Systematic review on the Study of Material Used in Composite Structure

Satya Bir Singh[1], Nishi Gupta[2], Harjot Kaur[3]

[1]Professor Department of Mathematics, Punjabi University Patiala, Punjab 147002, India

[2]Associate Professor-Mathematics, Department of Mathematics (UIS), Chandigarh University, Gharuan, Mohali, Punjab 140413, India

[3]Research Scholar, Department of Mathematics (UIS), Chandigarh University, Gharuan, Mohali, Punjab 140413, India

[2]Email: nishi.gupta.phd81@gmail.com, [3]Email: harjotmangat030@gmail.com

Abstract:

In this systematic review paper comparison is made between the various composite and monolithic materials having various characteristic properties strength, stiffness, weight, fat, temperature, structured behaviour, thermal insulation, conductivity, toughness, formidability, join ability, oxidation, wear resistance, affordability,high melt point, high compressive power and stability at high temperatureIt concluded that Al-SiC is the best material as compare to copper, steel, aluminium,P92 steel, titanium, magnesium, and aluminium alloy (AL6061-T6511) etc.

Keywords: Strength, thermal conductivity, stability, temperature behaviour, melting point.

1 Background:

1.1 Aim and Rational for current review:

The main aim of this review to find out which material is best for composite structure. The biggest problem facing to choose the material. The following parameters keep in mind while choosing the material that is lower cost, weight, strength, stiffness, attractiveness, fatigue life, temperature-dependent behaviour, thermal insulation, oxidation, wear resistance, affordability.

1.2 Definitional and Conceptual issue

Deepak V. [52]"A composite material is made by using combining two or more material to provide a unique combination of properties, considered one of that's made up of stiff, lengthy fibres and the other, a binder or 'matrix' which holds the fibres in place".

Kelly [50] defined that "The composites should not be regarded simple as a combination of two materials. In the broader significance; the combination has its own distinctive properties. In terms of strength to resistance to heat or some other desirable quality, it is better than either of the components alone or radically different from either of them".

Beghezan [49] defined that "The composites are compound materials which differ from alloys by the fact that the individual components retain their characteristics but are so incorporated into the composite as to take advantage only of their attributes and not of their short comings, in order to obtain improved materials".

Van Suchetclan [51] explain “Composite materials as heterogeneous materials consisting of two or more solid phases, which are in intimate contact with each other on a microscopic scale. They can be also considered as homogeneous materials on a microscopic scale in the sense that any portion of it will have the same physical property.”

1.3 Research Background

The concept of mixing some components for create new materialwith new properties to be not possiblethrough character additives isn't of latest foundation. Human have be first use of composite in “1500 B.C”. When “Egyptian” and “Mesopotamian”settleruse a mixture of “mud” and “straw” toconstruct strong and durable houses. Straw continuous to offer support to ancient composite products includeceramic and boats. Later, in “1200 A.D”. The “Mongols” invented the primary composite bow. Using a mixture of “wooden”, “bone”, and “animal glue,” bows have been pressed and wrapped with birch bark. These bows were extraordinarily effective and very correct. Composite “Mongolian” bows supplied “Genghis Khan” with army dominance, withfor the reason that of the composite era, this weapon becomes the maximum powerful weapon on the earth till the invention of “gunpowder”. The composite materials has been known in various paperwork in the history of mankind, the records of current composite probably commenced in “1937” while salesmen from the “Owens Corning fibreglass” organization commenced to promote fibreglass to interest events around the “United States”. Fiber glass have be prepared, approximately through coincidence in “1930”, whilst an engineer have become intrigue through a fiber that became shaped all through the manner of making use of lettering to a tumbler milk bottle. The composite material has many engineering applications for example composite material used for making turbine engines, aeroplanes jet and also in industries, particularly in structural applications.

The mud and straw mixture for making homes in 1500 B.C.

Turbine engine

1.4Practice Background

A composite material is a material preparedfrom two or more material by different physical and chemical properties.

"Wattle and daub is one of the oldest man-made composite materials, at over 6000 year old". From B.C to present time verities of composite material are used

Ancient Times

The instances B.C. marked start of varieties of composite substances utilized in every day application.

• The earliest recognised make use of composite is credited to "Mesopotamians". These historic human beings glued wooden strips at one of kind angle to make plywood in 3400 B.C.

•.Between 2181 and 2055 B.C, "Egyptians" use "Cartonnage" also layer of "linen or papyrus soaking" in plaster to create dying mask.

•Around 1500 B.C., "Egyptians and Mesopotamians" developers also artisans use straw towards boost mud bricks, boats and pottery.

