EXPERIMENTAL ANALYSIS OF SUPER ALLOY (PANCHALOHA)

A major project report submitted to
Jawaharlal Nehru Technological University Hyderabad
in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

MECHANICAL ENGINEERING

Submitted By

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2021-2022

CERTIFICATE

This is to certify that the Major-Project entitled "**EXPERIMENTAL ANALYLSIS OF SUPER ALLOY (PANCHALOHA)**" is being submitted by **Mr. PARVATHAM SIVA MALLIKARJUN (18WJ1A03F3), Mr. PAYELA NARASIMHA RAO NAIDU(18WJ1A03F6), Mr. PERALA HARSHITH REDDY (18WJ1A03F8)** in partial fulfillment for the award of the **Degree of Bachelor of Technology in Mechanical Engineering to the Jawaharlal Nehru Technological University Hyderabad** is a record of bonafide work carried out by them under my guidance and supervision.

The results embodied in this Major-Project report have not been submitted to any other University or Institute for the award of any Degree or Diploma

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DECLARATION

We declare that this Major-Project report titled "**EXPERIMENTAL ANALYSIS OF SUPER ALLOY (PANCHALOHA)"** submitted in partial fulfillment for the award of the **Degree of Bachelor of Technology in Mechanical Engineering to the Jawaharlal Nehru Technological University Hyderabad** is a record of original work carried out us under the guidance of **Dr. S. NAGAKALYAN, Professor, Department of Mechanical Engineering,** and has not formed the basis for the award of any other degree or diploma, in this or any other Institution or University. In keeping with the ethical practice in reporting scientific information, due acknowledgements have been made whenever the findings of others have been cited.

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On a more personal note we thank our **BELOVED PARENTS** and **FRIENDS** for their moral support during the course of our project.

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ABSTRACT

The Panchaloha is a traditional five alloys of casted together forms panchaloha as a super alloy from the literature review above statement is defined and casted. To observe performance of super alloy panchaloha this is analyzed the microstructure, hardness and magnetic properties. The accurate composition of panchaloha will be more prominent than other variant. The panchaloha will be more prominent than other variant. The panchaloha is traditionally described as an alloy of gold, silver, copper, zinc and bronze. Also, in some cases tin or lead used instead of zinc. In some specimens of panchaloha were made up of iron with negligible percentage in composition.

The Panchaloha are applied in wearing jewellery made of such an alloy brings balance in life, self-confidence, good health, fortune, prosperity, and peace of mind. The Mechanism of Panchaloha prominence is completely involved in the die casting furnace method. The composition is laid down in the shilpa shastras, an ancient text on idol making. It is traditionally described as an alloy of gold (Au), Silver (Ag), copper (Cu), brass (sometimes bronze) and lead (Pb) or in place of gold (Au) is replaced by Iron (Fe) as the major constituent. The Panchaloha have properties according to its significance made in applications for positive attraction like era in panchaloha.

Panchaloha is a superalloy in metallurgical science. The Panchaloha is analyzed by certain experimental procedures of Metallurgical and Material Science, Materials of Solids Laboratories involved to define the macroscopic and microscopic analysis, Brinell's hardness test of Panchaloha which is made up of different composition of two specimens.

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LIST OF ABBREVATIONS & SYMBOLS

EDAX: Energy Dispersive X-Ray Analysis

SEE: School of Engineering and Electronics

μ : Permeability

BVS: Broadband Viscoelastic Spectroscopy

Au: Gold

Cu: Copper

Ag: Silver

Pb : Lead

Fe: Iron

Sn : Tin

Cu.Pb.Zn : Brass

CuSn: Bonze

Zn : Zinc

GUI: Graphical User Interface

Wt%: Weight Percentage

Bs: Saturation induction or saturation magnetization

B: Magnetic flux density

H: Magnetic Field

IJHS: International Journal of Health Sciences

IEA: International Energy Agency

IHC: Indian History Congress

JOM: Journal of Metals

UHHS: Ultra High-Strength Steels

CHAPTER 1

INTRODUCTION

1.1 Introduction

During the past decade, research reports were devoted to the development and manufacturing of several metals in the metallurgical world the Panchaloha is a Super alloy in metallurgical science.

The earliest the panchaloha were permitted for worships of idols applications in most parts eastern and southern Asia and some parts around the world. In metal age of history of 13AD the Panchaloha is invaded for the silver gives the holder resistance to cold and heat. Copper is known for its calming qualities. On the other hand, iron improves mental strength, while lead is deadly on its own, but when combined with the other four metals, it exhibits holistic capabilities.

Fig 1.0 the casting process of panchaloha idols

1.11 Definition to Panchaloha

Panchaloha (Sanskrit), also known as Pacadhtu (Sanskrit), is a word for traditional five-metal alloys of spiritual importance, which are used to make Hindu temple murti and jewellery.

A study was carried out using a modest change in the Agnikarma process. In the study, Tila thailam was applied to the afflicted area first, followed by Agnikamra with a Panchaloha shalaka. The investigation was conducted over three sittings with a five-day break between them. In compared to Agnikarma using Panchaloha shalaka alone, the study yielded better results. When compared to surgical excision, it was determined to be more cost effective. The edoema and soreness were relieved for the patient.

In Kadara, Shalaka is often utilised for Agnikarma. Initially, Kadara is excised and red hot Panchalohashalakas are placed over the excised area until Samyak dagdha lakshana is detected. Madhu& Sarpi is then applied to the affected region. In rare circumstances, Agnikarma is performed without first doing Chedanakarma.

Swamimalai Kumbakonam Bronze is the genuine article, with idols crafted of Panchaloha, which means "five metals" in Sanskrit. For home temple prayers, Pancha loha is the recommended material for spiritual / religious idols.

1.2 Appendix

The First-principles quantum mechanics simulations are very useful to analyze the panchaloha specimen positive nature in materials. With help of computational methods, it predict how much magnetic field H, Magnetic flux density B produce that predicts positive nature components vital by electricity transmission. Many simulation methods based on quantum mechanics exist; here we primarily used is advantageous because metal conductors permits the use of periodic boundary conditions to simulate while usually providing a good balance between accuracy and computational expense.

Magnetic soft iron steels are widely used as core materials in motors, transformers, and inductors. If they are placed in a region without magnetic fields, they will remain without a magnetic field; they do not have an “intrinsic” magnetization. The B-H curve is usually used to describe the magnetization properties of such materials by characterizing the permeability μ, which is defined as

$$\mu = \frac{\mathbf{B}}{\mathbf{H}},$$

Where T is the magnetic flux density in tesla (T) and A/m is the magnetic field intensity in ampère per metre (A/m).

More than 200 materials having B-H curves are included in COMSOL Metaphysics. The Nonlinear Magnetic Material Library, in particular, contains most of the commonly used nonlinear magnetic materials. To define the B-H curve in COMSOL Multiphysics, an interpolation function with a local table is commonly used. By adding the B-H Curve material characteristic to a new magnetic material, you can also plug in your own B-H curves.

A material's B-H curve can be measured in the laboratory using established standards and methodologies. When is over the saturation induction, which is referred to as the overfluxed area, it is impossible to do a direct measurement. In general, test equipment struggles to achieve such a high level of stability; for example, 1.8 T. Even if the test equipment is capable of doing so, the measured data will almost always be erroneous due to the overheating of the test frame. As a result, extrapolation methods are commonly used to get B-H curve data in the overfluxed region, such as the simultaneous exponential extrapolation (SEE) approach

The slope of the B-H curve is very important from a numerical standpoint, because It is used by the nonlinear iterative solver to evaluate the nonlinear material behavior's local linearization. In nonlinear magnetic materials, it is therefore more useful to discuss differential permeability or incremental permeability. The differential permeability can be calculated as follows

$$\mu_D = \frac{d\mathbf{B}}{d\mathbf{H}},$$

For conventional materials, is greater than 0, implying that the B-H curve is rising monotonically. After magnetic saturation, the permeability of vacuum for ferromagnetic materials decreases, as seen in the diagram below.

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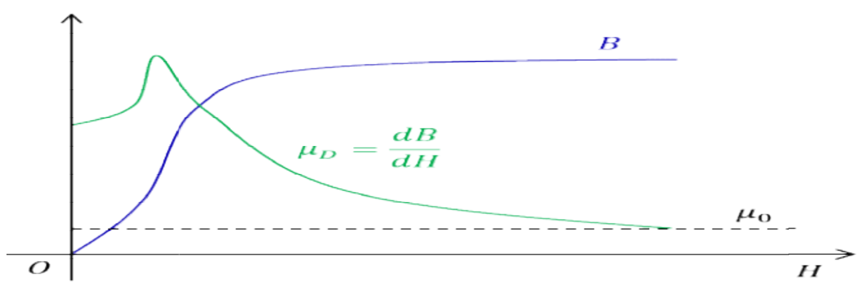

Fig 1.1 the schematic diagram of a typical B-H curve and the corresponding differential permeability as a function of magnetic field intensity.

1.21 Extrapolation of the B-H Curve Affects the Simulation

The view the B-H curve by clicking the Plot button in the Settings box of the B-H Curve interpolation function. Extrapolation can be set to Constant for better visualization. This setting, however, is not advised for the study since otherwise, the B-H curve data will have discontinuities at the start and finish points.

Let's look at the E-Core Transformer instructional model in the AC/DC Module Application Library as an example of how the settings effect the simulation. For a time-dependent research from 0 to 0.05 s, adjusting the B-H curve extrapolation to Constant takes around two minutes and putting it to Linear takes one minute.

The two simulations' convergence charts explain the results a time gap in computation Because of the discontinuities generated by the Extrapolation option, finding a solution when the magnetization reaches saturation needs substantially smaller time steps, as seen in the diagram below.

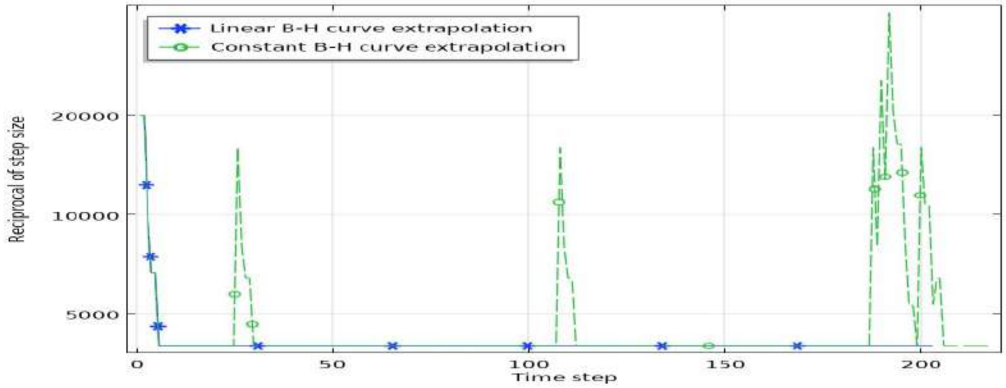

Fig 1.2 The convergence plot of the simulation with a linear and constant B-H curve extrapolation.

1.22 Smoothness of the B-H Curve Affects the Simulation

Let's look at the E-Core Transformer instructional model in the AC/DC Module Application Library as an example of how the settings effect the simulation. For a time-dependent research from 0 to 0.05 s, adjusting the B-H curve extrapolation to Constant takes around two minutes and putting it to Linear takes one minute.

The two simulations' convergence charts explain the results a time gap in computation Because of the discontinuities generated by the Extrapolation option, finding a solution when the magnetization reaches saturation needs substantially smaller time steps, as seen in the diagram below.

Aside from extrapolation difficulties, the curve derived from measured B-H data may have ripples that are generally unphysical. Numerical instabilities caused by such unphysical ripples result in prolonged calculation durations or even a lack of convergence. Consider the E-Core Transformer model once again. The model makes use of the built-in Soft Iron material, which has a smooth B-H curve. Now we'll alter the curve by changing a few data points to create three new B-H curve groupings, as illustrated below. Let's try running the time-dependent research in the model using these three B-H curves and the default settings. The convergence graphs are given in the figure below, and the simulation data are listed in the table below.

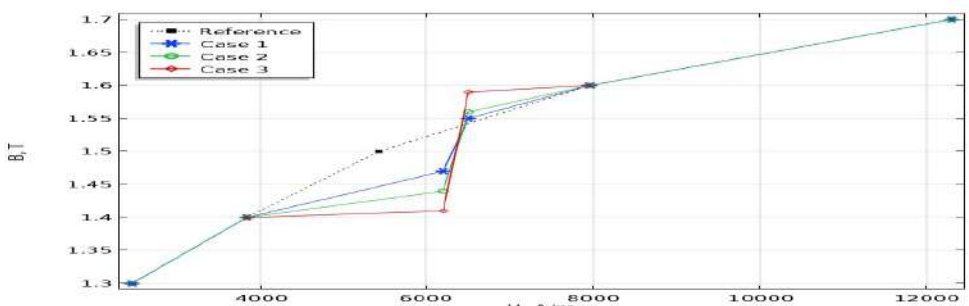

Fig 1.3 The plot of three groups of B-H curves with the reference from the built-in B-H curve. (Note that the plot only shows a part of the curve where the differences take place.)

Case	B-H Curve Data H (A/m), B (T)	Computation time
1	3841.67, 1.4 6200, 1.47 6500, 1.55 7957.75, 1.6	1minute 17 seconds
2	3841.67, 1.4 6200, 1.44 6500, 1.56 7957.75, 1.6	1 minute, 45 seconds
3	3841.67, 1.4 6200, 1.42 6500, 1.58 7957.75, 1.6	Nonlinear solver did not converge. Maximum number of Newton iterations reached. Time: 0.029466491699218753 seconds. Last time step is not converged.

Table 1.4 B-H curve data and computation times for the three cases.

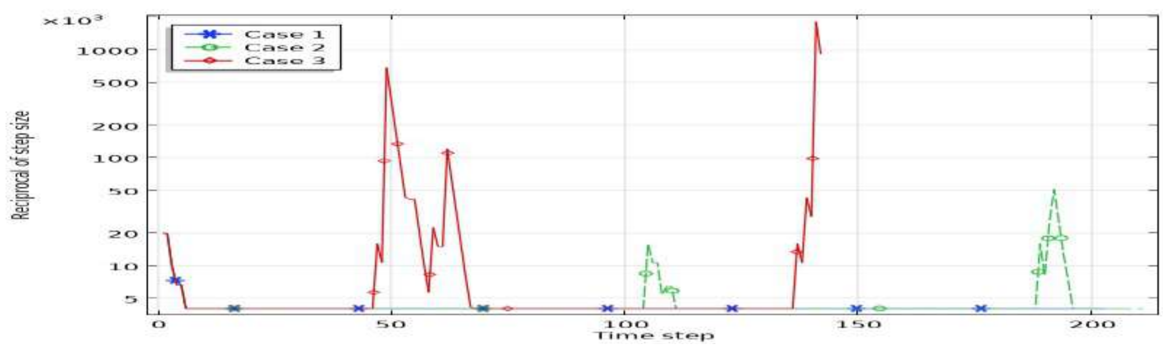

Fig 1.5 The convergence plot of the simulations for the three cases.

The smoothness of the B-H curve has a major impact on the simulation results, as shown in these graphs. The simulation goes smoothly in Case 1, where the B-H curve data differs somewhat from the reference. The simulation is still converged in Case 2, where the change in the B-H curve slope increases to some extent, but it takes a lot longer period. The simulation eventually fails to converge when the slope change rises (Case 3).

1.23 Optimize the B-H Curve

The B-H Curve Checker tool is now available in COMSOL Multiphysics® version 5.5. The B-H curve measured from experiments can be checked and optimized using this modeling tool. In the overfluxed zone, where measurements are difficult, the application can generate curve data. The programme can also reduce unphysical ripples in the B-H curve's slope, which could lead to numerical instability.

The application considers two features of the original B-H curve

1. If the extrapolation of the curve from a physical standpoint is reasonable
2. If the curve's slope is smooth,

The simultaneous exponential extrapolation approach and the linear interpolation method are the mainstays of the optimization algorithms. The programme necessitates the use of the original curve data, which is stored in a as the input, use a text file. The application will verify if the curve needs to be optimised after it has been imported. The application user can generate optimised curve data by pressing the Optimize button, which can then be exported to a text file.

