step-by-step-dvd / video, vocational training

1. BACKGROUND

The Lazola project had its origin in South Africa, where in 1998 and 1999 I installed a workshop for manufacturing box-cookers.

Main features were the training of qualified carpenters to manufacture cooker parts for small serial production and the training of unqualified labourers to assemble cookers.

We used power tools in connection with all sorts of jigs that allowed easy and accurate working.

Whereas the production ran very smoothly, the project as a whole was not very successful.

The acceptance of the cookers by the people was reluctant, though the organization that had invited me, had assured me of a big demand.



Fig.1 Manufacturing LAZOLA 1 with power-tools



Fig. 2 The LAZOLA 1 in use

Based on this experience and the encouragement of Prof. Schwarzer of the Solar-Institute at Jülich, I together with some friends of mine designed the LAZOLA 2.

As a result in 2003 we founded the registered, non profit “Lazola-Initiative for Spreading Solar Cooking” at Paderborn, Germany.

2. THE LAZOLA 2



Fig. 3 The LAZOLA 2 in use

As already mentioned, this box-cooker of light sheet metal is available as high-tech-manufactured kit or as a completely assembled device. It meets higher requirements.

Due to the very professional finish and the use of a removable “hot plate” for heat conduction to the pots in addition to heat radiation this cooker is up to 40 % faster than comparable box-cookers.

The “hot plate” allows also the use of light pots.

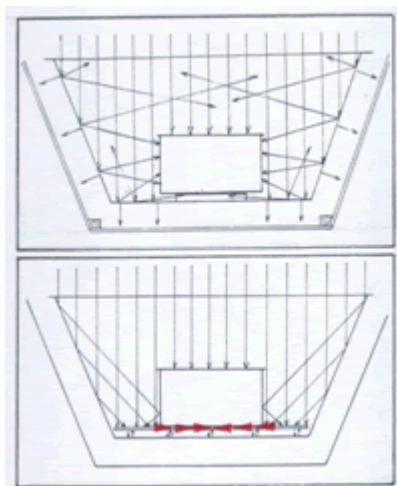


Fig. 4 Heat radiation (top) and heat conduction by hot plate (bottom)

In the meantime the Lazola-Initiative got much encouraging feedback regarding outfit, function, handling and efficiency of the LAZOLA 2.

Unfortunately, however, this cooker is too expensive for poor countries.

3. THE LAZOLA 3

Subsequently the Lazola-Initiative developed the LAZOLA 3.

This new cooker has very much the positive features of its predecessor, but it is much cheaper and can be made by hand in any place.



Fig. 4 The LAZOLA 3 in use

4. MATERIALS USED FOR THE LAZOLA 3

- Most parts are of 0.5 and 1.0 mm galvanized sheet metal which is less expensive and better available than aluminium.
- The hot plate is of 4 mm anodized sheet aluminium. Neither cutting nor coating can be done by hand. Therefore this part has to be supplied.
- Like with the LAZOLA 2, the two frames that keep the heat inside the cooker have to be made of wood. The parts that are painted are of wood as well.

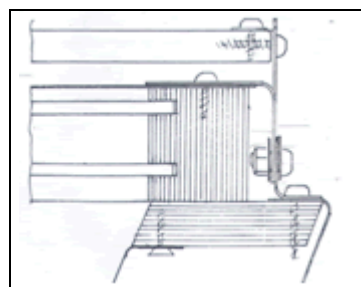


Fig. 5 The two wooden frames

The Reflector is covered with highly reflecting polyester foil.

- For the glass cover ordinary 4 mm sheet glass is used that is available almost everywhere.
- For insulating the cooker we use rock wool, which will not be available in most hot countries. Then hay or straw are recommended. Special jigs and tricks allow putting it in densely.

- All small parts (like pop rivets, screws and bolts) are specified in the Workbook containing background-Information.

5. MODIFIED VERSIONS OF THE LAZOLA 3

> By changing only some measurements the width of the cooker and its output can be doubled. Only the measurements concerning the width have to be changed.



Fig. 6 LAZOLA 3 with doubled capacity

> By deepening the cooker box 12 litre pots fit in. Thus one or more LAZOLA-cookers can be used for cooking food for bigger groups of people. After the food is heated up fast in a concentric cooker it can be put into the LAZOLA to continue cooking.

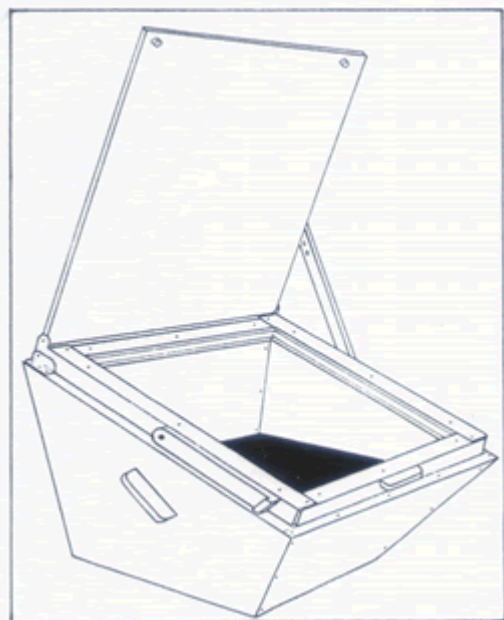


Fig. 7 Deepened LAZOLA 3 for 12 litre pot in combination with concentric cooker

> On both sides two additional reflectors may be fixed temporarily, if occasionally needed. Thus the efficiency can be improved by another 20 %.