•Around 25 B.C., "The Ten Books on Architecture" describe material with prominent diverse varieties of lime also mortars. Interestingly, studies demonstrate to cement defined is comparable, and inside various approach, better to "Portland" cement use these days.

Since the ancient time, developers, "artisans", "engineers" and manufacturer persevered to increase composite of a much broader collection of substances used for extra state-of-the-art application.

1200's

In approximately 1200 AD, "Mongols" invented first composite bows prepared as a mixture of "timber", "bamboo", "bone", "cattle tendons", "horns", "bamboo" and "silk bonded" with herbal pine resin.

1800's

From 1870's via the 1890's, a chemical revolution modified composite growth. New artificial resins had been converted from liquid to strong kingdom inside a pass-related molecular structure the use of a method referred to as "polymerization". Early on synthetic resins blanketed "celluloid", "melamine" and "Bakelite".

1900's

In the early on 1900's, chemical advances drove the growth of plastics. Material consisting of "vinyl", "polystyrene", "phenolic" and "polyester" has been produced and strengthening became necessary to offer strength also stress.

"Polyoxybenzylmethylenglycolanhydride" and"Bakelite" because it is usually regarded, be advanced with"Belgian-born New York chemist Leo Baekeland in 1907". A thermosetting phenol formaldehyde resincreated from are moval response of phenol through formaldehyde, Bakelite stand as single of the first plastics crafted from artificial components. Its

nonconductivity and heat-resistant residences made the composite extensively utilized in industrial and purchaser items packages along with electric insulators, radio and cell phone casing, kitchenware, earrings, tube stem, and kid's toy. Today's creditors love the "retro" attraction of Bakelite.

In 1993, in reputation of "Bakelite's" importance because the first artificial plastic, the "American Chemical Society special Bakelite a National Historic Chemical Landmark".

1930's

Recognized because the maximum essential decade inside the, composite enterprise, the thirties observed the improvement of resins still used these days. In 1935"Owens Corning" introduce the first glass fibre and released the fibre strengthened polymer (FRP) enterprise. In 1936, unsaturated polyester resins have been patented. In 1938, better presentation resin structures similar to epoxies additionally have become to be had.

1940's

The supplies of "World War II" took the FRP industry from studies to manufacture. In adding to high-energy-to-weight houses, chemists discovered that fibre glass composite are transparent to radio frequencies. This lead to the composite's variation for radar domes also different digital system.

Although now not deploy or commercialized until after "WWII", the first industrial grade boat hulls have been developed in this decade.

By 1947, a completely composite body vehicle is prototyped also examine, main to the development of the 1953 Corvette. Fiber glass perform impregnate with resin and molded in matched metallic die had been use to construct this classic car. The introduction of the auto age gives upward push towards numerous latest techniques for molding. Two methods, compression molding of "sheet molding compound (SMC)" and "bulk molding compound (BMC)", emerged as the dominant styles of molding for the automobile also other industries.

1950's

In early 1950's, production improvement continuous with the traits of "pultrusion", "vacuum bag molding", and "huge-scale filament winding". These composites continue towards locate application today. "Pultrusion" is use into the construct of linear components which include "ladders" and "moldings". Filament winding be one instance of aerospace composite substances. It have become the basis for massive-scale rocket automobiles to propel investigation of area within the 1960's also beyond.

1960's

In 1961, primary carbon fibre was original and numerous years later, have become commercially presented. Carbon fibres stepped forward thermo set component stiffness to weight ratio, to be used inside even more application inclusive of "aerospace", "automotive", "sporting goods", and "client goods". In the 1960's, the marine market changed into the major patron of composite materials.

1970's and 1980's

Over the subsequent 20 years, the composite substances marketplace superior. Latest ultra-high molecular mass polyethylene together different superior fibres utilized in break through

inside aerospace additives, structural also personal Armor, wearing apparatus, clinical gadgets and other application.

In the 1970's, the automotive marketplace surpass marine as the number one marketplace – a role it keeps nowadays.

In 1970, Mar-Bal started out to make custom-molded side for several programs which include:

- Electrical breakers
- Motor assemblies
- Small appliances

From this humble start, Mar-Bal growinterested in the mainly incorporated thermo set composites solution issuer these days.

1990's and 2000's

By the mid 1990's, composite substances became greater not unusual in mainstream production also construction. Because a price-effective alternative to conventional substances similar to metallic also "engineered thermoplastics", "thermoset" composites be commonplace components inside the equipment, creation, electric and transport industries.