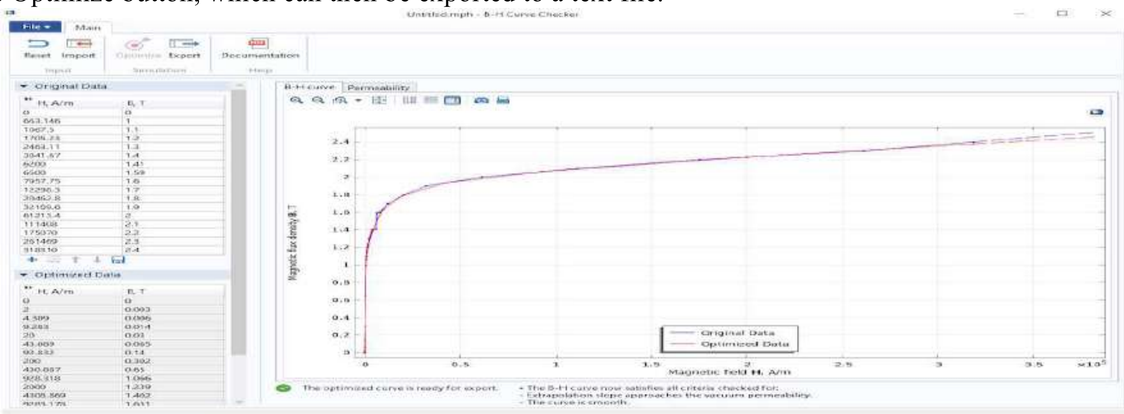

Fig.1.5 The B-H Curve Checker application, showing the original and optimized B-H curves

Fig.1.6 The B-H Curve Checker application, showing the differential relative permeability of the original and optimized B-H curves.

1.24 Optimized Nonlinear B-H Curves

The built-in materials have been subjected to the B-H Curve Checker application, with 35 of them being optimised for improved performance and stability. The following is a list of materials that have been corrected

1. AC/DC Material library for modules
2. B-H curve, Soft Iron (Without Losses), and Effective Curve B-H
3. B-H curve, Soft Iron (With Losses), and Effective Curve B-H
4. B-H curve of a nonlinear permanent magnet

Nonlinear magnetic material library

1. Silicon Steel NGO 35JN200
2. Silicon Steel NGO 35PN210
3. Silicon Steel NGO 35PN230
4. Silicon Steel NGO 35PN250
5. Silicon Steel NGO 50PN1300
6. Silicon Steel NGO 50PN600
7. Silicon Steel NGO 50PN700
8. Silicon Steel NGO 50PN800

9. Silicon Steel NGO M-22
10. Silicon Steel GO 3%
11. Silicon Steel GO 3413
12. Silicon Steel GO 3423
13. Silicon Steel GO Silectron 4 mil cross
14. Silicon Steel GO Silectron 4 mil rolling
15. Metglas Nano Finemet 50 Hz NoFieldAnnealed
16. Cobalt Steel Vacoflux 50
17. Nickel Steel 4750
18. Nickel Steel Monimax Nonoriented
19. Nickel Steel Mumetal 80% Ni
20. Nickel Steel Square 50
21. Nickel Steel Superperm 49
22. Low Carbon Steel 50H470
23. Low Carbon Steel Magnetite
24. Low Carbon Steel Soft Iron
25. Low Carbon Steel Vacofer S1 Pure Iron
26. Alloy Powder Core Hiflux 125 mu
27. Alloy Powder Core Hiflux 160mu
28. Alloy Powder Core Koolmu 125 mu
29. Alloy Powder Core Koolmu 40 mu
30. Alloy Powder Core Koolmu 75 mu
31. Alloy Powder Core Koolmu 90 mu
32. Alloy Powder Core MPP 60 mu

1.25 Frequency Study for Soft Iron Materials

The B-H curve is nonlinear in nature and can be employed in both stationary and time-dependent studies. It cannot, however, be used directly in frequency-domain research. You'll need a "cycled averaged" B-H curve that approximates a nonlinear material at the fundamental frequency to solve in the frequency domain.

1.3 History of Panchaloha

Panchalogam is a metal alloy designed by Indian metallurgists specifically for the creation of temple utsava murti, with investment casting as the primary method of production. Stock removal, on the other hand, is a method used when making idols out of stone.

The panchalogam is an alloy of five elemental metals that are each perfectly refined to the highest degree of purity required, then mixed to the correct proportions at specific temperature ranges and cooled at a specified rate to form blocks that are re-melted and poured into investment cast moulds to achieve high dimensional accuracy and surface finish. Panchalogam is also seen to have religious importance, and idols constructed of it are said to offer balance and serenity of mind to those who worship them.

Panchaloha have the option of using time-tested technology established by one of the world's first metallurgists and manufacturing engineers, or you can use marble imported from another nation with no legacy. It's worth noting that the modern-day panchalogam differs significantly from the classic panchalogam in terms of composition. The current panchalogam gets its name from the fact that it contains five metal components in its metallurgical composition.

Apart from panchalogam, there is another highly interesting and mysterious alloy called navapashanam, which is thought to have therapeutic benefits and was produced by a mystery person named boghar.

The Archaic Indian scientific texts such as Samarangana Sutradhara and Bharadwaja's Vymanika Sastra have allusions to ancient aeroplane materials and processing methods. In archaic Sanskrit, the Vymanika Sastra (Science of Aeronautics) gives specifics about unique property specific advanced materials for an ancient aeroplane. Several attempts have been attempted to decode and follow the instructions in this treatise in order to reproduce the experiments and recreate some of the property-specific materials.

CHAPTER 2

LITERATURE SURVEY

In the research paper of R. M. Pillai, S. G. K. Pilhii & A. D. Damodaran the Indian artisans and craftsmen have long been masters at extracting and shaping metals and alloys, as proven by archaeological finds from the 2nd—3rd millennia B.C. For example, two well-known artifacts, castings of the dancing girl of Mohenjo Daro and the Mother Goddess of Adichanallur, Tamilnadu, depict a high degree of metallurgical knowledge. Those castings were formed by the lost wax process, which later was modified and became known as investment casting. In various parts of India, this age-old casting process is still being practiced, without any major modifications. This paper discusses details of the process used by the Indian artisans of Swamimalai, Tamilnadu, and Mannar, Kerala, South India in shaping copper-base alloys into icons and utensils, bells, and lamps.

In the research paper of William E. Frazier Ph.D., Eui W. Lee Ph.D., Mary E. Donnellan M.S. & James J. Thompson B.S. the design requirements of the next generation of advanced aerospace vehicles and propulsion systems necessitate the development of structural materials with properties vastly superior to those which are currently achievable recognizing that each class of materials possesses its own unique set of advantages and disadvantages, the designers of tomorrow's aircraft must choose wisely from the plethora of available alloys.

In the research paper of Lee, E W; Neu, C E; Kozol, J an evaluation is made of the development status and prospective performance advantages and cost reductions obtainable through the application of state-of-the-art Al-Li alloys to naval aircraft airframes and ultrahigh strength Ni-Co alloy steels to their landing gears. Structural weight fractions are expected to be reduced by 8-10 percent through substitution of high-stiffness Panchaloha for conventional superalloys.

The Ni-Co alloy steels enhance landing gear damage tolerance and resistance to environmental degradation, without associated weight penalty, when supplanting conventional low-alloy steels. Both materials are judged ready for immediate application to existing and next-generation U.S. Navy aircraft.

In the research paper of James WF The Evolution of Technology for Light Metals over the Last 50 Years the Micro structural change caused by a short solution treatment and the corresponding change in tensile properties and impact energy of a strontium modified Al–7wt. %Si–0.3%Mg cast alloy were the panchaloha studied. It was found that a solution treatment of 10 min at 540 or 550 °C is sufficient for the α-aluminum phase to homogenize and achieve the maximum level of magnesium and silicon as predicted by the solubility and alloy composition limits. A solution treatment of 30 min causes spheroidisation, coarsening and an increase in inter-particle spacing of the eutectic silicon particles leading to a significant improvement in ductility and impact resistance. Compared with a standard 6 h solution treatment, solution treatment of 30 min at 540 or 550 °C is sufficient to achieve more than 90% of the maximum yield strength and more than 95% of the maximum UTS and the maximum average elongation to fracture. However, only 80% of the maximum impact energy can be attained by the short solution treatment. The values of the ductility and impact energy pass through a minimum between 1.5 and 10 min of solution treatment time indicating that solution treatments of less than 10 min should be avoided.

It presents a simple derivation of a simple GGA, in which all parameters (other than those in LSD) are fundamental constants. Only general features of the detailed construction underlying the Perdew-Wang 1991 (PW91) GGA are invoked. Improvements over PW91 include an accurate description of the linear response of the uniform electron gas, correct behavior under uniform scaling, and a smoother potential.

2.5 The research paper of Modern Science and Vedic Science

In the Research paper Modern Science and Vedic Science 1:1 (1987) this journal provides a forum for research on the forefront of mankind's expanding knowledge of the universe. It is devoted to exploration of the unified field of all the laws of nature through the combined approaches of modern science and ancient Vedic science, as brought to light by Maharishi Mahesh Yogi. The identification of the unified field by modern physics is only the first glimpse of a new area of investigation that underlies all disciplines of knowledge, and which can be explored not only through objective science but through a new technology of consciousness developed by Maharishi.

The unified field is now beginning to be understood through modern physics as the unified source of the entire universe, as a unified state of all laws of nature from which all force and matter fields sequentially emerge according to exact dynamical principles. As each science and each academic discipline progresses to uncover its own most basic laws and foundational principles, each is beginning to discover that the roots of these laws and principles can be traced to the unified field. The Maharishi, he said, defined an aeroplane as "a vehicle which travels through air from one country to other, from one continent to other, from one planet to other." He appealed to young scientists to attempt to make metal alloys named by the sage in his book, Vimana Samhita for plane-making.. Captain Bodas also spoke of the "jumbo" aeroplanes of ancient India. "The basic structure was of 60 by 60 feet and in some cases, over 200 feet," he said, some with "40 small engines". The ancient Indian radar system was called, rooparkanrahasya.

"In this system, the shape of the aeroplane was presented to the observer, instead of the mere blimp that is seen on modern radar systems," he said. Bharadwaj's book, Captain Bodas said, even mentioned a diet for pilots — milk of buffalo, cow and sheep. Pilots of ancient India's planes had to wear clothes made out of vegetation grown underwater, Bodas said. He declined to comment on criticism that his paper was a Hindutva ploy to bring Indian ancient textures in the ambit of science another topic at the symposium was 'science and spirituality.' The speaker, a spiritual counseller and public relations executive, said, "In the 21st century, fusion of science and spirituality will happen because of the law of inter-penetration. It is great that we are integrating the inward with the outward. Science and spirituality, said Binny Sareen, an executive at Brahmakumari Global Hospital at Mount Abu. "Should be together because if we go into the roots of it, it is for peace, for laws for governing positivity in life.

Bharadwaja's Vimana Shastra deals with advanced metallurgy, material science, machine design, mechanical engineering and rocketry. The text describes detailed procedures in the preparation of several hundreds of materials such as Alloys and Glasses which are unknown to modern science. Most of these materials can be reproduced in the laboratory even now. Some of the principles of metallurgy which are brought out in the textual description indicate an advanced development in technology and engineering. About 31 machines (yantras) are also described with their construction procedures.

Experimental investigation has been conducted for the materials part of the text. Several materials can be reproduced in the laboratory. By investigation it was found that they have special properties which are not available in any known materials of modern times. One machine "Vakra Prasarana Yantra" was reproduced as a working model and is found to be novel gear mechanism with sixteen gear wheels. In addition, "Agni Sthambana", a fire proofing spray, "Anahara" a food substitute has also been produced. Patents are also being obtained for some of these items.

In the research journal of Dongre N G Malaviya SK & Rao PR. Prakusha Stambhanabbids Lohs of Maharshi Bharadwain, S.33 (4) (1998) in Indian metal age phonology were begin with alloys of nature ambient outer core earth surface in such period assent of existing idols were discovered the super alloys of five metals such the maharishi had invaded lighten the world by metal age.

In the research journal of Prabhu CSR. High technology in Anicent Sansikrit Literature – a preliminary report on studies and investigation of Some Anicent Scientific Shaatras , Name Vign Falb, June (1999) 46-53 the investigation clearly mentioned about the panchalohas existence in nature the world superalloy family had many characteristics on Super properties preexistence in pre-medieval age of history of process of casting the panchaloha in the low wax casting method and open hearth furnace in scripted of the journal of High technology of ancient sansikrit literature.

In the research paper of selvaraj S, Ponmariappan S, others scientists of metallurgy invaded the panchaloha for the research of Corros Rev in Dezincification of Brass and its control the panchaloha's one of the constituent element found brass by dezincification they invaded the panchaloha for subisitenting the property of brass metal of corrosiveness.

In the research paper of Biswas AK, (1993) 309-327. The Zinc Metallurgy, Primacy of India in Anicent IJHS, 28(4), Brass. The panchaloha were characterized by the ferrous and non ferrous materials in the metallurgy the finite nature the ferrous materials invaded for their panchaloha used in materials for the hardening the metals of trade purpose in other aspect the non ferrous metals of panchaloha were casted for Hindu murties and idols , temple utensils, and heritages infrastructure top shields.

In the research paper outlook of TThorsen T Holt explains the finding hidden energy in membrane processes the author clearly dictates the hidden energy possessing in the nature of metallurgy by alloys of formation by super saturation temperature state of mixing of super alloy contains generally high ionization energy of super alloys means there is no contradiction of panchaloha are not positively charged, the charged superalloy is panchaloha in nature.

In the research History the Proceedings of the Indian History Congress Vol. 77(2016), pp. 83-89 (7pages) published by : Indian History Congress the history clearly mentioned about pre-existence of panchaloha in India in the Vedic period and it is not a artificial metal to concern the metals in spite of business strategy for rise of business demand of metals in India for foreign India the panchalohas were found in the many parts of the global in nations like Romania , Greek , Persia , Indonesia , China, Taiwan , Some parts Australia etc. were stated as pre-history for their nations the panchaloha were invaded as metallic – nature balance relationship in environment management in earth they found evidences as worships of idols of nature existence and some parts they used as utensils.

In the research of World Energy Outlook 2019, International Energy Agency. Paris available from IEA reports the superalloys pre-existence before the humans the metals have defective and reflective energy of the optical spectrum theory summaries the superalloy are one of specific and pre-dominant energy resources to earth which more energies of panchaloha as superalloy elements are 10X powerful effective energy than radioactive elements but there is no specifications nor researches are not found to handle the energy to be synthesized for utility of nature.

In the research paper of Wadie P, Brunner C.U.Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems: International Energy Agency, 2011. The efficiency of electric motor cooling systems by integrating the shield as the super alloy for motor optimistic performance required by synthesizing the cooling super alloys in the nature.

In the research paper of Soner Emec, Jorg Kruger, Gunther Seliger the online fault monitoring in machine tools based on energy consumption analysis and non-invasive data acquisition for improved resource-efficiency the machine tools can be strength the hardening or casting with the Superalloys in nature.

In the research paper of Bunse. K, Vodika.M, Schonsleben.P, Brulhart.M, Ernst.F.O, Integrating energy efficiency performance in production management – gap analysis between industrial needs and scientific literature: Journal of Cleaner Production, 2011 , 19, 667-679 the journal tells about the panchaloha as superalloy and existence of alloys in the
Industrials needs.

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In the research paper of S.G.K. Pillai etal,Journal of Metals, 46 (3) (1994), pp. 59–40.The journal of metals were given detailed explanation about the panchaloha as aircraft materials in ancient times and panchaloha having certain mechanical properties those were rear metals characteristics in nature that characteristics of panchaloha made a superalloy in nature.

In the research paper of Sharada Srinivasan, Journal of Metals, 50 (7) (1998), pp. 44–47, 49–50. The research paper justifies about the panchaloha having irrelevant sonority properties of metallic nature in which that alpha d particles emission sonority properties are unique compare to the other alloys mixture in nature.

In the research paper of R.M. Pillai, A.D. Damodaran, and S.G.K. Pillai,Trans. IIM (in press).The panchaloha has significant characteristics in metallic bond mixture collision atom are adhesive in nature observed in optical spectroscopy , these are inscriptions in this research paper.

In the research paper of R.M. Pillai, S.G.K. Pillai, and A.D. Damodaran, Metals, Materials and Processes, 13 (2–4) (2001) 291–300.The research paper explains about the formation of metalloids are superalloys like panchaloha were invaded in the radioactive elements deduction process of explosive metallic exposures.

In the research paper of The Engineer's India Weekly journal Edn., 3 (17 April 1994), IX.The research paper explains about the casting process involved in making of panchaloha metals in the Indian ancient history methodology involves for functioning the metals combination making as a super alloy in receptive ways followed in ancient civilization.

