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Box Type Solar Cooker Components

Role in improving performance for society acceptance

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Box Cooker Consists of inside box and outside box in between the box thermal insulation. By reducing surface area inner box, the temperature inside box increases. The inner box is of shape compound paraboloid cross section in square (two parabolas focal axis is perpendicular). This shape useful in reflect/deflect sun ray/radiations and surface heating of cooking vessel in addition to top lid heating. This shape useful in receiving vertical rays of sun noon period. Approximate curved reflector made from half pyramid (two sides of pyramid) tied to outer box with flexible rope to with stand wind load and for tilt adjustment also. It covers 2 sides of box and reflects sun light in to box cooker through top cover glasses in inclined portion of sun light. Reflector used is mirror segments. 14nos. mirror segments reflections are overlaps and higher temperatures generates to boil/frying/drying food. This reflector tracks sun. Only at noon to be rotated to once in a day for tracking. This ensures improved performance of cooker and acceptance solar cooking in society increases.

Keywords: Compound parabolic trough, approximated curved of pyramid reflector, increased society acceptance.

Photo: Box type solar cooker assembly with 13 segments reflector picture after completion of boiling water droplets formed.

Photo: Sun rays falling on concrete beam 2 sides and top of the beam

Box Cooker Consists of inside box and outside box in between the box thermal insulation. By reducing surface area inner box, the temperature inside box increases.
Q (directly proportional) = A(area)*t(thickness)*T (Temperature difference)
Without changing thickness by reducing surface area temperature difference will increase.
Consider the surface area of square box (b is side length box) top open is = 5 square b
Paraboloid cross section is circle. By converting circles into squares shape (converting circles into squares it is 2 parabolas focal axis perpendicular to each other) the compound parabola shape is having 4 sides and bottom side (keeping bottom above zero ordinates). Comparing parabola focus “a” topside of compound parabola is (at focal point) = 4a
Parabola at a/4 height width is = 2a
Trough height at above a/4 to a = 3/4a
Surface area of this Compound parabola = bottom area+4 sides area
Bottom area = 4a (square).
Side area (considering approximate trapezium of trough segment) trapezium inclined height =5/4b=square root of sum (9/16a square + a square)
Area trapezium (one segment) = 1/2(4a+2a) *5/4a = square ab 15/4
Total 4 segments area = 4(square ab 15/4) = 15 square a
Total area of trough as considered trapezium = 19 square a
As it is considered straight for curved portion it is slightly higher.
Considering box surface area = side 4 sides surfaces area+ bottom area
Height 3/4a square side 4a
area of side=3/4a*4a = 3 square a
4 sides area = 12square a
Bottom area = 16square a

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Total surface area = 12square a + 16square a = 28square a

Comparing the areas square box area is more by 9square a.

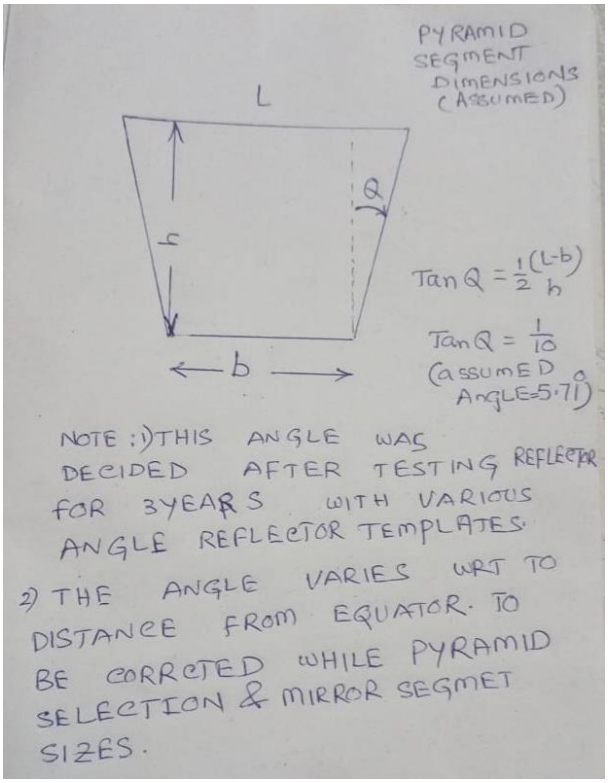
In this way reducing the surface area temperature difference increases.

Second point:

In parabolic surface incident rays reflect/deflect towards center by placing vessel of cylindrical type bottom closed. Cylindrical vessel surface heating is possible. Due to this solar cooking time reduces.

In this 9 aluminium sheet pieces are revitted (***photo 9 segment reflector template***).

2 segment reflector templates: (pyramid two sides) Two identical trapezium segments assembly. Top square side l & bottom square side b height of trapezium h.
Tan "Q" ={1/2(l-b)}h is the angle for selecting angle. (In graph l/18 is equal to one unit for top segment width. And Bottom segment b/18 is one unit as shown in graph)



2 segment reflector templates: (pyramid two sides) Two identical trapezium segments assembly. Top square side l & bottom square side b height of trapezium h.
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Below photo in graph for segments arrangement

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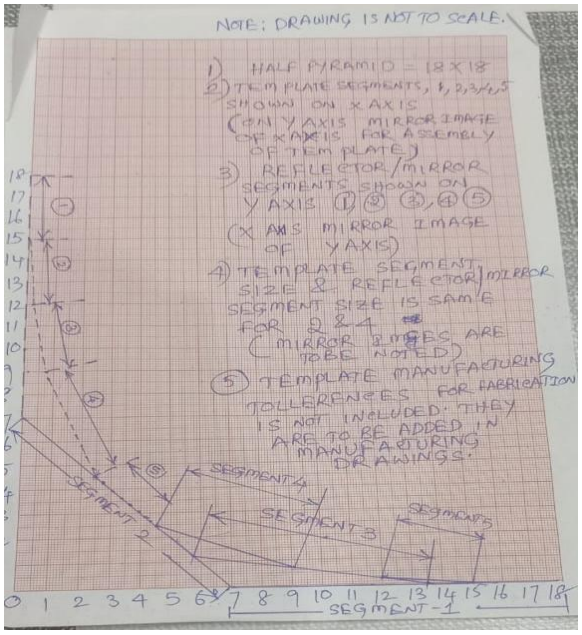

The above photograph/drawing is not to scale.