Consumer also industrial market noticed the upward push in normal composite use. Common makes use with time stay today as example of composite substances in packages includes:

- Handles and knobs
- Weather-resistant stains
- Electrical infrastructures
- Pole line hardware
- Electrical cross-hands
- Insulators

In the mid-2000s,the improvement of the 787 Dream liner verified composite for high-energy also rigid packages also the ongoing growth of end technology, like "PVD" and "THERMTIAL", accelerated the range of packages within the automotive, machine and patron merchandise industry.

2000's and 2010's

The "Beech Starship" 2000, which is approximately entirely made from carbon epoxy faced "honeycomb" sandwich. In 2006, advanced carbon logy and fibre optic strain sensor were used at the unfastened status carbon spars for the Maltese Falcon, the latest sailing yacht.

2010's and 2018's

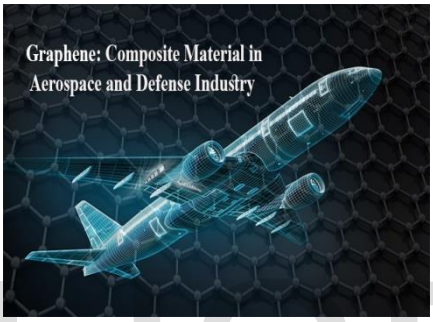
In 2013 "polymer resin matrix" material sand high fibres glass, carbon have be introduce resulting in stable expanarsion and reduce inside cost. FRP (Fibre-reinforced plastic) material

also used in “wind mill blades”, “industrial, shafts” and “fuel cylinders” for natural gas vehicles also bridges support beams.

2018’s and Future

Today, composite investigate attract offers from “governments”, “manufacturers” and “universities”. These investments permit improvement to boost up. Specialize organizations, along with “aerospace composite” businesses, will discover a place inside the industry. Two packages that maintain to experience modern growth are “airplane composite” substances and composite sheets used for marine.

Other materials together with “environmentally-friendly” resins incorporate recycled plastics, lighter also environmentally friendly products. Looking forward, nonetheless in the direction of be evolved fibres and resins will create even greater programs for ordinary and specialised use.



1.5 Review Question

Our review question is

Which is the best material?

2 Methods used in Review

2.1 Approach and Rationale

User group involvement is reflecting inside the work of the review itself, which include the background history, researcher’s research and books.

2.2 Methods used

User points of view on survey procedure and the temporary report be looked for and viewpoints composed with clients are incorporated into the last report. Points of interest of this survey have been coursed to various researcher’s research, books and papers.

3 Comparative Analysis of the Existing Models (Tables)

3.1Comparison of material used

So.No.	Year	Author	Title of paper	Material used

1	1950	"By Willian,D. Jenkins and Thomas G. Digges"	"Creep of High- Purity Copper"	Copper
2	1989	"B.A. Fields, R.J. Fields"	"Elevated temperature deformation of structural steel "	Steel
3.	1991	"Keisuke Matswura, Meikon Chou, Nortion Matsuda"	"Creep Deformation and Fracture of an Aluminium Composite Reinforced with Continous Alumina Fibers"	Aluminium
4.	1993	"M. Karayaka, HuseyinSehitoglu"	"Thermomechanical deformation modelling of Al2XXX-T4/SiCPcomposite"	Silicon Carbide, Al2XXX- T4 alloy
5.	1994	"D.J. Baker and Y.M.XIE"	"Elasto-Plastic-Creep Analysis of Restrained Steel Columns Exposed to Fire"	Steel
6.	1996	"N. Adefris, D.L. Mc Dowell"	"Creep- fatigue Crack Growth behaviour in 1Cr- 1Mo- 0.25V steels. Estimation of crack tip parameters"	1Cr- 1Mo- 0.25V steels
7.	1999	"B. Skrotzki, Gunther Eggeler, T. Rudolf"	"Creep behaviour and microstructural evoluation of near-gamma- TiAl alloy with duplex microstructure"	TiAl alloy
8.	2000	"Guowei Li and Brain G. Thomas"	"Modeling Creep and Fatigue of Coper Alloys"	Copper alloy, Cu-Ag-P, Cu-Cr-Zr, Cu-Ni-Bc and Cu- Al_2O_3
9.	2001	"A. Paquin, S.Berbenni, V.Favier, X. Lemoine, M. Berveiller"	"Micromechanical modelling of the elastic- viscoplastic behaviour of polycrystalline steels"	Steel
10.	2001	"Katsuhiko Sasaki, Ken-ichiOhguchi, Hiromasa Ishikawa"	"Viscoplastic Deformation of 40 Pb/60 Sn Solder Allpoys- Experimentals and Constitutive Modeling"	40Pb/ 60Sn solder alloy