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In the research paper of Martha Goodway, Journal of Metals, 40 (4) (1988), pp. 62–63.The Martha goodway stated that the panchaloha having specific properties of medicine in nature such superalloy can deal in curing the diseases like asthma, spinal cord cracks, knee joint fractures process of treating with panchaloha is known as agnikrama.

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In the research paper of J.E. Hughes, Metals and Materials (May/June 1981), pp. 51–58. The research paper explains about the formation of super alloys like panchaloha were invaded in calibration of alpha grain size particles in radioscopic surgery in medical operations.

In the research paper of Metals Handbook, vol. 2, 9th ed. (Materials Park, OH: American Society of Materials, 1979), p. 418. The research paper explains about the discovery of panchaloha idols of roman Greek cultured items at time of tornado at Atlantic sea it is confirmed that mixture of superalloys is panchaloha it was in use of 1520AD.

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In the research paper of Sweta KMProfessor, Department of PG studies in Shalya Tantra, Sri Sri College of Ayurvedic Science and Research Hospital, Udayapura post, Kanakapura Road, Bangalore, India. DOI: https://doi.org/10.47070/ijapr.v8i9.1540. The inscriptions of research paper were tells about medicinal properties of panchaloha in real time applications of ayurveda process.

In the research paper of Gayathry T SPG Scholar, Department of PG studies in Shalya Tantra, Sri Sri College of Ayurvedic Science and Research Hospital, Udayapura post, Kanakapura Road, Bangalore, India. DOI: https://doi.org/10.47070/ijapr.v8i9.1570. the panchaloha having wide scope of medicine field for treating and curing of incurable diseases which cannot fulfilled by other metals.

In the research paper of the effect of Asthapada Panchaloha Shalaka Agnikarma in the pain management of Gridhrasi w.s.r. to Sciatica September 2019 DOI: 10.21760/jaims.4.4.1. According to this research paper agnikrama was initially discovered in the eight village's tales of tamilnadu different practices later on these this practice undergone one unique process of treatment by the panchaloha.

In the research paper of Daga, Harish & Raval, Sonal & Toshikhane, Hemant & Jethava, Nilesh. (2019). MATERIAL AND METHODS OF DIFFERENT HEAT THERAPY. 10.20959/wjpr20175-8675. The research undergone on panchaloha has a heat therapy for cooling the human bodies and induce the immune system growth.

In the research paper of Jadvji Trikamji (Ed.), 2015, Sushruta Samhita Sutrasthana 12/10 Page number 52. Chaukamba Orientalia Varanasi The research paper tells about key element of panchaloha when five elements significance in nature were in detail the research paper.

In the research paper of Thakaral Keval Krushn (Ed.), 2016, Sushruta Samhita Sutrasthana 12/4 Page number 120, Chaukamba Orientalia Varanasi explains about the panchaloha metal invaded in operation procedure of medicine operational tools made by panchaloha as in antiseptic in nature in the panchaloha.

In the research paper of Jadvji Trikamji (Ed.), 2011, Sushruta Samhita Sutrasthana 11/3 Page number 51. Chaukamba Orientalia Varanasi explains about the panchaloha metal can invaded as medical implants in the knee joint at ancient times in India.

In the research paper of Management of Sandhigata Vata (Cervical Spondylosis) by Agnikarma with Lauha Shalaka - An Observational Pilot.http://www.ijacare.in/index.php/ijacare/article/view/21 the metals in nature having the significant in nature in multi functionality in super alloys are prominent panchaloha having prominence of several operational procedure in making of panchaloha.

In the research paper of Shashtri Ambika dutta. 10th ed. 4. Vol. 2 the shashtri inscriptions of the panchaloha is defined a superalloy invaded temples mainly the temple idols like tirumula malaiappa swamy idols were panchaloha founded at time of 5^{th} century the idols were have very attractive in nature by their tremendous shininess.

In the research paper of Shashtri Ambika dutta. 17th ed. 3. Vol. 12. The shashtri inscriptions of the panchaloha having the mechanical properties of high hardness strength by combining the ferrous as a composite in the panchaloha have adequate strength, stiffness, low density, hardness etc.

In the research paper of Haslett C, Chilvers ER, Hunter JA, Boon NA. Davidson's principles and practice of Medicine. In: Britton R, editor. 18th ed. Toronto: Churchill Living Stone; 1999. The panchaloha were the choice of curing diseases of ayurveda process in practice of medicine.

In the research paper of Ch101. Vol. 28. Bombay: Nirnaya Sagar Press; 1941. Charaka Samhita: By Chakrapani with Ayurveda Dipika Commentary. The research paper explains about the functions of panchaloha ayurveda process as medical tools for surgical operations in ancient times of charaka samhita.

In the research paper of Shashtri Ambika dutta., editor. 17th ed. 8. Vol. 4. Varanasi: Chaukhambha Sanskrita Sansthana; 2003. Sushruta, Sushruta Samhita, Ayurveda Tatvasandipika Hindi commentary; p. 26. Shashtri paper tells about loyalty and royalty of wearing panchaloha jewelers from ancient civilization to present life style and positive nature in world of metals.

In the research paper of Shashtri Ambika dutta. 17th ed. 10. Vol. 12. Varanasi: Chaukhambha Sanskrita Sansthana; 2003. Sushruta, Sushruta Samhita, Ayurveda Tatvasandipika Hindi commentary, by Kaviraj; p. 39.

The inscription of ayurveda teaches about the process of panchaloha and its medicinal values enhancement in treating of diseases according to the ayurveda.

In the research paper of A comparative study of Agni karma with Lauha, Tamra and Panchadhatu Shalakas in Gridhrasi (Sciatica) Babita Bakhashi, S. K. Gupta, Manjusha Rajagopala. In the paper of study report explains about the process of agnikrama when panchaloha is determined as a metallic medicine for the mankind and agnikrama processes medical revolution of ancient ayurvedic processes.

CHAPTER 3

METHODOLOGY

The methodology of experimental analysis of panchaloha having the following methods in this experiment

1. Casting processing methods of making panchaloha.
2. Computational analysis method of B-H Curve chart of panchaloha.
3. Specimen's classification method for experimentation of panchaloha.
4. Brinell's Hardness Experiment method for panchaloha.
5. Microscopic analysis method for panchaloha.
6. Application methods of panchaloha.
7. Calibration methods for calibrating the Panchaloha

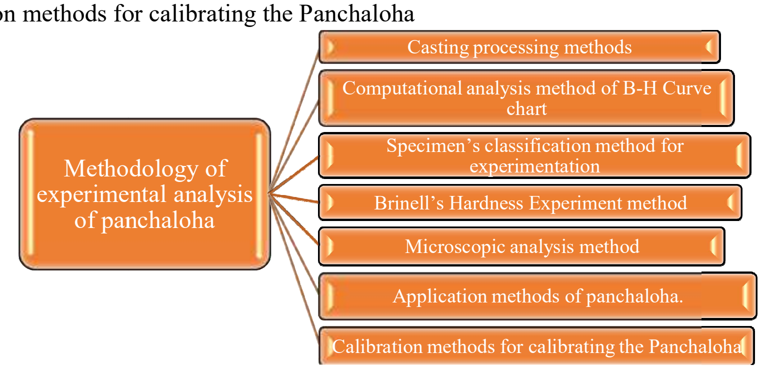


Fig 3.0 Chart of Methodology of experimental analysis of Panchaloha

3.1 Casting processing methods of making panchaloha

In the casting processing methods of making panchaloha several methods are involved in casting process for making panchaloha.

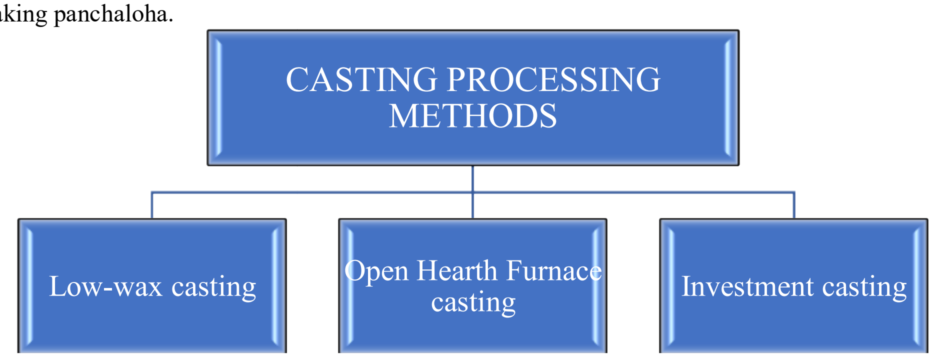


Fig 3.1 Chart of Casting Processing methods

1. Low-wax casting
2. Open Hearth Furnace casting
3. Investment casting

The Low-wax casting involves in the panchaloha process of melting initially the mould impression is taken in honey comb wax as material for preparing the mould for casting stage the replica is prepared in the form of mould piece for making molten form of panchaloha mostly the replica is unclosed by making the clay soil and moulding sand is preferred for making the idols mostly in Hindu idols for rituals.

The Open Hearth Furnace Casting process making for panchaloha utensils in the kitchenware it basically it converts scrap and liquid blast furnace iron to liquid steel using the heat of combustion of gaseous or liquid fuels cases, the fuel gas produces the high flame temperature required for melting.

The Investment casting the natural metals (or) atomized heavy metals were treated in high temperature the casting molten metal melts with two to three hours of time duration until the metal reaches its critical point of temperature in liquid state and mould cavity is in built in the casting the molten metal hardens immediately this methodology is used in joining of railway truck ends and panchaloha kitchen ware items.

In this Experiment analysis the miniature level of Open Hearth Furnace Method is invaded. In the miniature experiment the Open hearth furnace is used in customized way for casting panchaloha. The method invaded in this project is open hearth furnace casting with blower unit. Hence these are casting processing methods of making Panchaloha.

3.2 Computational analysis method of B-H Curve chart of panchaloha.

The Computational analysis method of B-H Curve chart of Panchaloha is computed by the COMSOL Multiphyiscs Software 6.0 version in which the panchaloha is analyzed the field of magnetic in nature that chart is known B-H Curve chart by Magnetic field and Magnetic flux density values are determined by inputs values of ammeter and voltmeter of current wire is coiled of specimens of panchaloha.

The First-principles quantum mechanics simulations are very useful to analyze the panchaloha specimen positive nature in materials. With help of computational methods, we can predict how much magnetic field H, Magnetic flux density B produces that predicts positive nature components vital by electricity transmission. Many simulation methods based on quantum mechanics exist; here we primarily used is advantageous because metal conductors permits the use of periodic boundary conditions to simulate while usually providing a good balance between accuracy and computational expense.

Magnetic soft iron steels are widely used as core materials in motors, transformers, and inductors. If they are placed in a region without magnetic fields, they will remain without a magnetic field; they do not have an "intrinsic" magnetization. The B-H curve is usually used to describe the magnetization properties of such materials by characterizing the permeability μ , which is defined as

$$\mu = \frac{\mathbf{B}}{\mathbf{H}},$$

Where T is the magnetic flux density in teals (T) and A/m is the magnetic field intensity in ampere per meter (A/m).The More than 200 materials having B-H curves are included in COMSOL Metaphysics. The Nonlinear Magnetic Material Library, in particular, contains most of the commonly used nonlinear magnetic materials. To define the B-H curve in COMSOL Multiphysics, an interpolation function with a local table is commonly used. By adding the B-H Curve material characteristic to a new magnetic material, you can also plug in your own B-H curves.

A material's B-H curve can be measured in the laboratory using established standards and methodologies. When is over the saturation induction, which is referred to as the over fluxed area, it is impossible to do a direct measurement.

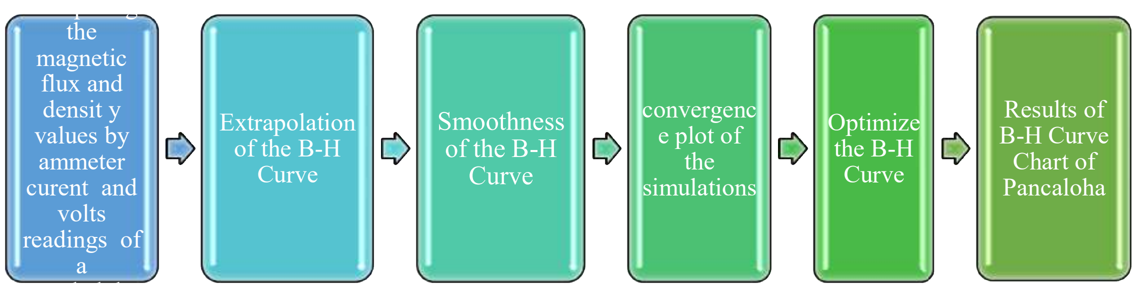


Fig 3.2 Process Chart of Computational analysis of B-H Curve Chart for Panchaloha

In the extrapolation of the B-H Curve the view the B-H curve by clicking the Plot button in the Settings box of the B-H Curve interpolation function. Extrapolation can be set to Constant for better visualization. This setting, however, is not advised for the study since otherwise, the B-H curve data will have discontinuities at the start and finish points.

Let's look at the E-Core Transformer instructional model in the AC/DC Module Application Library as an example of how the settings effect the simulation. For a time-dependent research from 0 to 0.05 s, adjusting the B-H curve extrapolation to Constant takes around two minutes and putting it to Linear takes one minute.

In the Smoothness of B-H curve the E-Core Transformer instructional model in the AC/DC Module Application Library as an example of how the settings effect the simulation. For a time-dependent research from 0 to 0.05 s, adjusting the B-H curve extrapolation to Constant takes around two minutes and putting it to Linear takes one minute.

The two simulations' convergence charts explain the results a time gap in computation Because of the discontinuities generated by the Extrapolation option, finding a solution when the magnetization reaches saturation needs substantially smaller time steps

In the Convergence plots of B-H Curve chart is aside from extrapolation difficulties, the curve derived from measured B-H data may have ripples that are generally unphysical. Numerical instabilities caused by such unphysical ripples result in prolonged calculation durations or even a lack of convergence. Consider the E-Core Transformer model once again. The model makes use of the built-in Soft Iron material, which has a smooth B-H curve. Now we'll alter the curve by changing a few data points to create three new B-H curve groupings.

In the Optimization of B-H curve Chart Checker tool is now available in COMSOL Multiphysics® version 5.5. The B-H curve measured from experiments can be checked and optimized using this modeling tool. In the over fluxed zone, where measurements are difficult, the application can generate curve data. The programme can also reduce unphysical ripples in the B-H curve's slope, which could lead to numerical instability.

The application considers two features of the original B-H curve

1. If the extrapolation of the curve from a physical standpoint is reasonable,
2. If the curve's slope is smooth,

The simultaneous exponential extrapolation approach and the linear interpolation method are the mainstays of the optimization algorithms. The programme necessitates the use of the original curve data, which is stored in a as the input, use a text file. The application will verify if the curve needs to be optimized after it has been imported. The application user can generate optimized curve data by pressing the Optimize button, which can then be exported to a text file.

Then the results of B-H Curve Chart are obtained by the optimization of curve, smoothness and extrapolation the curve determines the magnetic flux and magnetic field density. Hence this is the method of computational analysis of B-H curve chart of Panchaloha.

3.3 Specimen's Classification method for experimentation of Panchaloha

In the Specimen's Classification of Panchaloha the selected composites are the following:-

1. Panchaloha with ferrous
2. Panchaloha without ferrous

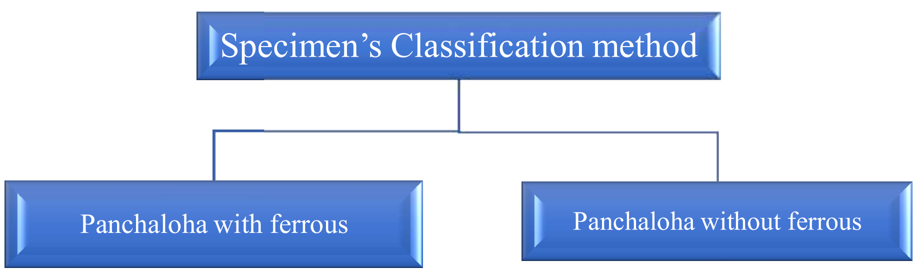


Fig 3.3.1 Specimen's Classification of Panchaloha

In this experiment the above the variant specimen were casted and tested analyzed Experimentally. The two Specimens having different compositions and some different elements with percentages of mixtures present in the panchaloha. Here the Specimen 1 denotes the Panchaloha with ferrous and the Specimen 2 denotes the Panchaloha without ferrous.