3 segment Reflector templates: The central piece (2) wrt to *graph* (photo) shown revitted with (on X axis) Segment 1 right hand side and same piece of its mirror image is (*segment - 1 on Y axis*) is revitted on left hand side. This is 3 segment assembly. By fixing mirror or reflectective material it is becoming 3 segment reflectors.

5 segment reflector templates: For Three segment reflector template segment 3 (*as shown in graph X axis*) revitted on right hand side with segment 2 & segment 1 and its mirror image (*segment on Y axis*) left side revitted to segment 1 (*mirror image of segment 1*) & segment 2. This is 5 segment reflector assembly. By fixing mirrors it is 5 segment reflectors.

Photo: 9 segment reflector templates

9 segment reflector templates: Segment 3(*shown in graph X axis*) revitted to segment 4(shown in graph X axis) on left side. Right side of segment 3 revitted to segment 5 (shown in graph X axis). This is right hand side assembly of segment 3, segment 4 & segment 5.
In the same way mirror image assembly (*y axis of graph*) of segment 3 right side segment 4 revitted. And segment 5 assembled/revitted to left side of segment 3 In the same way mirror image of assembly of segment 3, segment 4 and segment 5 revitted.
Segment 3, Segment 4 & segment 5 assembly segment 3 left side is revitted to segment 2 & segment 3 right side is revitted to segment 1. After this segment 4 second side revitted to segment 2. After this segment 5 second side is revitted to segment 1
In The same way mirror image (*y axis*) left side assembly is revitted. Segment3, Segment 4 & segment 5 mirror assembly segment 3 right side revitted to segment 2 and segment 4 second side to segment 2. Segment 3 left side revitted to Segment 1 and segment 5 second side revitted to segment 1.
In this way 9 segment reflector template shown in photo (9 segment reflector template) is fabricated. From 9 segment reflector reflection pattern changed and over lapping of reflections increased.
By adjusting mirror segments sizes 13 mirror or 14 mirrors as shown in photos using 9 segment templates.

Photo: 13 segment reflector reflection patterns as shown in above picture at 09:30 am on 17th January 2025.

Photo: 13 segment reflector reflection patterns as shown in above picture at 12:00 pm noon on 17th January 2025.

Photo: 14 segment reflector photos.

Photo: 14 segment reflector reflection pattern photos

If we observe the reflection patterns of 13 mirrors and 14 mirrors the bending slightly more increased overlapping in 14 segments of light rays can be observed. By increasing to 15 mirror segments the overlapping reduced drastically.

As the segments number increases reflection pattern varies and reflection overlapping reduces and shape becomes nearer to curve. To avoid this maximum segment are limited upto 14 as shown in fig

Photo: In above photo reflector mounted on aluminium angles (photo) the reflections of mirrors are transferred into trough photo through transparent glasses for reference sake.

Note: The selected pyramid bottom side = trough top square side+2(insulation thickness) = outer box side. The bottom side of pyramid is more than this dimension. Height is to adjusted as mentioned above.

Compound Parabolic trough - from surface characteristics wrt light/radiation reflection from optics, engineering development & and heat transfer:

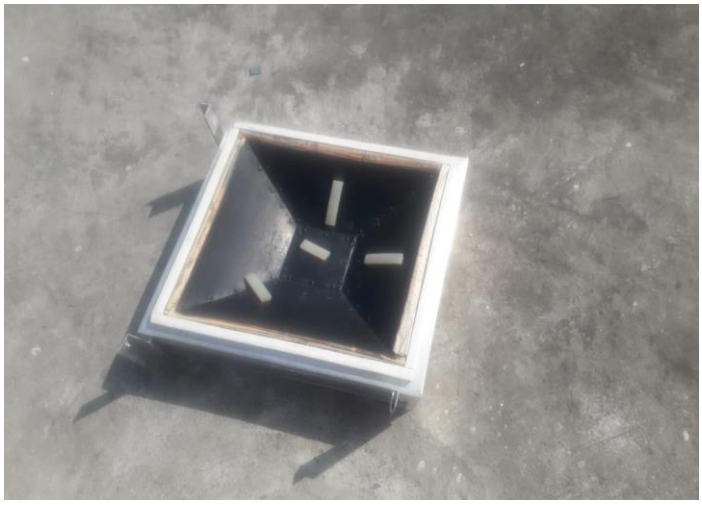

Photo: Compound parabolic trough kept in insulated box

Optics point of view of parabola: Parabola is an open curve. When parallel light beam falls on parabolic surface all the rays are get focused at focal point. Curvature below focal point rays

reflected upwards towards focus. Rays falling on curvature above focal point are reflected downward.

The curve follows formula “Square Y=4aX” (a = focal height of parabola)

Mathematics & Engineering development: Paraboloid is circle in cross section. By replacing circles into squares compound parabolic trough forms. In this shape it is having 4 sides and one bottom side total 5 sides only. (Above zero ordinate level is considered). The 4 sides are parabolic curved in nature. Bottom side is square and flat in nature. In parabolic curved surface when light rays fall it reflects/deflects to focus of parabola. Photo of compound parabolic trough for reference in previous mail.

Parabolic curve length considered for experiment for development: Above zero ordinates and above focal point. The height of parabola is more than the vessel height. Present experiment parabolic curve considered parabola curve ordinates as: X=a/9 (a = focal length) & Y= 2a/3 (+/-) at bottom of curve.

X=1.21 a & Y=2.2a (+/-) ordinates at top of selected curve

Considered compound parabola Bottom square side= 4a/3 & top square side= 4.4a

The curvature/parabolic are length is calculated from mathematical formula for above mentioned co-ordinates. Parabolic curve of above said coordinates.

Development of parabolic segment:

For example, parabolic Curve considered point p (X, Y) and point pn (Xn, Yn). In between intermediate points = p1(x1, y1), p2(x2, y2), p3 (x3, y3), p4(x4, y4) etc upto pn (Xn, Yn) above considered segment can be prepared. Keep difference between (y1-y2), (y3-y2), etc upto [Yn-(Yn-1)] same.

Calculate the distance between 2 points based on formula = Square root (square of difference x ordinates + square of difference y ordinates)

Distance between p&p1 = square root [square(x1-x) + square(y1-y)]. This way distance between p1&p2. p2 above mentioned points are length calculated. Square root [square(x2-x1) + square(y2-y1)]

Bottom square side = 2y Above this (x1, y1) p1 square side 2(y1). The distance between is square sides y & square side y1 = square root [square(x1-x) + square(y1-y)]. The distance between is square sides y 1 & square side y2 = square root [square(x2-x1) + square(y2-y1)]. In the same way up to pn is drawn and square side end points are connected with straight line. Slight curvature is observed.