11.	2003	"Ken-ichiOhguchi, Katsuhiko Sasaki"	"Elastic- Plastic-Creep simulation of Pb\Sn Solder Alloys by Separation of Plastic and Creep"	Pb/Sn Solder Alloys
12.	2003	"VikasHasija, S.Ghosh, Michael J.MillsDeepuS.Joseph"	"Deformation and Creep modeling in polycrystalline Ti-6Al alloys"	Polycrystalline Ti-6Al alloys
13.	2004	"S. Berbenni, V.Favier, X.Lemoine, M. Berveiller"	"Micromechanical modelling of the elastic- viscoplastic behaviour of polycrystalline steels having different microstructures"	Steels, HSLA, Dual- Phase steels
14.	2005	"Hidenari Takagi, Ming Dao, Masami Fujiwara and Masahisa Otsuka"	"Detecting the transition of creep rate-controlling process in Al-Mg solid solution alloy instrumented indentation"	Al-Mg
15.	2008	"G. Sasikala, S.K. Ray"	"Evaluation of quasistatic fracture toughness of a modified 9Cr- 1Mo(P91) steel"	9Cr- 1Mo(P91) grade steel
16.	2009	"Akhtan S. Khan, RehanKamzi,AnitPanderf, Thomas Stoughton"	"Evoluation of subsequrent yield surfaces and elastic constants with finite plastic deformation Part-1: A very low work hardening aluminium alloys (Al6061- T6511)"	Aluminium alloy (Al6061-T6511)
17.	2009	"G. Bles, W.K. Glowacki, A. Tourobi"	"Experiments study of the cyclic visco- elasto-plastic behaviour of a polynamits fibre strap"	Polyamide 6-6(PA66) fibre strap
18.	2009	"A. Rusinek, J.R. Keepacko"	"Experiment on heat generated during plastic deformation and stored energy for TRIP steels"	TRIP steels(C, Mn, Si)
19.	2009	"Masaaki Tabuchi, HimmichiHongo, Yongkui Li, Takashi	"Evalution of microstructures and creep deformation in thr	Cr steel

		Watanabe, Yukio Takahashi"	HAZ of P91 Steel weldment"	
20.	2010	"Akhtar S. Khan, Amit Pandey, Thomas Stoughton"	"Evoluation of subsequent yield surface and elastic constant with finite plastic deformation Part III : Yield surface in tension strees space (Al6061-T6511 and annealed 1100Al)"	Al6061-T6511 and annealed 1100Al, Steel , OHFC copper
21.	2010	"J. Brnic, M. Canedija, G. Tarkalj, D.Lanc"	"50 Cr Mo4 steel-Determination of mechanical properties at lowered and elevated temperatures, creep behaviour and fracture toughness calculation"	50 CrMo4 steel
22.	2010	"T.H. Hyde, M. Saber, W. Sun"	"Creep crack growth data and predection for a P91 weld for 650^0 C"	P91 weld(C, Mr, Si, N, Cr, Mo, Wb, Cr,V)
23.	2010	"M. Tabushi, A.T. Yokobri Jr., R. Sugiura, M. Yatomi, A. Fuji, K. Kobeyeshi"	"Results of Japanese round robin program for creep crack growth using Gr. 92 steel welds"	Cr. 92 steel
24.	2011	"Stefanie Feih, E. Kandare, B.Y. Lattimer, A.P. Mouritz"	"Structural Analysis of Compression Deformation and Failure of Aluminium in Fire"	Aluminium
25.	2012	"Lei Zhao, Hongyang Jing, Lianyong Hun, JunjieXiu, Yongdin Hun, JunjieXiu, YariaQiao"	"Evaluating creep property of distinct zones in P92 steel welded joint by small punch creep test"	P92 steel
26.	2012	"H.Wang, P.D. Wu, C.N. Tome, J. Wang"	"Study of lattice Strains in magnesium alloy AZ31 based on a large strain elastic-viscoplastic self-consistent polycrystal model"	magnesium alloy AZ31
27.	2012	"M. Basirat, T. Shrestha, G.P.Potirniche, I. Charit, K. Rink"	"A study of the creep behaviour of modified 9Cr-1Mo steel using continum-damage modeling"	9Cr-1Mo steel
28.	2012	"Lei Zhao, Hongyang Jing, Yongdiuan Han,	"Prediction of creep growth behaviour in	ASME P92 steel