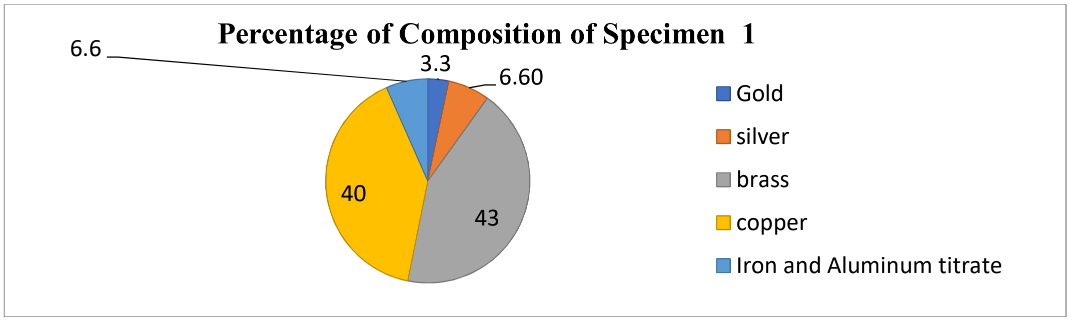


Fig 3.3.2 Percentage of composition of Specimen 1

The Specimen 1 is composed of several composites of Gold, Silver, Brass, Copper, Iron and Aluminum titrate the methodology of above percentages is extracted from the references [7], [18] cited in the context of contents.

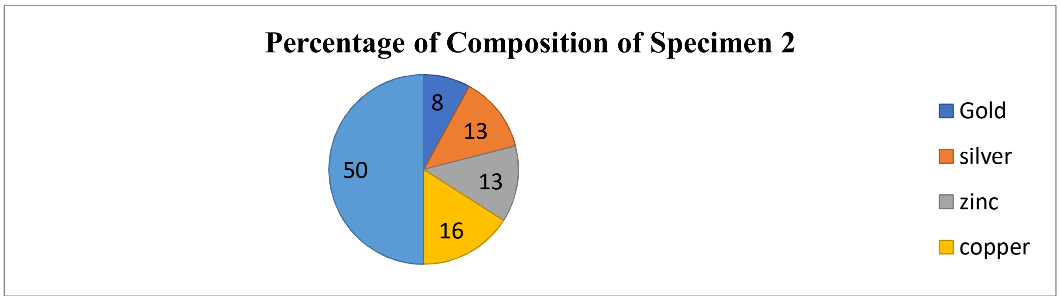


Fig 3.3.3 Percentage of Composition of Specimen 2

The Specimen 1 is composed of several composites of Gold, Silver, Bronze, Zinc, Bronze the methodology of above percentages is extracted from the references [3], [15] cited in the context of contents.

These specimens are invaded in experimentation of casting process, computational analysis method of B-H Curve chart, Brinell's Hardness test, Microscopic analysis, Applications methods of Panchaloha based on the specimens the experimentation and results of experiments varies respectively.

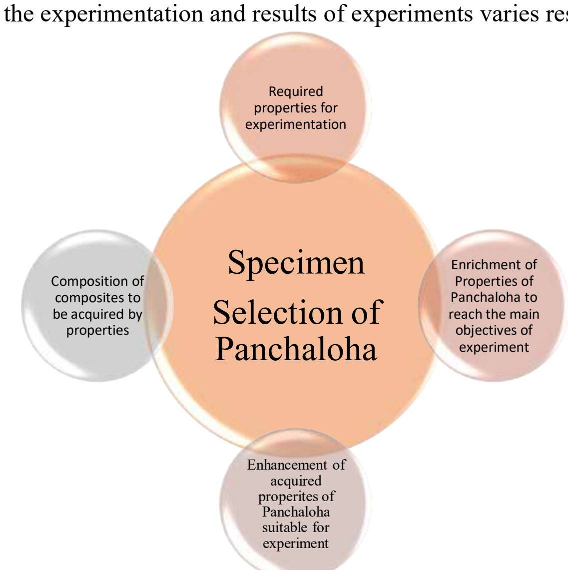


Fig 3.3.4 Demonstration of Specimen Selection of Panchaloha

The Specimen selection depends on the necessity of properties of Panchaloha to be acquired in order to reach the experiment main objectives. Hence this is the method of Specimen classification for experimentation in Panchaloha.

3.4 Brinell's Hardness experiment method for Panchaloha

The Brinell's method uses a spherical indenter, in contrast to the similarly optical Vickers method, which presses a pyramid-shaped indenter into a specimen. The size of the indentation the indenter leaves is measured in the optical Brinell's hardness test.

Brinell's hardness test is an indentation hardness test using a calibrated machine to force a hard steel ball indenter under specified conditions of load and name, into the
Surface of the material under test and to measure the diameter of the resulting impression after release of the load.

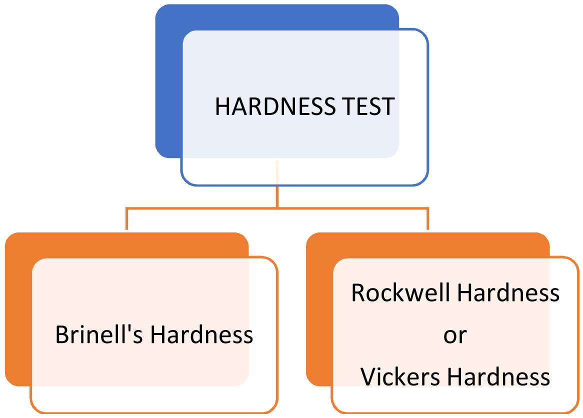


Fig 3.4.1 Classification of Hardness test

A hardness test can be conducted on Brinell's testing m/c, Rockwell hardness m/c or Vickers testing m/c. the specimen may be a cylinder, cube, thick or thin metallic sheet. A Brinell's cum- Rockwell hardness testing m/c along with the specimen is shown in figure.

Fig 3.4.2 Brinell's hardness testing m/c

This test consists of indenting the surface of the metal by a hardened steel all of specified diameter 'D' mm under a given load 'F' N and measuring the average diameter'd' mm of the impression by a Brinell's microscope. The Brinell's hardness HB is defined as the quotient of the applied force 'F' divided by the spherical area of the impression.

The hardness test is of cast iron body. The enclosed design protects the internal operating parts from determined dust and extraneous elements. The main screw is also protected by a rubber below. The basic system is of weights and levers. The weights under hydraulic dash – pot time control are applied on free end of lever, which transmits the pressure. On plunger and thereby on the work –piece for determination of hardness value. A clamping device enables the tight clamping of work – piece during the test which at times cannot be checked under normal conditions. Hence this is method of Brinell's Hardness test experiment for Panchaloha.

3.5 Microscopic analysis method for Panchaloha

To determine the present and to draw the microstructures of panchaloha we use the study of Microstructure under the microscope. The microstructure of metal decides its properties. An optical microscope is used to study the microstructure. A mirror polished surface of the metal is required for metallographic study.

Cut the specimen to the required size (small cylindrical pieces of 10 to 15mm diameter with 15mm height or 10mm cubes)

Fig 3.5.1 Process of Microstructure structure analysis of Panchaloha

3.5.1 Mounting of Specimens

The primary purpose of mounting is to make it convincement to handle specimens of arbitrary shape and/or small sizes during various steps of metallographic sample preparation and examination.

A secondary purpose is to protect and preserve extreme edges or surface defects during metallographic preparation. Specimens may also require mounting to accommodate various types of automatic devices used in metallographic laboratories or to facilitate placement on the microscope stage.

An additional benefit of mounting is the identification of the sample (name, alloy number or laboratory code number) without damaging the specimen. Compression mounting: It is most common mounting method, which involves molding around the metallographic specimen by heat and pressure using the molding materials such as Bakelite, Diallyl Phthalate resins, and acrylic resins.

Bakelite and Diallyl phthalate are thermosetting, and acrylic resins are thermoplastic. Not all materials or specimens can be mounted in thermosetting or thermoplastic mounting. The heating cycle may cause changes in the microstructure, or the pressure may cause delicate specimens to collapse or deform.

The size of the selected specimen may be too large to be accepted by the available mold sizes. These difficulties are usually overcome by cold mounting. Cold Mounting requires no pressure and little heat, and is a mean of mounting large numbers of specimens more rapidly than possible by compression mounting.

Epoxy resins are most widely used cold mounting materials. They are hard, and adhere tenaciously to most metallurgical, mineral and ceramic specimens.

3.52 Belt grinding

One of the faces of the specimen is pressed against the emery belt of the belt grinder so that all the scratches on the specimen are unidirectional.

The Panchaloha is defined as a super alloy in metallurgy for significance in architecture, medicinal, ancient archeologically metal age history structures, era in physics.

In the experimental approach of panchaloha the approaches are materials calibration, material composition and open hearth furnace casting operations, computational analysis of B-H curve chart on magnetic field, brinell's hardness test and microscopic approaches of panchaloha.

3.5.3 Intermediate

The sample is to be polished on 1/0, 2/0, 3/0, 4/0 numbered emery papers with increasing fineness of the paper. While changing the polish paper, the sample is to be turned by 90° so that new scratches shall be exactly perpendicular to previous scratches.

3.5.4 Disc polishing (fine polishing)

After polishing on 4/0 paper the specimen is to be polished on disc polishing machine (Buffing machine). In this disc-polishing machine a disc is rotated by a vertical shaft. The disc is covered with velvet cloth. Alumina solution is used as abrasive. Alumina solution is sprinkled continuously over the disc and the specimen is gently pressed against it. In case of nonferrous metals such as Brass, Brass is used instead of Alumina and water. The polishing should be continued till a mirror polished surface is obtained.

1. The sample is then washed with water and dried.

3.5.5 Etching

The sample is then etched with a suitable etching reagent, detailed in article 5. After etching the specimen should be washed in running water and then with alcohol and then finally dried. The sample is now ready for studying its microstructure under the microscope.

S.No.	Name of Etchant	Composition	Application
1.	Nital		General structure of Iron and steel
	a) 5% Nital	Nitric acid(5ml)and	
		Abs. Methyl alcohol(95ml)	
	b) 2% Nital	Nitric acid(2ml) and	
		Abs. Methyl alcohol (98ml)	
2.	Picral	Picric acid(4gm) and	General structure of Iron and steel
		Abs ethyl alcohol(96ml)	
3.	Marbel's reagent	Copper sulphate (4gm),	Stainless steels
		HCL(20ml) & H_2O (20ml)	
4.	Murakami's reagent	Potassium ferry cyanide,	Stainless steels
		(10grms), KOH(10grms) and	
		Water(100ml)	
5.	Sodium hydroxide	Sodium hydroxide(10gm) and Water (90ml)	Aluminum & its alloys
6.	Keller's reagent	Hydro fluoric acid(20ml)	Aluminum & its alloys
		Nitric acid(10ml) and	
		Glycerin (30ml)	
7.	Keller's reagent	Hydro fluoric acid(1ml)	Duralumin
		Hydrochloric acid(1.5ml)	
		Nitric acid(2.5ml) and Water(95 ml)	
8.	Ammonium phosphate solution	Ammonium persulphate solution(10gms and water (90ml)	Copper and copper alloys
9.	Fecl3 solution	FeCl3 (5gms), HCl acid(2ml) and Ethyl alcohol (96gms)	brass

Table no. 3.4.1 Table of few etching reagents and their composition and their application

Except for few cases a polished metallic surface can't reveal the various constituents (phases). Hence specimen should be etched to reveal the details of the microstructure i.e. a chemical reagent should be applied on the polished surface for a definite period of time. This reagent preferentially attacks the grain boundaries revealing them as this lines. Thus under the microscope the grain structure of the metal becomes visible after etching i.e. grain boundary area appears dark and grains appear bright.

The rate of etching not only depends on the solution employed and composition of the material but also on the uniformity of the material. A few etching reagents, their composition and their application are given below.

3.5.6 Magnification

A Metallurgical microscope differs with a biological microscope in a manner by which specimen of interest is illuminated .As metals are opaque their structural constituents Are studied under a reflected light. A horizontal beam of light from appropriate source is directed by means of plane glass reflects downwards and through the microscope objective on to the specimen surface.

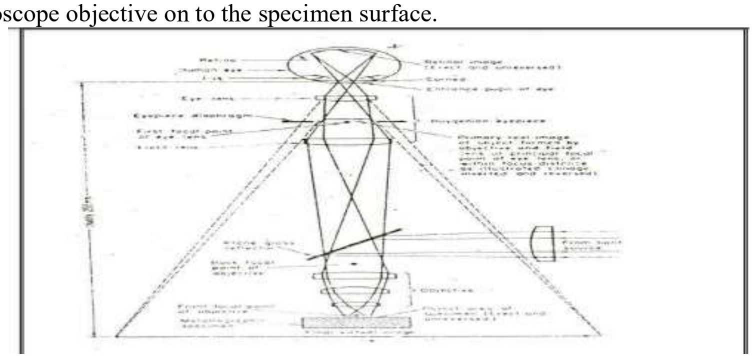


Fig 3.5.3 Illustration of Metallurgical Microscope

A certain amount of this light will be reflected from the specimen surface and that reflected light, which again passes through the objective, will form an enlarged image of the illuminated area.

A microscope objective consists of a number of separate lens elements which are compound group behave as positive and converging type of lens system of an illuminated object. Specimen is placed just outside the equivalent front focus point of objective. A primary real image of grater dimension than those of object field will be formed at some distance beyond the real lens element.

The Objective size of primary image w.r.t. object field will depend on focal length of objective and front focus point of objective. By appropriately positioning primary image w.r.t. a second optical system, primary image be further enlarged by an amount related, to magnifying power of eyepiece.

Fig 3.5.6 Microscope test Panchaloha with ferrous

As separation between objective and eye piece is fixed at same distance equivalent to mechanical tube length of microscope, primary image may be properly positioned w.r.t eye piece. By merely focusing microscope i.e. increase or decrease or the distance between object plane and front lens of objective the image is formed by objective in conjunction with field of eyepiece and microscope is so focused that primary image is located at focal point.

Fig 3.5.5 Microscope test Panchaloha without ferrous

The precise positioning of primary image is essential in order that final image can be formed and rendered visible to observe when looking into eyepiece. If now entrance pupil of eye is made to coincide with exit pupil eyepiece.

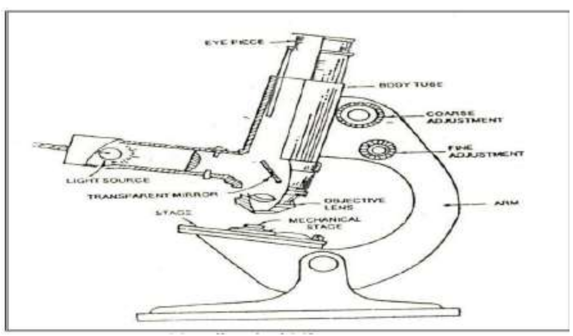


Fig 3.5.4 Diagram Metallurgical Microscope

Eyepiece lens in conjunction with cornea lens will form a second real image on retina. This retrieval image will be erect, un reversed owing to the manner of response of human brain to excitation of retina. The image since it has no real existence, known as virtual image and appears to be inverted and reversed with respect to object field.

3.6 Application methods of Panchaloha

The Application methods of Panchaloha are the following respectively

1. The panchaloha were found mostly in divine places of worships of Hindu temple like in tirumula temple the idols of murti offers all rituals outside the temple were panchaloha.

Fig 3.6.1 The Panchaloha idols of Malaiappa Swamy in Tirumula temple.

2. The panchaloha were used in the temples, churches divine cross, masjids top minar are mostly made of panchaloha.

Fig 3.6.2 the temple gopuram sikara were made up of Panchaloha.

Fig 3.6.3 the crunch top Christian divine cross is made of Panchaloha

Fig 3.6.4 the charminar sikara is made of Panchaloha.

3. The most of ancient monuments like temples, minars, other religious places protected from thunderstorms by placing panchaloha sikaras at top of it

Fig 3.6.5 the casted molten panchaloha is pouring the mould cavity.

4. The panchaloha invaded in arts of gifting idols and divine idols were made for divine rituals purposes for traditional practices.

Fig 3.6.6 the panchaloha idol of goddess lakshmi Devi.

5. The panchaloha were used in the medicinal field of ayurvedic treatments of panchakrama medicinal treatment they use five medicinal plants herbs roots, five medicinal herbs oils, five medicinal herbs steam's powder dove, five metals of panchaloha the treatment is five months time period in southern part of India place named Thiruvidam, this treatment mainly invade to cure cracks of spinal cords, knee, neck shoulders, joint pains.

Fig 3.6.7 the panchaloha shakala invaded in agnikrama of ayurvedic treatment.

Fig 3.6.8 the panchaloha agnikrama equipments.