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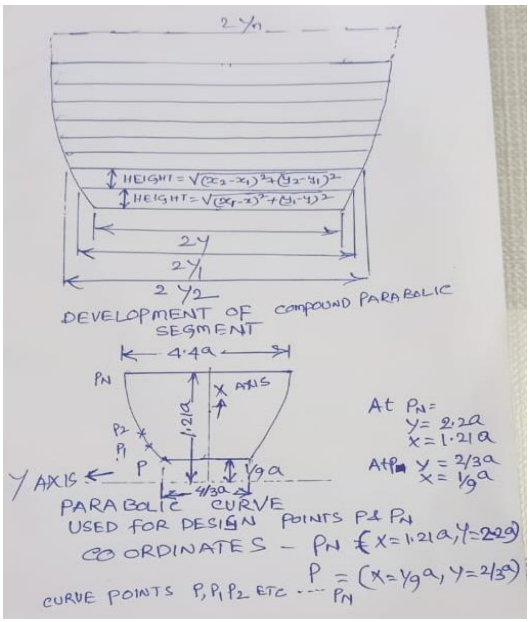

Photo: Development of parabolic trough segment above one & bottom
Parabolic curve coordinates actually used for experiment

4nos. of curved segments assembled and bottom is closed. This is compound parabolic shape. Cylindrical Vessel considered radius = r and Vessel diameter (more than the 2a/3) to create air gap between bottom of trough and vessel bottom. Consider vessel height is equal to a/2

<u>The vessel rests on compound parabolic trough. Contact with cooking vessel and trough is point contact only</u>

Height of vessel is less than difference of X ordinates = (1.21-1/9) a = 1.099a to have sufficient clearance with lid of vessel and top cover glass. Parabola focal point considered should match with local available Vessel height.

Incident Direct beam falling on compound parabolic trough vessel top area (lid area) = 22/7 (square r) = 22/7 (square a/2) = 22/28 square a

& Top square area of compound parabolic trough (direct incident light area) = 19.36a

Considering “w” watts is insolation per square meter in a location.

The incident radiation falling on compound parabolic trough = 19.36w (watts)

The incident radiation on vessel lid = w (square a) 22/28(watts)

Radiation falling on 4 parabolic trough segments excluding cooking vessel lid = w [(19.36- (22/28)] square a = 18.58 w*square a (watts)

Since trough segments are parabolic curve in nature, the emitted radiation by black coated compound parabolic trough surface reflect thermal radiation 18.58w (watts) energy on periphery of cooking vessel maximum and some radiation on cooking vessel lid.

In inclined portion of sun, the sun rays fall through reflector reflected/transferred into compound parabolic trough inspite of direct reception of sun rays. For vertical sunrays reflector is less

effective trough profile is effective for capturing sun rays. In both cases radiation exchange between trough segment and vessel is more. IN solar radiation 0 to 0.38 microns wavelength 7% and 0.38 to 0.78 microns 47% and 0.78 to 4.0 microns 45% approximately. Aabsorbtance and emittence of radiation for particular wave length of are equal. Sun ray's maximum % wave lengths ranges of less than 2.5 microns. Highest absorption and highest emission for all wave lengths of light for ideal black body. Emission increase with temperature. The re-emitted light progressively shorter wave length and greater energy as temperature of black body increases.

As vessel is kept on *compound parabolic trough bottom side square side length is less than cooking vessel diameter. In this selected trough the cooking vessel cylindrical shape is positioned. This trough shape gives support to cooking vessel. The contact between cooking vessel and trough is point contact only.*

Black Body: "Black body concept is an idealization as perfect black body does not exist in nature. However, graphite and lamp black with emission greater than 0.95 are good approximations to black material." A closed box with walls of graphite at constant temperature with small hole on one side produces a good approximation to ideal black body radiation emanating from opening. All normal matter absorbs electromagnetic radiation to some degree. An object that absorbs all radiation falling on it at all wave lengths is called black body. Due to the above it was mentioned in write up sun rays/radiation.

Heat Transfer: When vessel is kept in trough the vessel shade forms and temperature differences create at sides, and top – bottom of cooking vessel. For trough sun exposed area temperature is higher compared to sun not exposed area. Through reflector additional light is transmitted through cover glass on to parabolic surface of trough. (The selected pyramid angle 84 degrees of reflector). Reflected light beam passes through cover glasses it is shown in photo. Above critical angle of light total internal reflections and scattered reflection of radiation occur and maximum light energy absorbed for conversion into thermal energy. For nonselective coating solar flux absorbed is equal to thermal flux generated. As trough surface is curved in nature thermal flux generated and reflected/diverted on to cooking vessel periphery/surface from heated through. Heating starts radiation equilibrium balancing occurring between trough and periphery of cooking vessel. In this way vessel periphery heat transfer due to radiation emitted by trough occurs. Top of vessel lid absorbs light. sides and top of vessel heating are more. In spite due to convection heating is done due to inside air circulation also. The trough bottom face (bottom square of trough) by virtue of thermal conductivity of trough material temperature raises at bottom but less in comparison to top. The radiation release from trough at bottom is less compared trough periphery. Due to gap between vessel bottom and trough bottom heat transfer through convection by air circulation occurs.

It can be concluded that conduction of heat between cooking vessel and trough is negligible. Maximum heat transfer through radiation and some extent by convection in this type design. Higher light absorption increases more temperature raise in this design. All wave length radiation absorption and utilization sun light are more in this design

More over due to sun movement to west at noon one-time tracking is sufficient.

Comparison with Single mirror box type cooker -:

1) Box cooker inside box size is equal to compound parabolic trough top side dimensions as mentioned above. The surface area of trough is less than is less than box surface area. Due to this temperature raise is more.
2) The reflector covers 2 sides of box in this model and in curved form. Due to this tracking of cooker eliminated drastically as the reflector tracks the sun in comparison other type solar cookers.
3) Boiling time reduces because sun rays input to box is continuous in comparison to single reflector of same area.
4) Reflector segments reflections overlaps and high intensity sun light forms and heat input is more in comparison to single mirror type one.
The equipment with 5 segment reflectors was tested at University Pune India for performance During year 2016.
As the segments has increased to 13 the reflections overlapping temperature raise is more. With reference 5 segment reflector 30 minutes time reduced at Visakhapatnam geographical area. This was not tested for F1 & F2 coefficients (because the performance is more effective than 5 segments)

Note: The following assumptions are considered for selecting pyramid sizes.