Fig. 8 Removable lateral reflectors

6. THE LAZOLA 3 PRODUCTION AND MARKETING CONCEPT

- The LAZOLA 3 has been designed for local serial production by hand, particularly in underdeveloped countries.
- All costs for materials will amount to approx. 65.- €, VAT included.
- The manufacturing process is rather complex and will take its time, depending on the number of cookers made at the time and the routine acquired. Considering that labour is mostly very cheap, the time needed should not be a problem.
- All work involved can be learned by non professionals, provided they are guided by a qualified trainer and supervisor.
- Nevertheless the selling price for the LAZOLA 3 will not be easily afforded in very poor areas. But this cooker is very rugged and durable and the price of it has to be seen in relation to its lifetime. We trust that paying by instalments or other viable ways of payment will be found – even for poor people.
- The local production contributes towards creating value and will also facilitate repair service by the production unit.

7. PRODUCTION SUPOORTS

- The production process has been broken down into smallest units that can be easily overlooked.
- All steps have been documented by subtitled pictures on a 105 min DVD / Video.



Fig. 9 Step-by-step instruction on DVD / Video

- The subtitles are available in a booklet and can thus be used for looking up details anytime.
- A workbook comprises all relevant background-information concerning organizing the whole LAZOLA 3 project.
- Exact production of all parts is facilitated by full-scale templates and various jigs.
- Jigs are also used for precise and easy assembling at any stage.



Fig. 10 Jig for assembling inner box

The whole project is ideal for training in vocational schools for metal and wood work. The acquired skill can be used for other tasks.

8. MACHINES AND TOOLS REQUIRED

> For cutting the parts of sheet metal a guillotine is necessary, for bending the parts a bending brake. In Germany these devices are part of the equipment of every plumber's shop. In more developed countries this may be the case as well. In other cases, and once production is envisaged on a bigger scale, these tools will have to be bought, however not at the beginning – see next point. (There is a good chance to get these devices second hand.)



Fig. 11 A guillotine for cutting sheet metal

> Apart from these two devices only a few ordinary tools are necessary that are specified in the workbook with background-information.

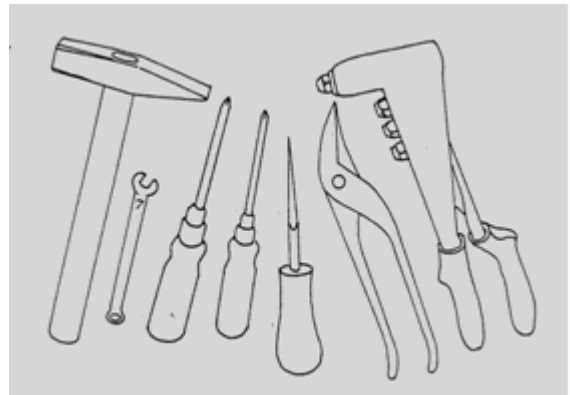


Fig. 12 Tools needed

9. LAUNCHING A LAZOLA-PROJECT

- The Lazola-members consult individuals and groups intending to launch a solar-cooker project, but do not perform any project on their own.
- We suggest that in an envisaged project not only one type of solar cookers, e.g. the LAZOLA should be produced. Purchasers should have the option to choose between at least between two types of cookers, e.g. concentric ones and a box-cooker, or to buy both kinds.
- Prior to starting a LAZOLA production in a first phase the acceptance of solar cookers among the population in question should be tested with a small number of assembled LAZOLA 2 cookers.



Fig. 13 Opened LAZOLA 2 with light pots



Fig. 14 Testing the LAZOLA 2 on the Philippines

- Only if this first phase proves positive, then in the second phase the production should be launched. At this stage we recommend to start with assembling of LAZOLA 3-cookers only. For this purpose all parts for a bigger number of cookers can be ordered from a subcontractor of the Lazola-Initiative or – if available – from a local plumber who has the required equipment.
- Only if the second phase has proved successful, in the third phase machines for cutting and bending the sheet metal should be bought.
- In the fourth stage this centralized workshop that has bought the machines could even supply further decentralized assembling units with cooker parts.

10. SUMMARY

- The LAZOLA 2 and particularly the LAZOLA 3 represent our ideas concerning box cookers. We feel obliged to share them with others who have the possibility and energy to realise them and – with regard to myself – who are much younger.

- We hope people with further creative ideas will feel encouraged by us to come up with them and will build even better cookers in time to come.
- The Lazola-Initiative is convinced that the many advantages of well performing box-cookers are still widely underestimated or unknown. Our objective is to make a useful contribution towards bringing about a change in this situation.
- Let me close with an encouraging thought: Only less than 150 years ago the first bicycle was invented. Look at the incredible progress that has been made ever since. Bicycles can only use the power of legs. Why should not the expected progress in solar cooking be even greater whilst using the immense energy of the sun.

11. APPENDIX



Fig. 15 The parts are cut with simple stops



Fig. 16 The edges of the parts get exactly bent



Fig. 17 All parts fit exactly



Fig. 18. The LAZOLA 3 is rugged and durable...



Fig. 19 ...and looks very smart.