6. It is believed that wearing jewellery made of such an alloy brings balance in life, self-confidence, good health, fortune, prosperity, and peace of mind.

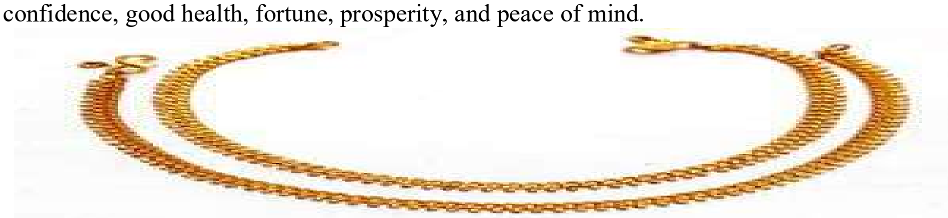


Fig 3.6.8 the panchaloha anklets jewellery.

7. The panchaloha invaded in arts of gifting idols and divine idols were made for divine rituals purposes for traditional art practices.

Fig 3.6.9 the art of making panchaloha as traditional practice.

8. The panchaloha mainly used for at present for research of metallurgical operations which may fulfil the present industrial needs.

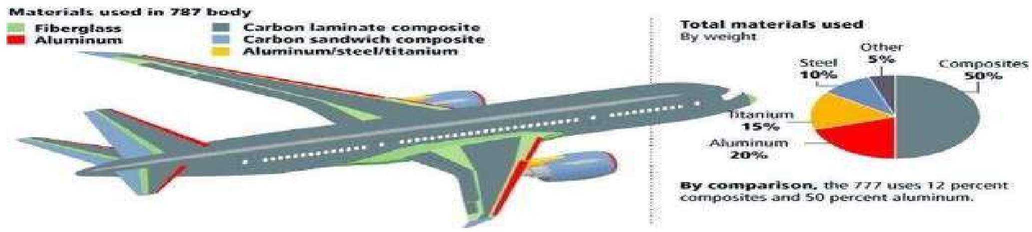


Fig 3.6.10 Aircraft materials composites 50% can by ancient variant of panchaloha aircraft material for cost optimization.

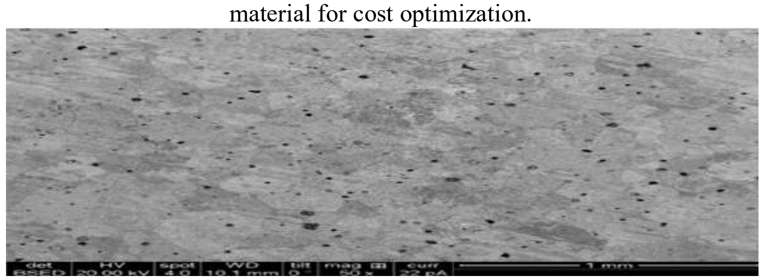


Fig 3.6.11 Ancient Panchaloha variant microstructure.

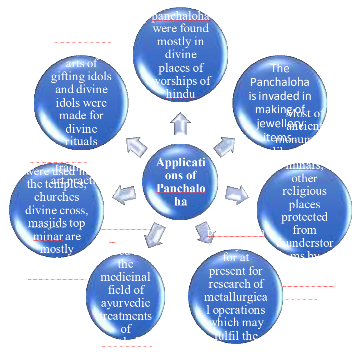


Fig 3.6.12 in detail mapping of Applications of Panchaloha.

3.7 Calibration methods of Panchaloha

The types of Calibration methods are following respectively.

1. Pressure Calibration.
2. Temperature Calibration.
3. Flow Calibration.
4. Pipette Calibration.
5. Electrical calibration.
6. Mechanical calibration.

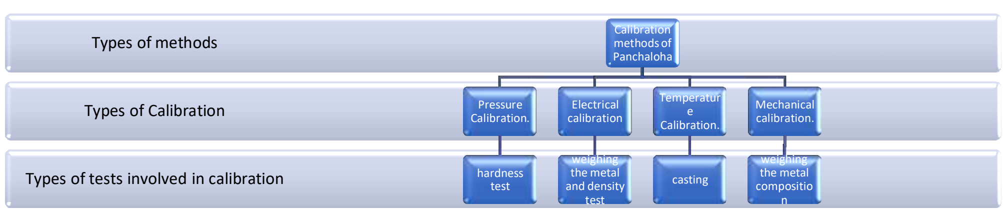


Fig 3.7.1 Process of Calibration methods of Panchaloha

Pressure calibration is the comparison of the output of a device used to measure pressure with that of another pressure measurement device, or pressure measurement standard. This usually involves plumbing the device under test (DUT) to the standard device and generating a common pressure in the measurement circuit.

The Temperature calibration consists of placing the thermometer under test into a known, stable temperature environment.

The flow meter calibration procedure involves the diversion of the fluid onto a mass comparator over a given timescale, where the basic mass flow rate measurement is derived by mass over time calculation. This is a simple process often referred to as the bucket and stopwatch method.

The Pipette calibration is necessary to prevent inaccuracies in order to attain better results, performance, and longevity of the pipette itself. The most common way to check your pipette accuracy is by weighing water. The density of water is 1 g/mL. This means that every micro liter (μL) should weigh 0.001 g. In other words, if your pipette is accurate, the amount of water you dispense will equal the amount the water weighs.

The Electrical calibration implies that the results from a device measuring an electric magnitude with unknown accuracy are compared with the values provided for a device (calibrator) whose uncertainty is known. This calibrator is universally accepted as "reference" and traceable to international standards.

The Mechanical calibration in this connection means measurements that can be carried out with relatively simple tools to record changes in the dimensions of an object because of breakdown or wear during use.

In the experimentation of panchaloha the Flow and Pipette calibration are not invaded. Hence these are the calibration methods of a panchaloha as per experimentation.

Fig 3.7.2 Electrical calibration of weighing panchaloha without ferrous

CHAPTER 4

EXPERIMENTATION ON PANCHALOHA

4.1 Materials used in Panchaloha

The Materials used in Panchaloha are formed by the method of heating by doping the five elements at certain composition to make a specimen of superalloy.

Composition of panchaloha without ferrous for (10 grams) is

1. 8% of gold = 0.8grams
2. 13% of silver = 1.3grams
3. 13% of zinc = 1.3grams
4. 16% of copper = 1.6grams
5. 50% of bronze = 5grams

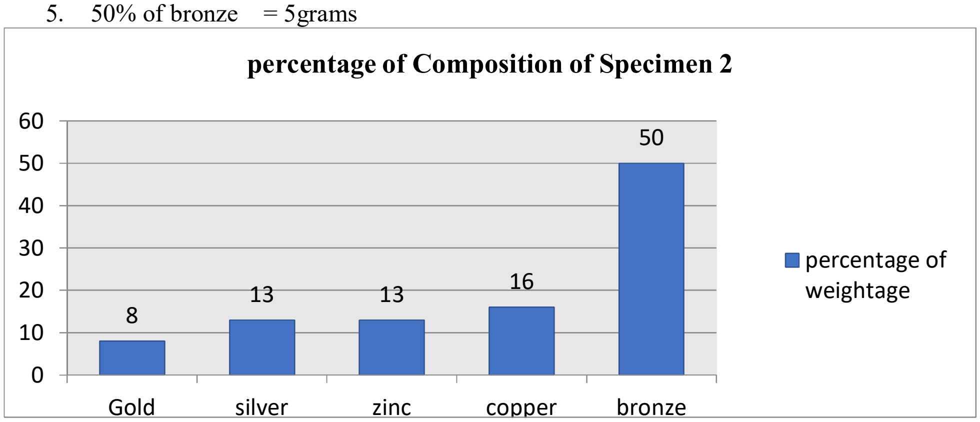


Fig 4.1.1 Bar graph of Composition of panchaloha without ferrous

In the specimen the materials composed like following respectively The method of heating by doping the five elements at certain composition to make a specimen of superalloy.

Composition of panchaloha for (30 grams) is

1. 3.3% of gold = 1gram
2. 6.6% of silver = 2grams
3. 43% of brass =13 grams
4. 40% of copper = 12grams
5. 6.6% of iron = 2grams

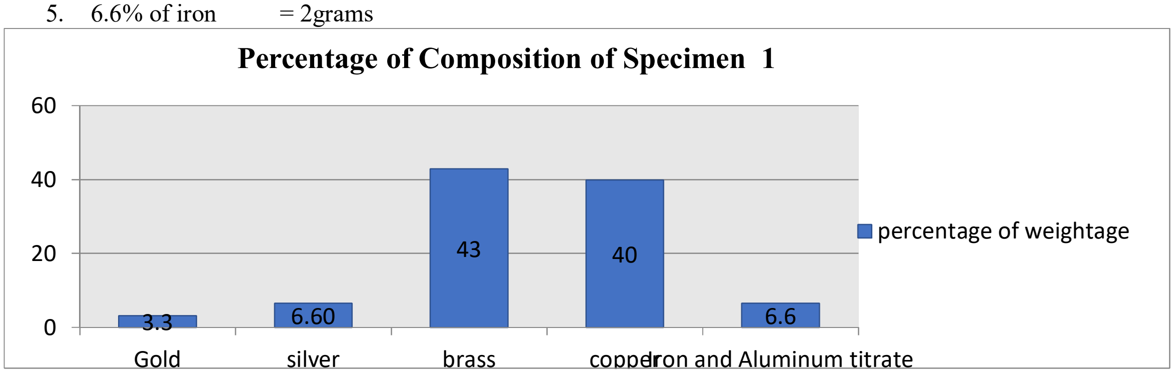


Fig 4.1.2 Bar graph of Composition of panchaloha with ferrous

4.1.2 Materials used for making Panchaloha

The materials used for making Panchaloha are as following respectively.

1. Earth ore char coal
2. Sulphide powder
3. Navasagaram powder
4. Liquid fuels
5. Etching reagents

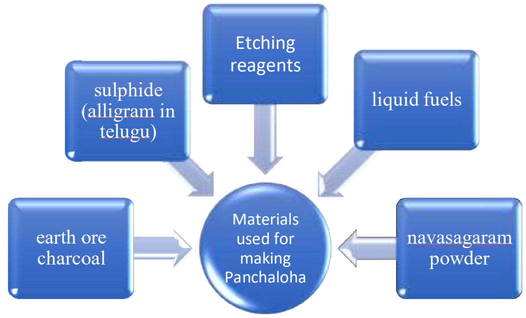


Fig 4.1.2.1 Chart of Materials used for making Panchaloha

The Earth ore Char coal is a traditional charcoal made directly from hardwood material it usually produces far less ash than briquettes. Hardwood charcoal is great for barbeque; it does not contain any chemical binders or igniting agents.


Fig 4.1.2.2 Earth ore charcoal

The Sulphide powder is known as Mould powders are essential for the stability of the continuous casting process at all casting speeds. The main functions of mould powder are to provide strand lubrication and to control mould heat transfer in the horizontal direction between the developing steel shell and the water-cooled copper mould.


Fig 4.1.2.3 Sulphide powder

The navasagram is also known as Ammonium chloride ($NH4Cl$) (also Sal Ammoniac, Salmiac, Salmiak, Nushadir Salt, Navsagari, Zalmiak, Sal Armagnac, Sal Armoniac, Salmiakki, Salamaka, Salmiak and Salt Armoniack) is, in its pure form, a clear white water-soluble crystalline salt of ammonia. Its principal uses are as a nitrogen supply in fertilizers and as an electrolyte in dry cells, and it is also extensively employed as a constituent of galvanizing, tinning, and soldering fluxes to remove oxide coatings from metals and thereby improve the adhesion of the solders.


Fig 4.1.2.4 Navasagaram Powder

The Liquid fuels are combustible or energy-generating molecules that can be harnessed to create mechanical energy, usually producing kinetic energy; they also must take the shape of their container. It is the fumes of liquid fuels that are flammable instead of the fluid.

Fig 4.1.2.5 Petrol as a Liquid agent

There are five kinds of etching solutions, which are ammonium persulfatei, sulfur/chromic acid, sulfuric acid/hydrogen peroxide, sodium chlorite, ferric chloride etching solution and so on

Fig 4.1.2.6 Etching reagents containers

4.2 Open Hearth Furnace Casting Method

The open-hearth furnace (OHF) uses the heat of combustion of gaseous or liquid fuels to convert a charge of scrap and liquid blast-furnace iron to liquid steel. The high flame temperature required for melting is obtained by preheating the combustion air and, sometimes, the fuel gas.

The Sir William Siemens invented the open-hearth furnace, which could produce and sustain much higher temperatures than any other furnace. Martin obtained a license to build such furnaces and developed a method of producing steel by using scrap steel and pig iron.

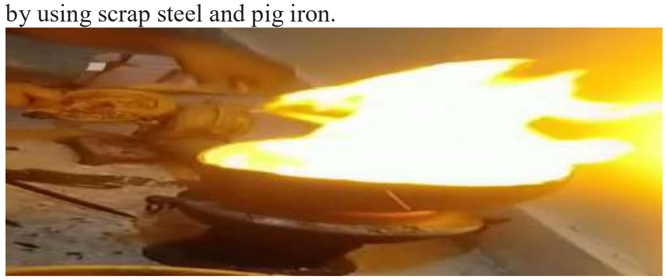


Fig 4.2.1 Miniature setup of Open Hearth Furnace Casting

Natural gas or atomized heavy oils are used as fuel; both air and fuel are heated before combustion. The furnace is charged with liquid blast-furnace iron and steel scrap together with iron ore, limestone, dolomite, and fluxes.In the miniature experiment the open hearth furnace is used in customised way for casting panchaloha. The method invaded in this project is open hearth furnace casting with blower unit.

4.3 Procedure for Open Hearth Furnace Casting Method

The following steps are the Procedure for Open Hearth Furnace Casting Method for Panchaloha

Fig 4.3.1 Specimen composition of Panchaloha

1. Casting process involves initially lighting the earth ore charcoal in furnace heating up to the entire charcoal turns red in colour.
2. Place the air blower horizontally to the furnace as shown in the figure in below and working in casting process.

Fig 4.3.2 image of panchaloha casting operation performed by the team member

3. Place the crucible inside the furnace with support air blower heat up to 3 to 4 hours here we can see the green flame in furnace it is indication that the panchaloha is melting and becoming in molten state.
4. Use the sulphide (alligram in Telugu) as reagent for the panchaloha mixing and helps for removal of sludge from molten metal in crucible.
5. After some time can make crucible out from the furnace pour the molten metal of pour mould cavity by placing before the sulphide and navasagaram powder in mould cavity for removal of porosity of metal.

Fig.4.3.3 Mould holder

6. Keep the mould cavity in running water or dip in the water after that removal moulded specimen out for mould cavity.

Fig 4.3.4 Mould specimen of Panchaloha with ferrous

Fig 4.3.5 Mould specimen of Panchaloha without ferrous

4.3.1 Observations for Open Hearth Furnace Casting Method of Panchaloha

1. Casting process involves initially lighting the earth ore charcoal in furnace heating up to the entire charcoal turns red in colour.
2. he furnace with support air blower heat up to 3 to 4 hours here it can be seen the green flame in furnace it is indication that the panchaloha is melting and becoming in molten state.
3. The sulphide (alligram in Telugu) as reagent for the panchaloha mixing and helps for removal of sludge from molten metal in crucible.
4. The furnace pour the molten metal of pour mould cavity by placing before the sulphide and navasagaram powder in mould cavity for removal of porosity of metal.
5. The mould cavity is kept in running water or dip in the water after that removal moulded specimen out for mould cavity.
6. It is noticed that the melting point of Panchaloha is **$2897^{0}C$** in casting process the emission of heat intolerable and which impact the health issues of melting process craftsman.
7. The experiment achieved the main objective out comes with best resultant in melting point of temperature and mixing of composites.
8. Here the list of materials of panchaloha with their temperature.

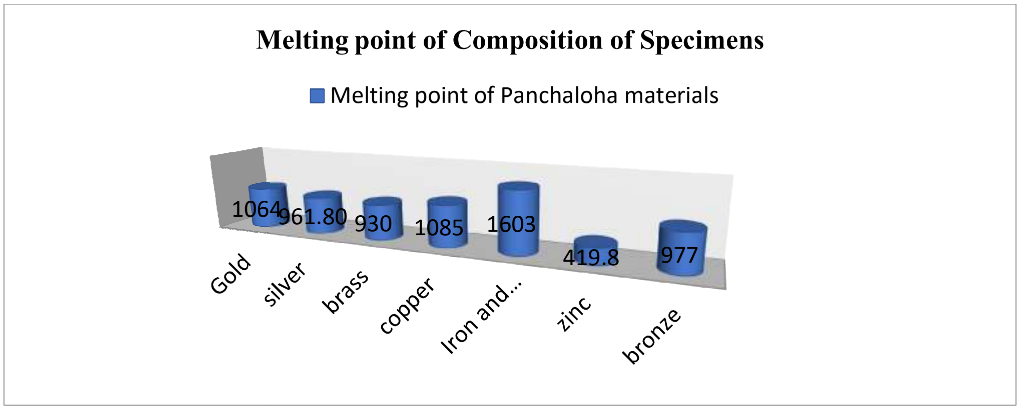


Fig 4.3.1.1 Graph of Melting point of composition of Specimens

The melting points of materials were extracted from the references cited [14], [12], [5] are insisted in the experimentation of this casting process.