The tilt adjusted partly through pyramid angle and further adjustment is done by placing packing or by permanent lever mechanism whichever is possible. The reflector template is tied to insulating box through flexible rope/plastic wires to with stand wind loads and collision due to birds and pet animals etc.
The pyramid bottom square side dimension is more than the insulating box side dimension. It is more than 50 mm and less than 100 mm. The area of half pyramid area considered is 0.6-meter square for half kilo food material boiling/frying.
Height of pyramid calculation is as follows:
height = [{(Top side-bottom side)2}10] (as per selected angle of pyramid)
The above design was tested for 1kg boiling and frying. Time of boiling/frying is remaining same for normal sun light.
The above extract was selected for the 6th international conference CONSOLFOOD 2025/ Advances in solar thermal food processing to be held on dates of May 5th to 7th 2025 held at Marseille France. "Sixth International Conference CONSOLFOOD2025. *Advances in Solar Thermal Food Processing* 5-7 May 2025 MARSEILLE-FRANCE".

REF: New Design of Box type Solar Cooker author Kota Anjaneya Sarma

Design Considerations & heat calculation
Reflector template Pyramid side considered is = 72.0 cm topside and bottom side 61.8 cm height 51.0 cm.
Area of one side = (72+61.8) 51/2 = 3411.9cm square
For 2 sides area = 6823.8 square cm = 0.6823square meter
Incident sun light on reflector is considered = 0.6 (0.6823) = 0.4094 square meter (as sun light falls on 2 sides). It is assumed on an average one side full and other side 10% in inclined zone sun

light with rotary part of light this is considered. This by observation of sun light rotation on concrete beam physically.

Parabolic trough Focal height 10 cm for calculation purpose bottom square side =14 cm and top square side 42 cm. The length calculated of parabolic trough segment = 17.3cm. Area of segment by considering as trapezium bottom side = 14cm. and top side = 42cm. height = 17.3cm. height of trough = 9.8 cm. for parabolic trough incident area per one segment = (14+42) 17.3/2 = 484.4 square cm. total area of 4 segments = 1937.6 = .1936 square meter as bottom is not exposed to sun and bottom plate area not considered.

Considering full solar radiation 1000watts/square meter or 860Kcal/hr. square meter total heat available = 1000(.1937+0.6823) = 876.06watts or (0.1937+0.6823)860 = 753.36 Kcals/hr.

This an ideal heat in put in day at solar constant 1000watts. While manufacturing and fixing mirrors 5% area is reduced keeping manufacturing tolerances. So, heat input = 0.95(870.6) = 830watts or 15.6Kcals/hr. in normal conditions. Net sun light energy available = (9753.36 - 15.6) = 967.66Kcal/hr.

Practically top cover losses and bottom covers losses are to be considered. This is varying wrt to location. In put heat reduces further reduces.

(In this heat available after considering over all heat = 3.504 watt/degree Celsius for unglazed solar water heater thermal losses calculation. The heat absorbed bottom cover glass is more and it becomes very hot and top one is less. This loss is also accountable. This experiment was carried at residence).

The compound parabolic surface acceptance angle is 141.419 degrees without placing cooking vessel.

The cooking vessel selected standard pressure 12 lts cooker smaller vessel dia = 200mm and height 50mm.

As these losses are un controllable and inevitable and varies with location. To know in put heat reverse calculation method is used. Time taken for boiling 500 grams food material = 90 minutes. Consider food material = rice. Water added = 1kg. ambient temperature = 30 degrees

Temperature difference = 70 specific heat of water = 1. Effective heat taken/used = mass*specific heat*temperature difference = 70Kcals. For rice specific heat = 0.186Kcal/kg, heat gained through mass = 1/2(0.186) x 70 = 6.515xKcals

Total heat gained = 76.515Kacls in 90 minutes.

The temperature raise will reduce cooking period.

The Pune university test in 2016 January is enclosed for your ready reference. During this period number of segments 5 only.

1) The Stagnation temperature = 103Degcelcius
2) Figure of merit F1 = 0.1034
3) Figure of merit F2 = 0.5886
4) The time of boiling calculated minutes = 138.8
5) Reflectivity of mirrors = 76%

After this the segments have been increased with same template area. But this was not tested at labs as this is upgraded model and increased reflections leads to higher stagnation temperature and reduction of boiling time.

The same model exhibited for design demonstration during solar cooking demonstration for 6th Solar Cookers International. A copy of their invitation is enclosed.

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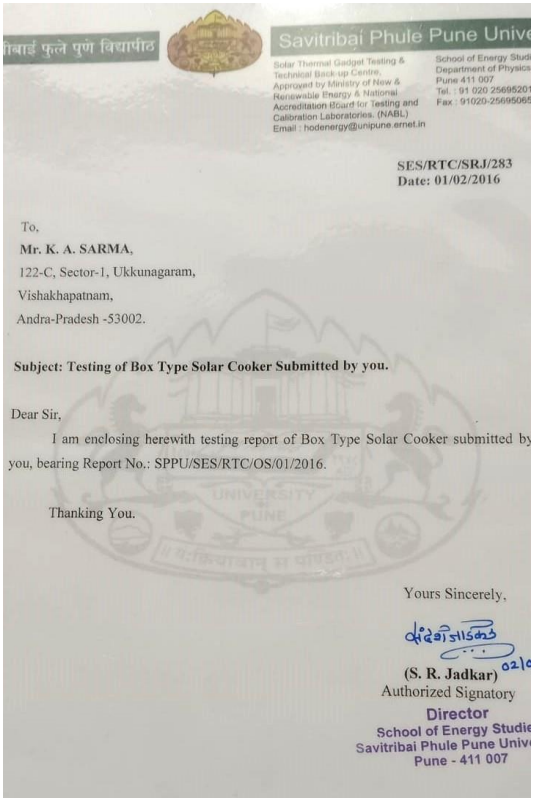


सावित्रीबाई फुले पुणे विद्यापीठ

Savitribai Phule Pune Univ

Solar Thermal Gadget Testing & Technical Back-up Centre, Approved by Ministry of New & Renewable Energy & National Accreditation Board for Testing and Calibration Laboratories. (NABL)
Email : hodenergy@unipune.ernet.in

School of Energy Studi
Department of Physics
Pune 411 007
Tel. : 91 020 25695201
Fax : 91020-25695065

SES/RTC/SRJ/283
Date: 01/02/2016

To,
Mr. K. A. SARMA,
122-C, Sector-1, Ukkunagaram,
Vishakhapatnam,
Andra-Pradesh -53002.