4.4 Applications of Open Hearth Furnace method

The Applications of Open Hearth Furnace Method uses the heat of combustion of gaseous or liquid fuels to convert a charge of scrap and liquid blast-furnace iron to liquid steel. The high flame temperature required for melting is obtained by preheating the combustion air and, sometimes, the fuel gas.

The open-hearth process was another process that worked in conjunction with the Bessemer process. These techniques made possible to production of steel in great quantities and large dimensions. Only gaseous fuels are used for the burning process in an open hearth furnace. Peat is a very basic form of coal and cannot be used as a fuel here.

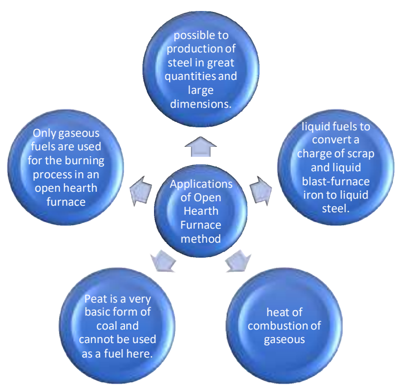


Fig 4.4.1 Applications of Open hearth furnace method

4.5 Advantages of Open Hearth Furnace casting

The Open hearth process is a slow process and easy to control. We can minimize the slag due to the low speed and high efficiency of the process. The process is controlled and all the carbon need not be burned, unlike Bessemer process, hence being able to stop the process when required carbon contents are achieved.

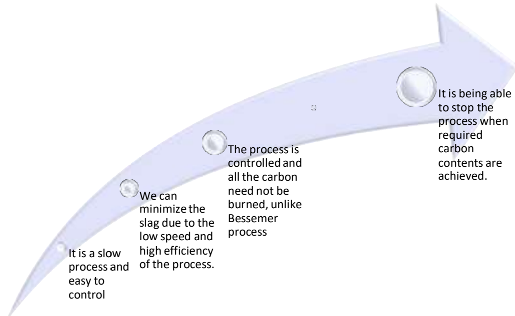


Fig 4.5.2 Advantages of Open Hearth Furnace Casting

Hence these are the Advantages of Open Hearth Furnace Casting and above advantages made for selection of casting the Panchaloha.

4.5.1 Disadvantages of Open Hearth Furnace casting

The basic open hearth furnace, the world's greatest steel producer at present, suffers under the disadvantage of greater cost of operation than the Bessemer converter, due chiefly to costs for fuel, labor and repairs.

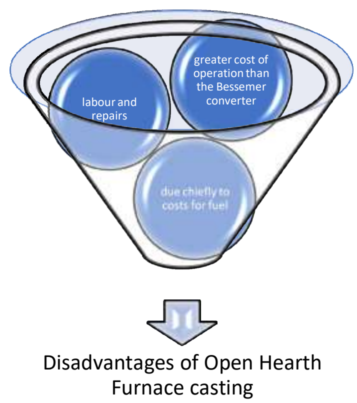


Fig 4.5.1 Disadvantages of Open Hearth Furnace casting

4.6 Computation of B-H Curve Chart on Magnetic field

In this Experiment the Panchaloha casted specimens are computed by COMSOL Multiphyiscs software , In the COMSOL Multiphyiscs software the B-H Curve chart are inbuilt library modules which gives accurate outcomes of magnetic field and magnetic flux density, These are needed in order to know whether to know the Panchaloha having Hidden energy, that hidden energy is positive or negative emission, to prove the assumption of Panchaloha emits positive hidden energy called era in nature the metal really gives the wealth and prosperity for mankind this experiment is initiated with the casted specimens of panchaloha. These main objectives are referred from the references [2], [47], [23], [10], [15], [17], [7], [12].

The First-principles quantum mechanics simulations are very useful to analyze the panchaloha specimen positive nature in materials. With help of computational methods, it predicts how much magnetic field H, Magnetic flux density B produces that predicts positive nature components vital by electricity transmission. The more simulation methods based on quantum mechanics exist; here we primarily used is advantageous because metal conductors permits the use of periodic boundary conditions to simulate while usually providing a good balance between accuracy and computational expense. The Magnetic soft iron steels are widely used as core materials in motors, transformers, and inductors. If they are placed in a region without magnetic fields, [15][17][7] they will remain without a magnetic field; they do not have an “intrinsic” magnetization. The B-H curve is usually used to describe the magnetization properties of such materials by characterizing the permeability μ , which is defined as:

$$\mu = \frac{\mathbf{B}}{\mathbf{H}},$$

Where T is the magnetic flux density in teals (T) and A/m is the magnetic field intensity in ampère per metre (A/m).

More than 200 materials having B-H curves are included in COMSOL Metaphysics. The Nonlinear Magnetic Material Library, in particular, contains most of the commonly used nonlinear magnetic materials. To define the B-H curve in COMSOL Multiphysics, an interpolation function with a local table is commonly used. By adding the B-H Curve material characteristic to a new magnetic material, you can also plug in your own B-H curves.

A material's B-H curve can be measured in the laboratory using established standards and methodologies. When is over the saturation induction, which is referred to as the over fluxed area, it is impossible to do a direct measurement. In general, test equipment struggles to achieve such a high level of stability; for example, fig 4.6.1 T. Even if the test equipment is capable of doing so, the measured data will almost always be erroneous due to the overheating of the test frame. As a result, extrapolation methods are commonly used to get B-H curve data in the over fluxed region, such as the simultaneous exponential extrapolation (SEE) approach [47][23].

The slope of the B-H curve is very important from a numerical standpoint, because It is used by the nonlinear iterative solver to evaluate the nonlinear material behavior's local linearization. In nonlinear magnetic materials, it is therefore more useful to discuss differential permeability or incremental permeability. The differential permeability can be calculated as follows:

$$\mu_D = \frac{d\mathbf{B}}{d\mathbf{H}},$$

For conventional materials, is greater than 0, implying that the B-H curve is rising monotonically. After magnetic saturation, the permeability of vacuum for ferromagnetic materials decreases, as seen in the diagram below.

For conventional materials, is greater than 0, implying that the B-H curve is rising monotonically. After magnetic saturation, the permeability of vacuum for ferromagnetic materials decreases, as seen in the diagram below.

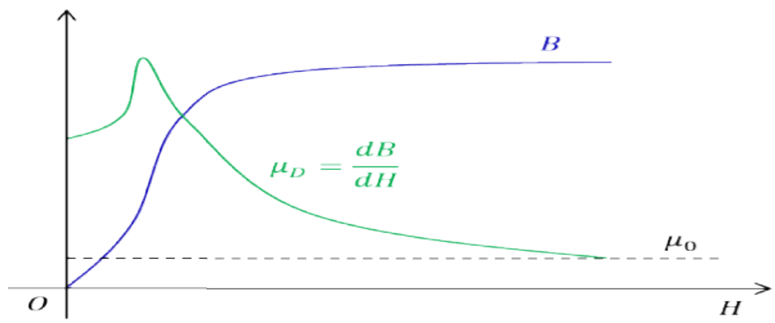


Fig 4.6.1 The schematic diagram of a typical B-H curve and the corresponding differential permeability as a function of magnetic field intensity.

4.7 Procedure for Computation of B-H Curve Chart on magnetic field Panchaloha

The procedure for computation of B-H Curve Chart on magnetic field for panchaloha material of Specimens is computed following respectively. In the COMSOL Multiphyiscs software it can able run by giving input values of panchaloha specimens.

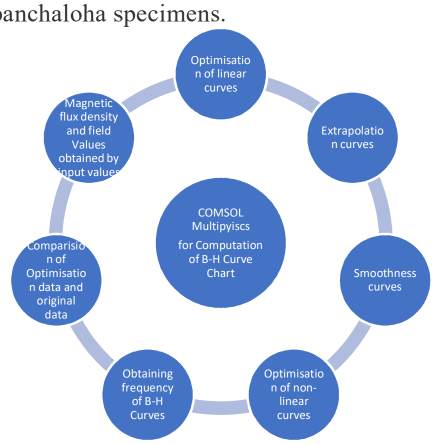


Fig 4.7.1 Process chart of Computation of B-H Curve Chart by COMSOL Multiphyiscs

4.7.1 Obtaining input values of B-H Curve Chart on Panchaloha Specimens

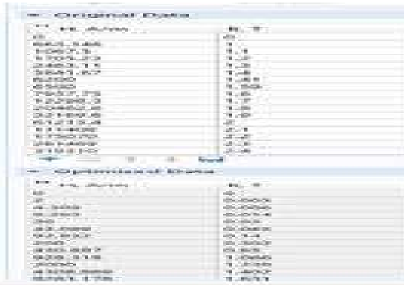


Fig 4.7.1.1 Input values given to the software original data obtained table

Initially place the specimen with coiling the wire around the Specimen insert the two ends of coiled wire to testing nibs of voltmeter and ammeter fractionate current amps to the no. of coils induced in the specimen similarly repeat the process with other specimen the following outputs are tabulated respectively.

Here the Specimen 1 is panchaloha with ferrous and Specimen 2 without ferrous

Specimen 1 Magnetic field H	Specimen 2 Magnetic field H	Specimen 1 Magnetic Flux B	Specimen 2 Magnetic Flux B
0	0	0	0
1.02	2	1.2	1.1
259.61	2508	1.4	25
528.554	2089	1.6	298
565.692	2099	20.55	2052
651.098	4698	152.89	2052
785.82	4699.325	1985.99	2065

Table 4.7.1.2 Input values of specimens of Panchaloha

4.7.2 Extrapolation of B-H Curve Chart on Panchaloha

The view the B-H curve by clicking the Plot button in the Settings box of the B-H Curve interpolation function. Extrapolation can be set to Constant for better visualization. This setting, however, is not advised for the study since otherwise, the B-H curve data will have discontinuities at the start and finish points.

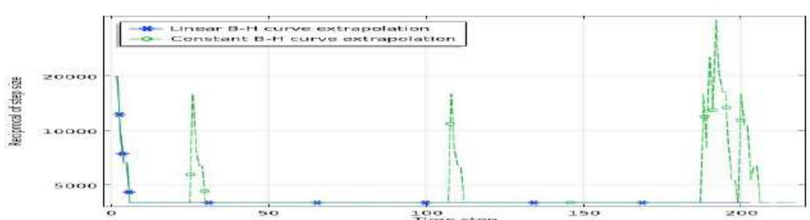


Fig 4.7.2 the convergence plot of the simulation with a linear and constant B-H curve extrapolation.

4.7.3 Smoothness effect of B-H Curve Chart on Panchaloha

The two simulations' convergence charts explain the results a time gap in computation Because of the discontinuities generated by the Extrapolation option, finding a solution when the magnetization reaches saturation needs substantially smaller time steps, as seen in the diagram below.

Aside from extrapolation difficulties, the curve derived from measured B-H data may have ripples that are generally unphysical. Numerical instabilities caused by such unphysical ripples result in prolonged calculation durations or even a lack of convergence. Consider the E-Core Transformer model once again. The model makes use of the built-in Soft Iron material, which has a smooth B-H curve. Now we'll alter the curve by changing a few data points to create three new B-H curve groupings, as illustrated below. Let's try running the time-dependent research in the model using these three B-H curves and the default settings. The convergence graphs are given in the figure below, and the simulation data are listed in the table below.

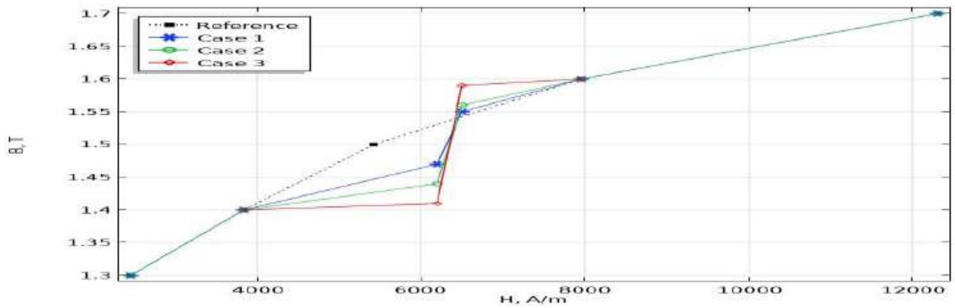


Fig 4.7.3.1 The plot of three groups of B-H curves with the reference from the built-in B-H curve. (Note that the plot only shows a part of the curve where the differences take place.)

Case	B-H Curve Data H (A/m), B (T)	Computation time
1	3841.67, 1.4 6200, 1.47 6500, 1.55 7957.75, 1.6	1minute 17 seconds
2	3841.67, 1.4 6200, 1.44 6500, 1.56 7957.75, 1.6	1 minute, 45 seconds
3	3841.67, 1.4 6200, 1.42 6500, 1.58 7957.75, 1.6	Nonlinear solver did not converge. Maximum number of Newton iterations reached. Time: 0.029466491699218753 seconds. Last time step is not converged.

Table 4.7.3.2 B-H curve data and computation times for the three cases.

4.7.4 Optimization of Linear and non-Linear Curves for B-H Curves of Panchaloha

The B-H Curve Checker tool is now available in COMSOL Multiphysics® version 5.5. The B-H curve measured from experiments can be checked and optimized using this modeling tool. In the overfluxed zone, where measurements are difficult, the application can generate curve data. The programme can also reduce unphysical ripples in the B-H curve's slope, which could lead to numerical instability.

The application considers two features of the original B-H curve:

1. If the extrapolation of the curve from a physical standpoint is reasonable,
2. If the curve's slope is smooth,

The simultaneous exponential extrapolation approach and the linear interpolation method are the mainstays of the optimization algorithms. The programme necessitates the use of the original curve data, which is stored in a as the input, use a text file. The application will verify if the curve needs to be optimised after it has been imported. The application user can generate optimised curve data by pressing the Optimize button, which can then be exported to a text file.

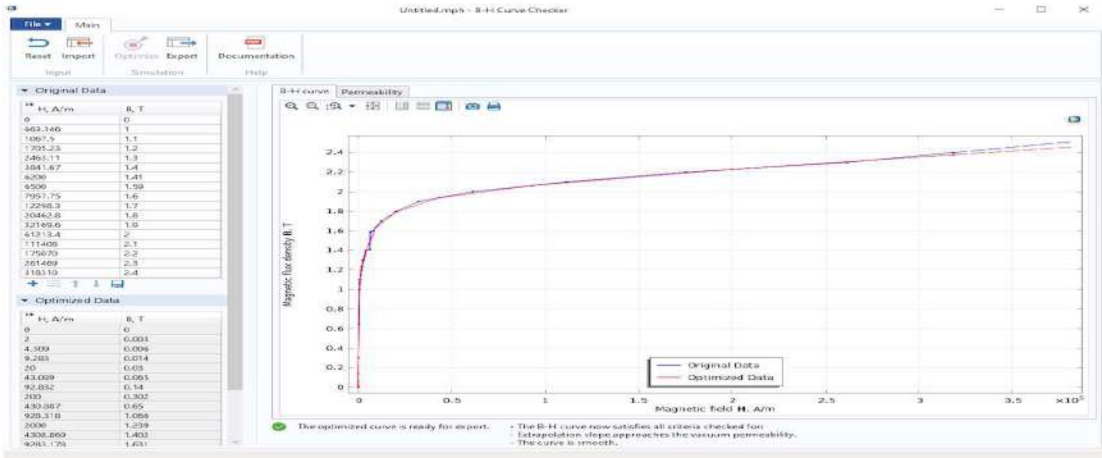


Fig.4.7.4.1 The B-H Curve Checker application, showing the original and optimized B-H curves.

Fig4.7.4.2 The B-H Curve Checker application, showing the differential relative permeability of the original and optimized B-H curves.

4.7.5 Observations of B-H Curve Chart of Panchaloha

The built-in materials have been subjected to the B-H Curve Checker application, with 35 of them being optimized for improved performance and stability. The following is a list of materials that have been corrected:

1. AC/DC Material library for modules
2. B-H curve, Soft Iron (Without Losses), and Effective Curve B-H
3. B-H curve, Soft Iron (With Losses), and Effective Curve B-H
4. B-H curve of a nonlinear permanent magnet

When the Panchaloha is in the computation of B-H Curve Chart on Magnetic Field of magnetic field by invading application of COMSOL Multi physics software a relative tolerance of 30% is used the magnetic flux density is 1.8 B under 0.5 H of magnet field in Specimen 1.

Specifications	Specimen 1 Panchaloha with Ferrous	Specimen 2 Panchaloha without Ferrous
Magnetic flux density B (Wb/m^2)or Tesla	1.76T	45.59T
Magnetic field H (N/mm^2)	5.56	25.39

Table 4.7.5.1 The Resultant of B-H Curve Chart of Panchaloha in Magnetic Flux Density and Magnetic Field of Specimens.

4.8 Microscopic Analysis of Panchaloha Specimens Experiment

To prepare the given specimen for metallographic examination and to Study the constructional details of Metallurgical Microscope and observe the micro structure of the prepared specimen.

The Apparatus required are Metallurgical microscope, emery belt 1/0, 2/0, 3/0, 4/0 emery papers, lapping cloth, alumina powder, etchants, sample of metal.

The microstructure of metal decides its properties. An optical microscope is used to study the microstructure. A mirror polished surface of the metal is required for metallographic study.

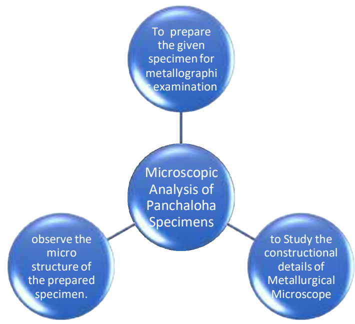


Fig 4.8 the Microscopic Analysis of Panchaloha Specimens

4.9 Procedure for microscopic analysis of Panchaloha Specimens Experiment

1. Cut the specimen to the required size (small cylindrical pieces of 10 to 15mm diameter with 15mm height or 10mm cubes)
2. The primary purpose of mounting is to make it convincement to handle specimens of arbitrary shape and/or small sizes during various steps of metallographic sample preparation and examination.
3. A secondary purpose is to protect and preserve extreme edges or surface defects during metallographic preparation. Specimens may also require mounting to accommodate various types of automatic devices used in metallographic laboratories or to facilitate placement on the microscope stage. An additional benefit of mounting is the identification of the sample (name, alloy number or laboratory code number) without damaging the specimen.
4. Compression mounting is most common mounting method, which involves molding around the metallographic specimen by heat and pressure using the molding materials such as Bakelite, Diallyl Phthalate resins, and acrylic resins. Bakelite and Diallyl phthalate are thermosetting, and acrylic resins are thermoplastic. Not all materials or specimens can be mounted in thermosetting or thermoplastic mounting. The heating cycle may cause changes in the microstructure, or the pressure may cause delicate specimens to collapse or deform. The size of the selected specimen may be too large to be accepted by the available mold sizes.
5. These difficulties are usually overcome by cold mounting. Cold Mounting requires no pressure and little heat, and is a mean of mounting large numbers of specimens more rapidly than possible by compression mounting. Epoxy resins are most widely used cold mounting materials.
6. They are hard, and adhere tenaciously to most metallurgical, mineral and ceramic specimens.
7. The Belt grinding is one of the faces of the specimen is pressed against the emery belt of the belt grinder so that all the scratches on the specimen are unidirectional.
8. The Intermediate is the sample is to be polished on 1/0, 2/0, 3/0, 4/0 numbered emery papers with increasing fineness of the paper. While changing the polish paper, the sample is to be turned by 90° so that new scratches shall be exactly perpendicular to previous scratches.
9. The Disc polishing (fine polishing) is polishing on 4/0 paper the specimen is to be polished on disc polishing machine (Buffing machine). In this disc-polishing machine a disc is rotated by a vertical shaft. The disc is covered with velvet cloth. Alumina solution is used as abrasive.
10. Alumina solution is sprinkled continuously over the disc and the specimen is gently pressed against it. In case of Non ferrous metals such as Brass, Brass is used instead of Alumina and water. The polishing should be continued till a mirror polished surface is obtained. The sample is then washed with water and dried. The Etching is the sample is then etched with a suitable etching reagent.
11. After etching the specimen should be washed in running water and then with alcohol and then finally dried.
12. The sample is now ready for studying its microstructure under the microscope.
13. Except for few cases a polished metallic surface can’t reveal the various constituents (phases).

14. Hence specimen should be etched to reveal the details of the microstructure i.e. a chemical reagent should be applied on the polished surface for a definite period of time. This reagent preferentially attacks the grain boundaries revealing them as this lines.
15. Thus under the microscope the grain structure of the metal becomes visible after etching i.e. grain boundary area appears dark and grains appear bright. The rate of etching not only depends on the solution employed and composition of the material but also on the uniformity of the material. A few etching reagents, their composition and their application are given below.
16. Metallurgical microscope is used for micro and macro examination of metals. Micro examinations of specimens yield valuable metallurgical information of the metal.
17. The absolute necessity for examination arises from the fact that many microscopically observed structural characteristics of a metal such as grain size ,segregation, distribution of different phases and mode of occurrence of component phases and non metallic inclusions such as slag, sulfides etc., and other heterogeneous condition(different phases)expert a powerful influence or mechanical properties of the metal. It is possible to predict as to how metal will behave under a specific stress. Microstructure of metals at magnifications ranging from 50x to 2000x is carried out with the aid of metallurgical microscope.

Fig 4.9.1 Specimen 1 is tested under Electrical Metallurgical Microscope

Fig 4.9.2 Specimen 1 is tested under Electrical Metallurgical Microscope

A Metallurgical microscope is shown in figure 4.8.1 Metallurgical microscope differs with a biological microscope in a manner by which specimen of interest is illuminated .As metals are opaque their structural constituents Are studied under a reflected light. Is shown fig. a horizontal beam of light from appropriate source is directed by means of plane glass reflects downwards and through the microscope objective on to the specimen surface. A certain amount of this light will be reflected from the specimen surface and that reflected light, which again passes through the objective, will form an enlarged image of the illuminated area. A microscope objective consists of a number of separate lens elements which are compound group behave as positive and converging type of lens system of an illuminated object.The Specimen is placed just outside the equivalent front focus point of objective. A primary real image of grater dimension than those of object field will be formed at some distance beyond the real lens element.The Objective size of primary image w.r.t. object field will depend on focal length of objective and front focus point of objective.By appropriately positioning primary image w.r.t. a second optical system, primary image be further enlarged by an amount related, to magnifying power of eyepiece. As separation between objective and eye piece is fixed at same distance equivalent to mechanical tube length of microscope, primary image may be properly positioned w.r.t eye piece. By merely focusing microscope i.e. increase or decrease or the distance between object plane and front lens of objective the image is formed by objective in conjunction with field of eyepiece and microscope is so focused that primary image is located at focal point. Such precise positioning of primary image is essential in order that final image can be formed and rendered visible to observe when looking into eyepiece. If now entrance pupil of eye is made to coincide with exit pupil eyepiece. The Eyepiece lens in conjunction with cornea lens will form a second real image on retina. This retrieval image will be erect, un reversed owing to the manner of response of human brain to excitation of retina.The image since it has no real existence, known as virtual image and appears to be inverted and reversed with respect to object field.

4.10 Observation for Microstructure analysis of Panchaloha Specimen

1. The microscopic approaches of panchaloha is to be determined experimentally.
2. In this experiment the electronic microscope to test the microstructures of specimens panchaloha.
3. In the Electronic microscope containing the lenses of 5X, 10X,15X.
4. The Ethyl alcohol is used for cleaning reagent for better appearance of microstructure of the specimen.
5. These are microstructures of panchaloha which observed under the electronic microscope at 5X,10X,15X lens .
6. The experiment approach of panchaloha specimens microstructures is similar to panchaloha as per the research papers of Ishwarbhai Patel.
7. Hence the microscopic approaches of panchaloha are determined experimentally.

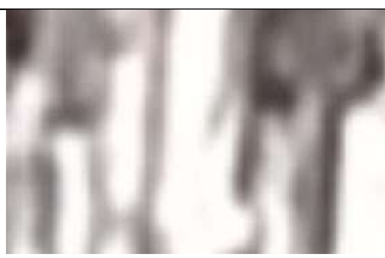
Panchaloha without ferrous	**Panchaloha with ferrous**
 Microstructure of Specimens at 5X	 Microstructure of Specimens at 5X
 Microstructure of Specimens at 10X	 Microstructure of Specimens at 10X
 Microstructure of Specimens at 15X	 Microstructure of Specimens at 15X

Table 4.10.1 The Observation table of Microstructures of Specimens at 5X,10X,15X stages of microscope

4.15 Brinell's Hardness Experiment of Panchaloha

The aim is to find hardness of the given specimen by Brinell's testing Machine

4.15.1 APPARATUS

1. Brinell's Hardness testing machine
2. Specimen of mild steel / cast iron/ non ferrous metals
3. Brinell's microscope.

4.15.2 PRINCIPLE BRINELL TESTING

Brinell hardness test is an indentation hardness test using a calibrated machine to force a hard steel ball indenter under specified conditions of load and name, into the surface of the material under test and to measure the diameter of the resulting impression after release of the load.

4.15.3 SPECIFICATION OF HARDNESS TESTING M/C AND INDENTORS

A hardness test can be conducted on Brinell testing m/c, Rockwell hardness m/c or vicker testing m/c. the specimen may be a cylinder, cube, think or thin metallic sheet. A Brinellcum- Rockwell hardness testing m/c along with the specimen is shown in figure.

4.15.4 SPECIFICATION

Ability to determine hardness up to 500BHN.

1. Diameter of ball (as indentor) used D = 2.5mm, 5mm.
2. Maximum application load = 3000kgf.
3. Method of load application = Lever type
4. Capability of testing the lower hardness range = 1 BHN on application of 0.5D2 load.

4.15.5 TESTING METHOD

This test consists of indenting the surface of the metal by a hardened steel all of specified diameter 'D' mm under a given load 'F' N and measuring the average diameter 'd' mm of the impression by a Brinell microscope. The Brinell hardness HB is defined as the quotient of the applied force 'F' divided by the spherical area of the impression.

HB = load applied (Kgf) / Spherical area indentation (in mm)

$$\boxed{HB = 2F/\pi D(D- \sqrt{D^2 - d^2})\ Kg/mm^2}$$

Where,
F= Load…….N
D= Diameter of the indenter ……… mm
d= Diameter of the impression……… mm

Fig 4.11.1 Brinell's Hardness test M/c

4.15.6 DESCRIPTION

The hardness test is of cast iron body. The enclosed design protects the internal operating parts from determined dust and extraneous elements. The main screw is also protected by a rubber below.

The basic system is of weights and levers. The weights under hydraulic dash – pot time control are applied on free end of lever, which transmits the pressure. On plunger and there by on the work –piece for determination of hardness value.

A clamping device enable the tight clamping of work – piece during the test which at times can not be checked under normal conditions.

4.15.7 TECHNICAL DATA

1. Maximum test height: 295mm.
2. Depth of throat: 150
3. Maximum depth of screw below base: 280 mm.
4. Dimension of machine: 210 X 470 mm
5. Height: 850 mm.
6. Net weight: 125 kg.

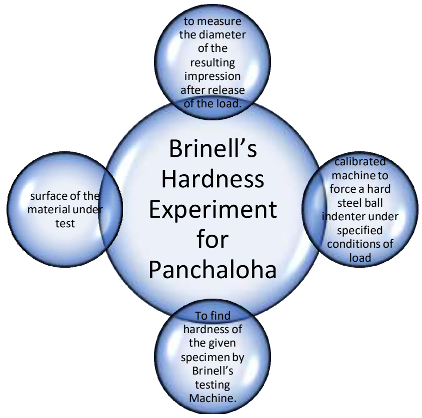


Fig 4.11.2 Brinell's Hardness test principles chart

4.12 Procedure Brinell's Hardness Experiment of Panchaloha

For carrying out tests, the following procedure should be adopted very carefully; any negligence may lead damage to the indenter.

1. Adjust the weights on plunger of dash – pot according to the Rockwell scale required as shown on chart.
2. Keep the leaver at position A.
3. Place specimen securely on testing table. Tern the hand wheel clockwise, so that specimen will push the indenter of diameter 'D' and show a reading on dial gauge as small point at '3'(Red spot) and long pointer close to '0' of outer scale.
4. Turn the lever from position A to B slowly so that, the total load is brought into action with out any jerks.
5. The long pointer dial gauge reaches a steady position when indentation is complete. Then take back the lever to 'A' position slowly. (Sudden return to lever from B to A may show erratic reading. The weights are hereby lifted off, only the initial load remaining active.
6. Replace the specimen from the testing table to the surface plate. Then measure the impression diameter of 'd' by using Brinell's microscope.
7. Carry on the same procedure for further tests.

4.12.1 CHART

The Chart for most commonly used for Brinell's hardness tests.

1st force preliminary test force (10Kgf)	187.5Kgf	250 Kgf
	Ball – 2.5 mm diameter	Ball – 5mm diameter
Application	Steel and cast iron	Copper and aluminum alloys

Table no. 4.12.1 Chart for most commonly used for Brinell's hardness tests.


Fig 4.12.1 Brinell's Hardness testing operational image

4.13 Observations Brinell's Hardness Experiment of Panchaloha

1. The size of the indentation the indenter leaves is measured in the optical Brinell hardness test. The Brinell method uses a spherical indenter, in contrast to the similarly optical Vickers method, which presses a pyramid-shaped indenter into a specimen.
2. The Brinell indenter, using a predetermined ball diameter and a defined test force, leaves an indentation in the surface of a work piece (specimen), and the greater the indentation, the softer the material being tested.

3. According to ISO 6506, a spherical, hard metal (tungsten carbide) indenter is pressed into a specimen (workpiece) with a specified test load to determine the Brinell hardness (HBW) (between 1 kgf and 3000 kgf).
4. The ratio of the applied test force (F in newtons) and the Brinell hardness (HBW) determines the Brinell hardness.

Fig 4.13.1 Brinell's Hardness conversion tables

4.13.1 TABULAR COLUMN (BRINELL TEST)

4.13.1.1 SPECIMEN 1

1. Test piece material = Panchaloha with Ferrous
2. Dia. of the ball , D = 2.5mm
3. Load section P/D^2 = 1200
4. Test load = 3000Kgf
5. Load application time = 15 sec – 40 sec

S.no	d1	d2	(d1+d2)/2	Load applied in Kg	Dia. of ball D mm	Average HB Kg/mm^2
1.	2.2	2.8	2.4	1000	2.5	105.62
2.	2.4	3.1	2.75	1500	2.5	270.62
3.	3.1	4.1	3.6	3000	2.5	424.41

Table no. 4.13.1 Observation table for Specimen 1

4.13.1.2 SPECIMEN 2

1. Test piece material = Panchaloha without Ferrous
2. Dia. of the ball , D = 5mm
3. Load section P/D^2 = 500
4. Test load = 3000Kgf
5. Load application time = 15 sec – 50 sec

S.no	d1	d2	(d1+d2)/2	Load applied in Kg	Dia. of ball D mm	Average HB Kg/mm^2
1.	3.8	4.1	3.95	1000	5	65.62
2.	2.4	3.1	2.75	1500	5	109.62
3.	3.3	4.4	3.85	3000	5	211.05

Table no. 4.13.2 Observation table for Specimen 2

Take, If diameter of ball indenter 'D' is 2.5 mm, then $F/D^2 = 30$

If diameter of ball indenter 'D' is 5 mm, then $F/D^2 = 10$

4.13.1.3 PRECAUTIONS

1. The specimen should be clean properly.
2. Take reading more carefully and correct.
3. Place the specimen properly.
4. Jack adjusting wheel move slowly
5. After applying load remove the load.

4.13.1.4 CALCULATIONS

HB = load applied (Kgf) / Spherical area indentation (in mm)

$$HB = 2F/\pi D(D- \sqrt{D^2 - d^2})\ Kg/mm^2$$

1. HB= 2*1000/ **π *2.5 (2.5- √(2.5² – 2.4²) = 105.62 with ferrous similarly other loads.**
2. HB= 2*1000/ **π *5 (5- √(5² – 3.95²) = 65.62 with out ferrous similarly other loads.**
3. Similarly remaining terms were calculated as follows.