Subject: Testing of Box Type Solar Cooker Submitted by you.

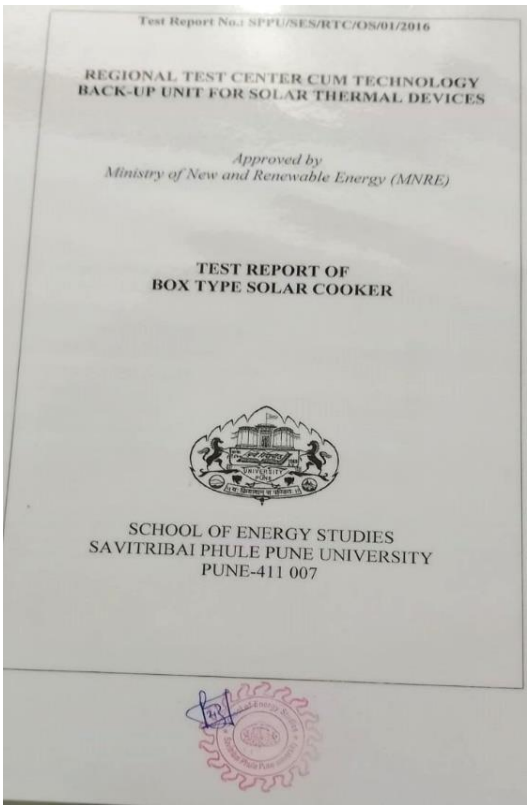
Dear Sir,

I am enclosing herewith testing report of Box Type Solar Cooker submitted by you, bearing Report No.: SPPU/SES/RTC/OS/01/2016.

Thanking You.

Yours Sincerely,

(S. R. Jadkar)
Authorized Signatory
Director
School of Energy Studie
Savitribai Phule Pune Univ
Pune - 411 007



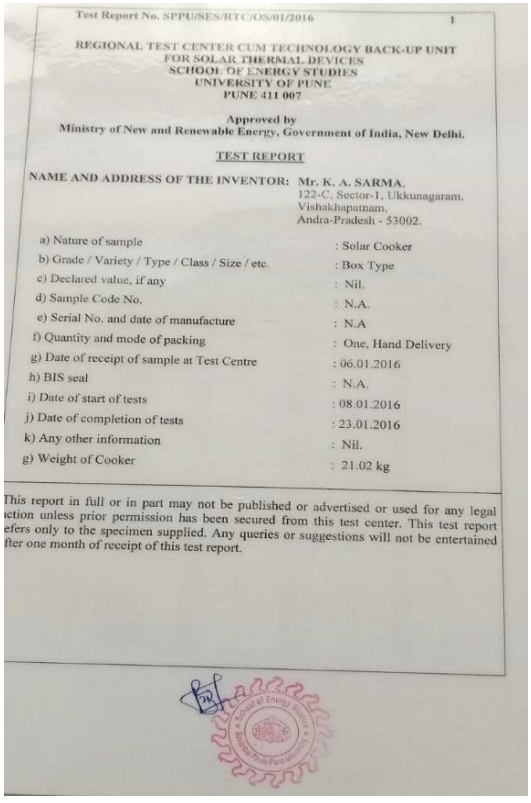
Test Report No.: SPPU/SES/RTC/OS/01/2016

REGIONAL TEST CENTER CUM TECHNOLOGY BACK-UP UNIT FOR SOLAR THERMAL DEVICES

Approved by
Ministry of New and Renewable Energy (MNRE)

TEST REPORT OF
BOX TYPE SOLAR COOKER

SCHOOL OF ENERGY STUDIES
SAVITRIBAI PHULE PUNE UNIVERSITY
PUNE-411 007



Test Report No. SPPU/SES/RTC/OS/01/2016 1

REGIONAL TEST CENTER CUM TECHNOLOGY BACK-UP UNIT
FOR SOLAR THERMAL DEVICES
SCHOOL OF ENERGY STUDIES
UNIVERSITY OF PUNE
PUNE 411 007

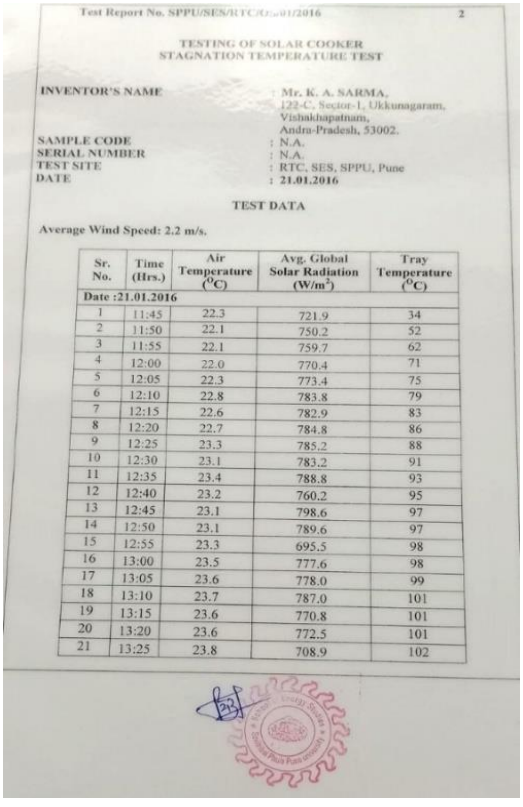
Approved by
Ministry of New and Renewable Energy, Government of India, New Delhi.

TEST REPORT

NAME AND ADDRESS OF THE INVENTOR: Mr. K. A. SARMA,
122-C, Sector-1, Ukkunagaram,
Vishakhapatnam,
Andra-Pradesh - 53002.

a) Nature of sample	: Solar Cooker
b) Grade / Variety / Type / Class / Size / etc.	: Box Type
c) Declared value, if any	: Nil.
d) Sample Code No.	: N.A.
e) Serial No. and date of manufacture	: N.A
f) Quantity and mode of packing	: One, Hand Delivery
g) Date of receipt of sample at Test Centre	: 06.01.2016
h) BIS seal	: N.A.
i) Date of start of tests	: 08.01.2016
j) Date of completion of tests	: 23.01.2016
k) Any other information	: Nil.
g) Weight of Cooker	: 21.02 kg

This report in full or in part may not be published or advertised or used for any legal action unless prior permission has been secured from this test center. This test report refers only to the specimen supplied. Any queries or suggestions will not be entertained after one month of receipt of this test report.



Test Report No. SPPU/SES/RTC/OS/01/2016 2

TESTING OF SOLAR COOKER
STAGNATION TEMPERATURE TEST

INVENTOR'S NAME	: Mr. K. A. SARMA, 122-C, Sector-1, Ukkunagaram, Vishakhapatnam, Andra-Pradesh, 53002.
SAMPLE CODE	: N.A.
SERIAL NUMBER	: N.A.
TEST SITE	: RTC, SES, SPPU, Pune
DATE	: 21.01.2016

TEST DATA

Average Wind Speed: 2.2 m/s.

Sr. No.	Time (Hrs.)	Air Temperature (^{0}C)	Avg. Global Solar Radiation (W/m^2)	Tray Temperature (^{0}C)
Date :21.01.2016				
1	11:45	22.3	721.9	34
2	11:50	22.1	750.2	52
3	11:55	22.1	759.7	62
4	12:00	22.0	770.4	71
5	12:05	22.3	773.4	75
6	12:10	22.8	783.8	79
7	12:15	22.6	782.9	83
8	12:20	22.7	784.8	86
9	12:25	23.3	785.2	88
10	12:30	23.1	783.2	91
11	12:35	23.4	788.8	93
12	12:40	23.2	760.2	95
13	12:45	23.1	798.6	97
14	12:50	23.1	789.6	97
15	12:55	23.3	695.5	98
16	13:00	23.5	777.6	98
17	13:05	23.6	778.0	99
18	13:10	23.7	787.0	101
19	13:15	23.6	770.8	101
20	13:20	23.6	772.5	101
21	13:25	23.8	708.9	102

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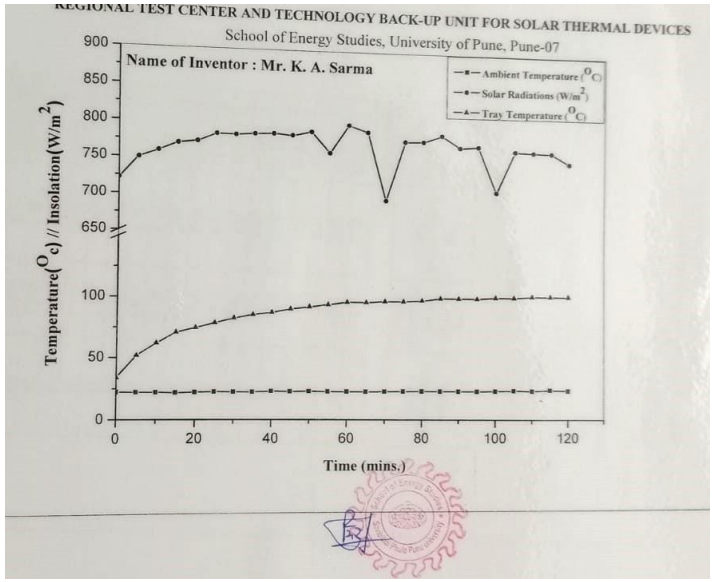
22	13:30	24.3	766.7	102
23	13:35	24.0	765.7	103
24	13:40	24.8	764.9	103
25	13:45	24.4	750.7	103

First Figure of Merit (F_1) : 0.1034

REGIONAL TEST CENTER AND TECHNOLOGY BACK-UP UNIT FOR SOLAR THERMAL DEVICES
School of Energy Studies, University of Pune, Pune-07



TESTING OF SOLAR COOKER
LOAD TEST: SENSIBLE HEATING OF WATER

INVENTOR'S NAME : Mr. K. A. SARMA, 122-C, Sector-1, Ukkunagaram, Vishakhapatnam, Andra-Pradesh - 53002.
SAMPLE CODE : N.A.
SERIAL NUMBER : N.A.
TEST SITE : RTC, SES, SPPU, PUNE – 411 0
DATE : 23.01.2016

TEST DATA

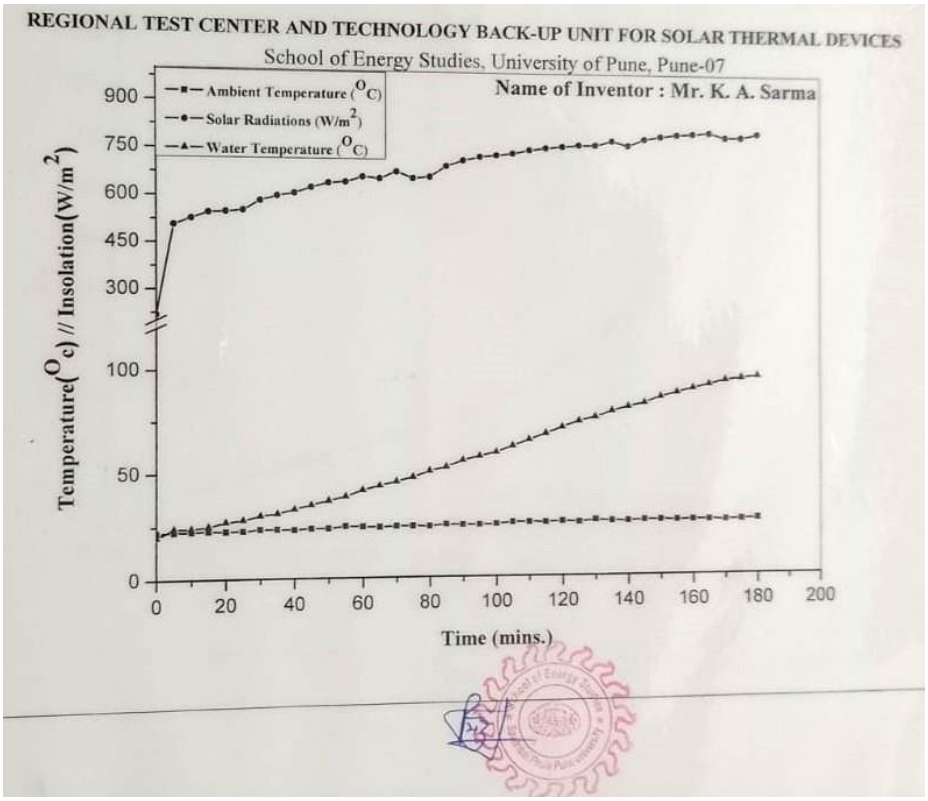
Average Wind Speed: 2.4 m/s.