4.13.1.5 RESULT

The Brinell's Hardness number of the specimen 1 is **266.833.**
The Brinell's Hardness number of the specimen 2 is **128.763.**

Specifications	specimen 1 Panchaloha with Ferrous	specimen 2 Panchaloha without Ferrous
The Brinell's Hardness number	**266.833**	**128.763.**

Table no.4.17.2 Table Results of the Brinell's Hardness number in Hardness test.

4.13.1.6 INFERENCE

The Hardness of Specimen 1 is greater than the Specimen 2 is composition of ferrous and aluminium titrate (neglected quantity) is added in Specimen 1 the wear resistance is founded in Specimen 1.

RESULTS AND DISCUSSIONS

5.1 Results and discussions of Open Hearth furnace casting method

1. The Panchaloha is the super alloy in naturally the composition of panchaloha is finite and appropriate weight age is calibrated for making the panchaloha specimens in casting process moreover it is essential process to take mixing of composition is significant role in casting by using sulphide and navasagaram powder in mould cavity for removal of porosity of metal.
2. In this experiment the above the variant specimen were casted and tested analyzed experimentally.
3. In the Experimental approach of Panchaloha the selected composites are the following
   i. Panchaloha with ferrous
   ii. Panchaloha without ferrous
4. The method of process of casting involved to make specimen heating by help of crucible inserted in the furnace.
5. Most of specimen formation involves time complexity taking of 5 to 6 hours of time.
6. Mixing of metals is a crucial stage in casting the metals combines at super saturation state of metals for reaching its critical point of approach.
7. The Super saturation can be observed in casting flame of crucible in furnace turns into light greenish colour.
8. The earthen ore charcoal should be used for casting heat treatment for certain high temperatures of melting points of metals.

The Process and Results of Panchaloha Specimens casted images are below respectively.

Fig 5.1.1 The Process and observation of making Panchaloha specimen by OHF casting.

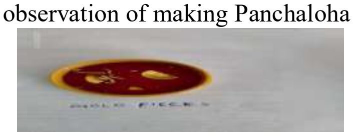


Fig 5.1.2 Image of 24K Gold pieces of 1gram for composition of Panchaloha

Fig 5.1.3 Image pure silver for composition of Panchaloha

Fig 5.1.4 Image five materials for composition of Panchaloha

The Panchaloha Specimens were prepared with 10grams without ferrous and 30 grams with ferrous accurately by reaching results of main objectives of experiment.

Fig 5.1.5 Result of Panchaloha without ferrous specimen

Fig 5.1.6 Result of Panchaloha with ferrous specimen

5.2 Results of Computation of B-H curve chart for Panchaloha

When the Panchaloha is in the computation of B-H Curve Chart on Magnetic Field of magnetic field by invading application of COMSOL Multi physics software a relative tolerance of 30% is used the magnetic flux density is 1.12 B under 0.5 H of magnet field.

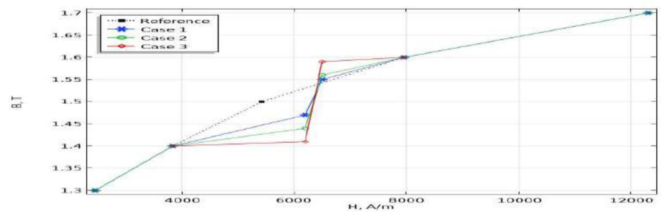


Fig 5.2.1 The plot of three groups of B-H curves with the reference from the built-in B-H curve.

The First-principles quantum mechanics simulations are very useful to analyze the panchaloha specimen positive nature in materials.

Case	B-H Curve Data H (A/m), B (T)	Computation time
1	3841.67, 1.4 6200, 1.47 6500, 1.55 7957.75, 1.6	1minute 17 seconds
2	3841.67, 1.4 6200, 1.44 6500, 1.56 7957.75, 1.6	1 minute, 45 seconds
3	3841.67, 1.4 6200, 1.42 6500, 1.58 7957.75, 1.6	Nonlinear solver did not converge. Maximum number of Newton iterations reached. Time: 0.029466491699218753 seconds. Last time step is not converged.

Table 5.2.1 B-H curve data and computation times for the three cases.

With the help of computational methods, we can predict how much magnetic field H, Magnetic flux density B produce that predicts positive nature components vital by electricity transmission.

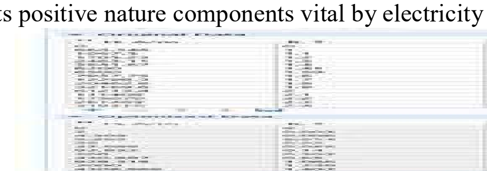


Fig 5.2.2 Input values given to the software original data obtained table

Many simulation methods based on quantum mechanics exist; here we primarily used is advantageous because metal conductors permits the use of periodic boundary conditions to simulate while usually providing a good balance between accuracy and computational expense.

Specimen 1 Magnetic field H	Specimen 2 Magnetic field H	Specimen 1 Magnetic Flux B	Specimen 2 Magnetic Flux B
0	0	0	0
1.02	2	1.2	1.1
259.61	2508	1.4	25
528.554	2089	1.6	298
565.692	2099	1.55	2052
651.098	4698	1.89	2052
785.82	4699.325	1.99	2065

Table 5.2.2 Input values of specimens of Panchaloha

The simultaneous exponential extrapolation approach and the linear interpolation method are the mainstays of the optimization algorithms. The programme necessitates the use of the original curve data, which is stored in a as the input, use a text file. The application will verify if the curve needs to be optimized after it has been imported. The application user can generate optimized curve data by pressing the Optimize button, which can then be exported to a text file.

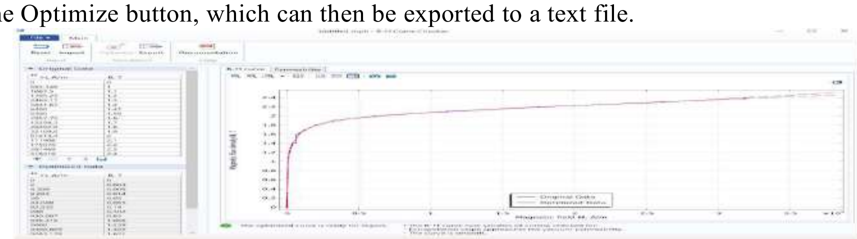


Fig 5.2.3 The B-H Curve Checker application, showing the original and optimized B-H curves.

The B-H Curve Checker tool is now available in COMSOL Multi physics version 5.5. The B-H curve measured from experiments can be checked and optimized using this modeling tool.

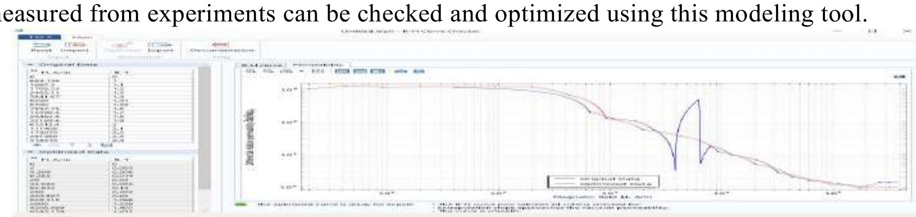


Fig 5.2.4 The B-H Curve Checker application, showing the differential relative permeability of the original and optimized B-H curves.

In the over fluxed zone, where measurements are difficult, the application can generate curve data. The programme can also reduce unphysical ripples in the B-H curve's slope, which could lead to numerical instability is observed.

5.2.1 Results for computation of B-H Curve Chart for Panchaloha

Specifications	Specimen 1 Panchaloha with Ferrous	Specimen 2 Panchaloha without Ferrous
Magnetic flux density B (Wb/m^2)or Tesla	1.86T	45.59T
Magnetic field H (N/mm^2)	15.56	25.39

Table 5.2.3 The Resultant of B-H Curve Chart of Panchaloha in Magnetic Flux Density and Magnetic Field of Specimens.

The Resultant of B-H Curve Chart determines the Panchaloha is having hidden energy that is positive energy by more emission of magnetic field and flux density then other metals and therefore the main objectives of the experiment is analyzed and observed and the assumptions of experiment made true in scientifically.

The Panchaloha with ferrous is having less Magnetic flux density B (Wb/m^2) or Tesla and Magnetic field H (N/mm^2) than Panchaloha without ferrous. Hence It is Observed that the Panchaloha without ferrous are invaded traditional rituals idols for worship place like temples etc.

5.3 Results and Observations Brinell's Hardness test of Panchaloha

The Brinell's Hardness number of the specimen 1 is **266.833 ,** the Brinell's Hardness number of the specimen 2 is **128.763** ,The Hardness of Specimen 1 is greater than the Specimen 2 is composition of ferrous and aluminium titrate (neglected quantity) is added in Specimen 1 the wear resistance is founded in Specimen 1

5.3.1 SPECIMEN 1

1. Test piece material = Panchaloha with Ferrous
2. Dia. of the ball , D = 2.5mm
3. Load section P/D^2 = 1200
4. Test load = 3000Kgf
5. Load application time = 15 sec – 40 sec

S.no	d1	d2	(d1+d2)/2	Load applied in Kg	Dia. of ball D mm	Average HB Kg/mm^2
1.	2.2	2.8	2.4	1000	2.5	105.62
2.	2.4	3.1	2.75	1500	2.5	270.62
3.	3.1	4.1	3.6	3000	2.5	424.41

Table no. 5.3.1 Observation table for Specimen 1

5.3.2 SPECIMEN 2

1. Test piece material = Panchaloha without Ferrous
2. Dia. of the ball , D = 5mm
3. Load section P/D^2 = 500
4. Test load = 3000Kgf
5. Load application time = 15 sec – 50 sec

S.no	d1	d2	(d1+d2)/2	Load applied in Kg	Dia. of ball D mm	Average HB Kg/mm^2
1.	3.8	4.1	3.95	1000	5	65.62
2.	2.4	3.1	2.75	1500	5	109.62
3.	3.3	4.4	3.85	3000	5	211.05

Table no. 5.3.2 Observation table for Specimen 2

Take, If diameter of ball indenter 'D' is 2.5 mm, then $F/D^2 = 30$

If diameter of ball indenter 'D' is 5 mm, then $F/D^2 = 10$

5.3.3 CALCULATIONS

HB = load applied (Kgf) / Spherical area indentation (in mm)

$$\mathbf{HB = 2F/\pi D(D- \sqrt{D^2 - d^2})\ Kg/mm^2}$$

1. HB= 2*1000/ π ***2.5 (2.5-** $\sqrt{(2.5^2}$ **–** $\mathbf{2.4^2}$ **) = 105.62 with ferrous similarly other loads.**
2. HB= 2*1000/ π ***5 (5-** $\sqrt{(5^2}$ **–** $\mathbf{3.95^2}$ **) = 65.62 with out ferrous similarly other loads.**

Similarly remaining terms were calculated as follows.

5.3.4 RESULT

1. The Brinell's Hardness number of the specimen 1 is **266.833.**
2. The Brinell's Hardness number of the specimen 2 is **128.763.**

Specifications	specimen 1 Panchaloha with Ferrous	specimen 2 Panchaloha without Ferrous
The Brinell's Hardness number	**266.833**	**128.763.**

Table no. 5.3.3 Table Results of the Brinell's Hardness number in Hardness test.

5.3.5 INFERENCE

The Hardness of Specimen 1 is greater than the Specimen 2 is composition of ferrous and aluminium titrate (neglected quantity) is added in Specimen 1 the wear resistance is founded in Specimen 1.

5.4 Results and Observations for Microstructure analysis of Specimen Panchaloha

1. The microscopic approaches of panchaloha is to be determined experimentally.
2. In this experiment the electronic microscope to test the microstructures of specimens panchaloha.
3. In the Electronic microscope containing the lenses of 5X, 10X,15X.

4. The Ethyl alcohol is used for cleaning reagent for better appearance of microstructure of the specimen.
5. These are microstructures of panchaloha which observed under the electronic microscope at 5X,10X,15X lens .
6. The experiment approach of panchaloha specimens microstructures is similar to panchaloha as per the research papers of Ishwarbhai Patel.
7. Hence the microscopic approaches of panchaloha are determined experimentally.

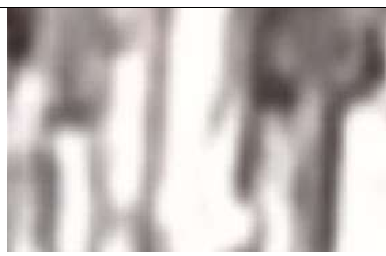
Panchaloha without ferrous	**Panchaloha with ferrous**
 Microstructure of Specimens at 5X	 Microstructure of Specimens at 5X
 Microstructure of Specimens at 10X	 Microstructure of Specimens at 10X
 Microstructure of Specimens at 15X	 Microstructure of Specimens at 15X

Table 5.4.1 The Observation table of Microstructures of Specimens at 5X,10X,15X stages of microscope

CONCULSION

It is been observed and concluded that the Open Hearth Furnace Casting process making for panchaloha utensils in the kitchenware it basically it converts scrap and liquid blast furnace iron to liquid steel using the heat of combustion of gaseous or liquid fuels cases, the fuel gas produces the high flame temperature required for melting.

The Investment casting the natural metals (or) atomized heavy metals were treated in high temperature the casting molten metal melts with two to three hours of time duration until the metal reaches its critical point of temperature in liquid state and mould cavity is in built in the casting the molten metal hardens immediately this methodology is used in joining of railway truck ends and panchaloha kitchen ware items.

In this Experiment analysis the miniature level of Open Hearth Furnace Method is invaded. In the miniature experiment the Open hearth furnace is used in customized way for casting panchaloha. The method invaded in this project is open hearth furnace casting with blower unit.

Hence these are casting processing methods of making Panchaloha. The Panchaloha is the super alloy in naturally the composition of panchaloha is finite and appropriate weight age is calibrated for making the panchaloha specimens in casting process moreover it is essential process to take mixing of composition is significant role in casting by using sulphide and navasagaram powder in mould cavity for removal of porosity of metal.

When the Panchaloha is in the computation of B-H Curve Chart on Magnetic Field of magnetic field by invading application of COMSOL Multi physics software a relative tolerance of 30% is used the magnetic flux density is 1.12 B under 0.5 H of magnet field.

The Panchaloha with ferrous is having less Magnetic flux density B (Wb/m^2) or Tesla and Magnetic field H (N/mm^2) than Panchaloha without ferrous. Hence It is Observed that the Panchaloha without ferrous are invaded traditional rituals idols for worship place like temples etc.

The Brinell's Hardness number of the specimen 1 is **266.833 ,** the Brinell's Hardness number of the specimen 2 is **128.763** ,The Hardness of Specimen 1 is greater than the Specimen 2 is composition of ferrous and aluminium titrate (neglected quantity) is added in Specimen 1 the wear resistance is founded in Specimen 1.

The Bharadwaja M & Shaastra V, Translated into English and edited by GR Josver, Coronation Press, Mysore, (1973).The Review extracted nearly 24 research papers and 32 journals.The emission of era is observed in superalloy panchaloha.The complete information were analysed practically and some research done experimentally in scope of future.The bharadwaja paper analysed many scientists observed from the Bharadwaja valmiki's sastra.

The Panchaloha experimental approach of panchaloha specimens microstructures is similar to panchaloha as per the research papers of Ishwarbhai Patel. The experiments were conducted to explore and find the procedure employed 5000 years ago to obtain lighter material from the heavy materials known at that time and to examine whether the same procedure can be adopted in the present day world.

Panchaloha specimens prepared by liquid metallurgy route using blower fitted coal fired furnace were found to conform to the descriptions in BVS with respect to colour and suitability for specific application.

However, the experimental density of the prepared Panchaloha specimens was 6 % less than the theoretical density as evidenced from the uniformly distributed microporosity.

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SCOPE OF FUTURE IMPROVEMENT

Although, the alloy specimens exhibited good mechanical properties, the strengths are not comparable with the present day aircraft materials. But, strengths were high in terms of the metals and materials known at that time.

The Panchaloha Specimen with ferrous can be used for industrial needs which requirements like wear resistance, feasibility, Durability, Hardness factors.

The Panchaloha Specimen without ferrous can be used for idols like attractive in nature for mankind for developments.

The Panchaloha Specimen needs more research and development should be enhanced for industrial needs, aircraft applications, protective arm shields, satellite networking defective receivers replacing gold percentage of usage of panchaloha.

The Panchaloha super alloy having the medicinal entities for curing the diseases like panchakrama treatment more research should be progressed in other techniques involved according to pantanjali book of ayurveda.

The Panchaloha as hidden energy proven by B-H curve chart magnetic field of positive emission of energy the research should be progressed in further decades for that emission of energy can utilize in energy generation units as green renewable resources.