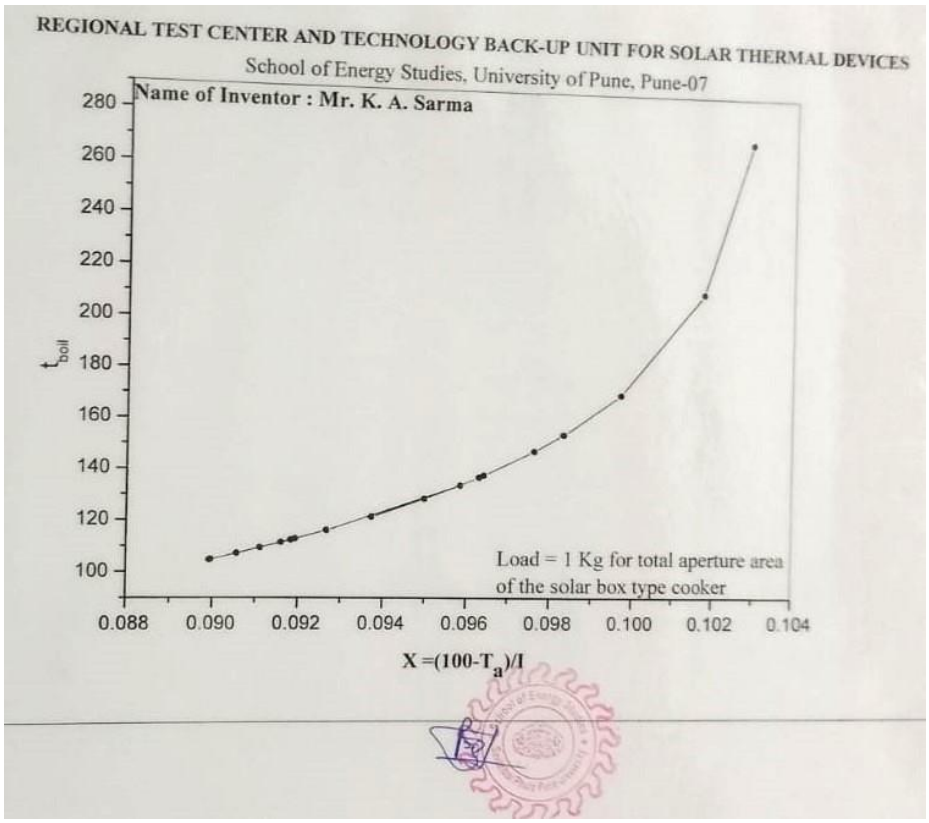
Sr. No.	Time (Hrs.)	Air Temperature (°C)	Avg. Global Solar Radiation (W/m²)	Water Temperature (°C)
Date:23.01.2016				
1	10:00	22.2	218.7	20
2	10:05	22.3	506.9	24
3	10:10	22.6	527.2	24
4	10:15	22.7	545.7	25
5	10:20	22.6	548.3	27
6	10:25	22.7	553.3	28
7	10:30	23.4	584.0	30
8	10:35	23.4	600.4	31
9	10:40	23.2	609.6	33
10	10:45	23.7	627.5	35
11	10:50	23.7	641.9	37
12	10:55	24.7	645.7	39
13	11:00	24.4	662.7	42
14	11:05	24.2	657.7	44
15	11:10	24.6	679.6	46
16	11:15	24.5	659.8	48
17	11:20	24.4	664.3	51
18	11:25	25.3	698.7	53
19	11:30	24.9	717.5	56
20	11:35	25.0	729.0	58
21	11:40	25.3	734.3	60

22	11:45	26.1	741.3	63
23	11:50	26.1	751.7	66
24	11:55	25.9	759.1	69
25	12:00	26.4	763.4	72
26	12:05	25.9	769.5	75
27	12:10	26.9	769.6	77
28	12:15	26.5	784.2	80
29	12:20	26.3	768.9	82
30	12:25	26.8	790.0	84
31	12:30	26.8	799.1	87
32	12:35	26.6	805.6	89
33	12:40	26.8	808.3	91
34	12:45	26.8	813.7	93
35	12:50	26.6	798.4	95
36	12:55	26.7	798.2	96
37	13:00	27.1	810.7	97

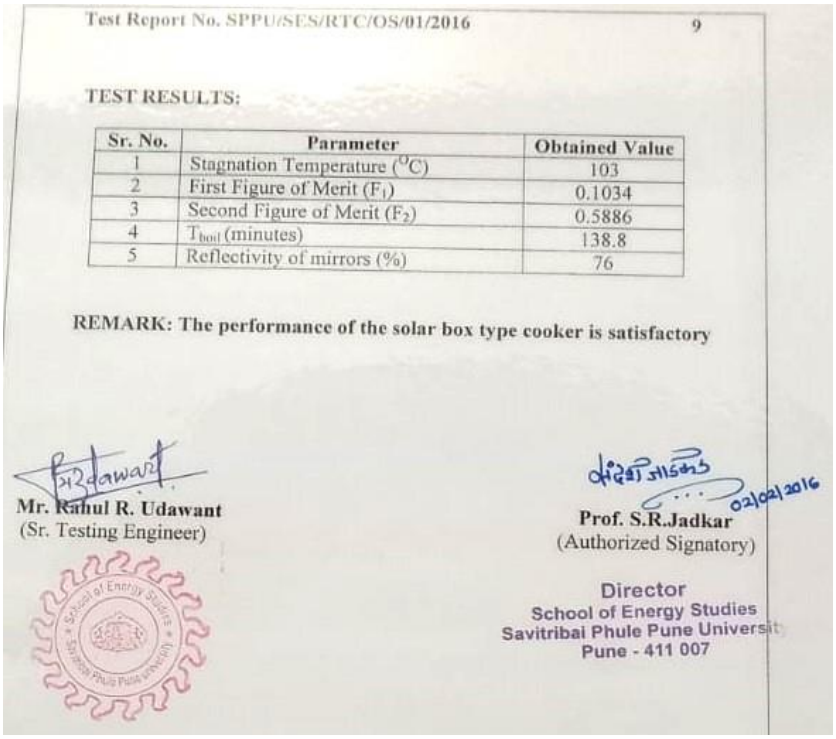
Second Figure of Merit (F_2): 0.5886

https://doi.org/10.36375/prepare_u.a419





https://doi.org/10.36375/prepare_u.a419



Test Report No. SPPU/SES/RTC/OS/01/2016 9

TEST RESULTS:

Sr. No.	Parameter	Obtained Value
1	Stagnation Temperature (^{O}C)	103
2	First Figure of Merit (F_1)	0.1034
3	Second Figure of Merit (F_2)	0.5886
4	T_{boil} (minutes)	138.8
5	Reflectivity of mirrors (%)	76

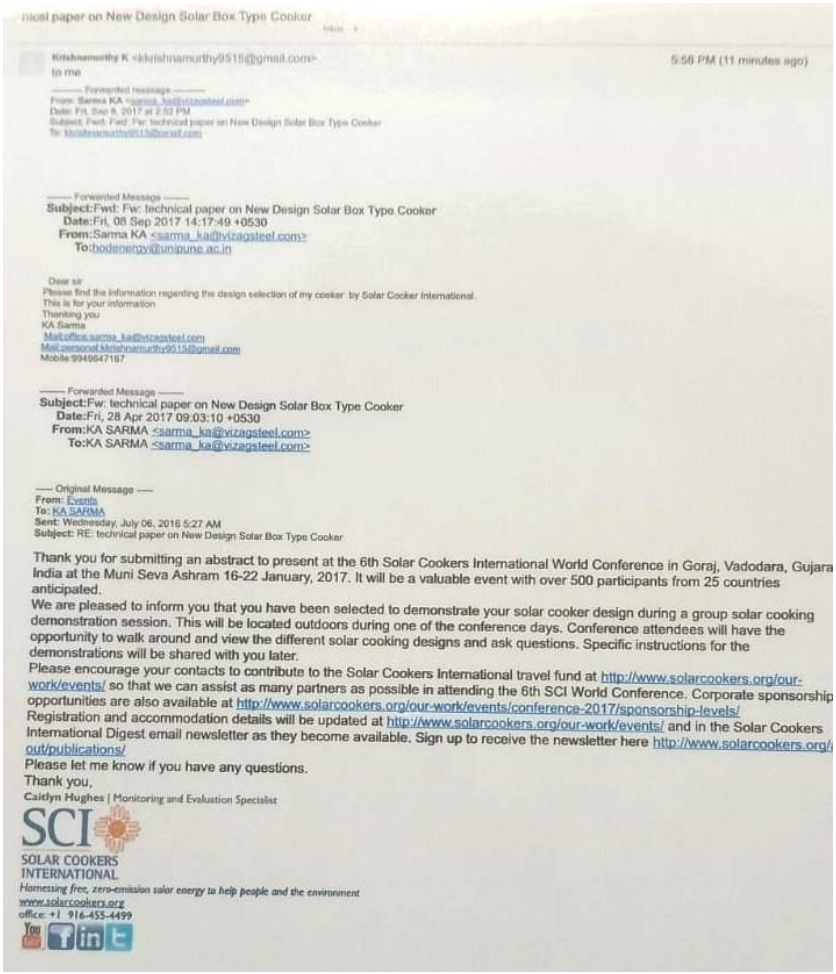
REMARK: The performance of the solar box type cooker is satisfactory

Mr. Rahul R. Udawant
(Sr. Testing Engineer)

02/02/2016

Prof. S.R.Jadkar
(Authorized Signatory)

Director
School of Energy Studies
Savitribai Phule Pune Universit
Pune - 411 007



nical paper on New Design Solar Box Type Cooker

Krishnamurthy K <kkrishnamurthy9515@gmail.com> 5:58 PM (11 minutes ago)
to me

---------- Forwarded message ----------
From: Sarma KA <sarma_ka@vizagsteel.com>
Date: Fri, Sep 8, 2017 at 2:52 PM
Subject: Fwd: Fwd: Fw: technical paper on New Design Solar Box Type Cooker
To: krishnamurthy9515@gmail.com

---------- Forwarded Message ----------
Subject: Fwd: Fw: technical paper on New Design Solar Box Type Cooker
Date: Fri, 08 Sep 2017 14:17:49 +0530
From: Sarma KA <sarma_ka@vizagsteel.com>
To:hodenergy@unipune.ac.in

Dear sir
Please find the information regarding the design selection of my cooker by Solar Cooker International.
This is for your information
Thanking you
KA Sarma
Mail:office.sarma_ka@vizagsteel.com
Mail:personal.kkrishnamurthy9515@gmail.com
Mobile:9949647167

---------- Forwarded Message ----------
Subject: Fw: technical paper on New Design Solar Box Type Cooker
Date: Fri, 28 Apr 2017 09:03:10 +0530
From:KA SARMA <sarma_ka@vizagsteel.com>
To:KA SARMA <sarma_ka@vizagsteel.com>

---- Original Message ----
From: Events
To: KA SARMA
Sent: Wednesday, July 06, 2016 5:27 AM
Subject: RE: technical paper on New Design Solar Box Type Cooker

Thank you for submitting an abstract to present at the 6th Solar Cookers International World Conference in Goraj, Vadodara, Gujara India at the Muni Seva Ashram 16-22 January, 2017. It will be a valuable event with over 500 participants from 25 countries anticipated.
We are pleased to inform you that you have been selected to demonstrate your solar cooker design during a group solar cooking demonstration session. This will be located outdoors during one of the conference days. Conference attendees will have the opportunity to walk around and view the different solar cooking designs and ask questions. Specific instructions for the demonstrations will be shared with you later.
Please encourage your contacts to contribute to the Solar Cookers International travel fund at http://www.solarcookers.org/our-work/events/ so that we can assist as many partners as possible in attending the 6th SCI World Conference. Corporate sponsorship opportunities are also available at http://www.solarcookers.org/our-work/events/conference-2017/sponsorship-levels/
Registration and accommodation details will be updated at http://www.solarcookers.org/our-work/events/ and in the Solar Cookers International Digest email newsletter as they become available. Sign up to receive the newsletter here http://www.solarcookers.org/out/publications/
Please let me know if you have any questions.
Thank you,
Caitlyn Hughes | Monitoring and Evaluation Specialist
SCI
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