		JunjieXiu, Lianyong Xu"	ASME P92 steel welded joint"	
29.	2013	"Y.C. Lin, Yu- Chi Xia, Ming –Song Chen, Yu-Qiang Jiang , Lei-Ting Li"	"Modeling the creep behaviour of 2024-T3 Al alloy"	2024-T3 Al alloy(Aluminium alloy) Al-Cu-Mg
30.	2013	"S.B. Narasimhachary, A. Saxena"	"Crack growth behaviour of 9Cr-1Mo(9P1) steelunder creep-fatigue conditions"	9 Cr- 1 Mo (P91) steel
31.	2013	"F.Moreno, M.Sol, J.Martin, M.Perez, M.C. Rubio"	"The effect of crumb rubber modifier on the resistance of asphalt mixes to plastic deformation"	Rubber
32.	2013	"Tahior Mahmood, Sangarapillai, Kanapathipilli, Mahiuddia Chowdhury"	"A model for creep life prediction of thin tube using strain energy density as a function of streestriaviality under quasi static loading employing elastic-creep & elastic-creep deformation"	0.5% Cr- 0.5 % Mo-0.25% V low alloy of steel
33.	2013	"A Siebert- Timmer, M Fletcher, L Bichler , D. Seeliako"	"Creep performance of wrought AX30 & EZ33 magnesium alloy"	AX30 & EZ33 magnesium alloy
34.	2014	"Lei Zhao, Hongyang Jing, JunjieXiu, Yongdian Han, Lianyong Xu"	"Experimental investigation of specimen size effect on creep crack growth behaviour in P92 steel welded joint"	P92 steel
35.	2014	"S. Venugopal, G.Sasikala, Vatindra Kumar"	"Creep crack of growth behaviour of a P91 steel weld"	9 Cr-1 Mo steel (P91)
36.	2014	"Paulo Roberto Costa Junior, Carslo de MouraNeto, Darrell A. Wade"	"Evaluation of a 7050TAF aluminum alloy submitted to creep age forming"	7050 TAF aluminum alloy
37.	2014	"AkhioNakamara, Yasushi Kamimurea, Keiichi Edagwa, Shin Takeuchi"	"Elastic and plastic characteristics of a model Cu-Zr amorphous alloy"	Cu-Zr amorphous alloy
38.	2015	"Y.C. Lin, Guan Liu, Ming-Song Chen, Jia Li, Hua-Min Zhou"	"Effect of two-stages creep- aging processing on mechanical properties of an Al- Cu-Mg alloy"	Al-Cu-Mg alloy

39.	2016	"Yatinder Kumar, S. Venugopal, G. Sasikala, Shaju K Albert, A.K. Bhaturi"	"Study of creep crack growth in a modified 9 Cr- 1 Mo steel weld metal and heat affected zone"	"9 Cr-1 Mo steel"
40.	2016	"Zhong Chen, Hyuk Jong Bong, Dayong Li, R.H. Wangoner"	"The elastic-plastic transition of metals"	DP980-1, DP980-2,DP980-3, DP600-1,DP600-2,DP600-3,HSLA-1,HSLA-2,HSLA-3,IF-1,IF-2,IF-3,BH340,DP780, TRIP780, TWIP,CP1180,SS301, SS304, SS316, Al7075, Al6016, Al5754, Brass 260, MgAZ31, MgAZ61, TiCP Grade2QP980, TBF980
41.	2017	"Yongzhong Ni, Hong Xu, Yuan Chang &Xueping Mao"	"Elastic- plastic creep demage of notched P92 steel specimens"	P92 steel
42.	2017	"PankajThakur,Gaurav Verma, D.S. Pathania, SatyaBirSingh"	"Elastic-Plastic Transition On Rotating Spherical Shells In Dependence Of Compressibility"	Rubber, Plastics, Copper
43.	2017	"Hongyang Jing, Dingbng Su, Lianyong Xu, Lei Zhao, Yongdian Han, Ruiwan Sun"	"Finite element simulation of creep – fatigue crack growth behaviour for P91 steel at 625^0C considering creep-fatigue interaction"	P91 steel
44.	2017	"Pankaj Thakur, Nishi Gupta, Satya Bir Singh"	"Thermal effect on the creep in a rotating disc by using Sherby's law"	Al-SiCp
45.	2017	"Nishi Gupta, Pankaj Thakur, Satya Bir Singh"	"Effect of thermal gradient on the creep on a rotating disc"	Al-SiCp
46.	2017	"Xinjun Yang, Xiang Ling"	"Application of a composite model in the analysis of creep	TA2 and R60702

			deformation at low and intermediate temperature"	
47.	2018	"Yongqian Xu, Lihua Zhan, Minghui Huang, Ruilin Shen, Ziyao Ma, Lingzhi Xu, Kai Wang, Xun Wang"	"Deformation behaviour of Al-Cu-Mg alloy during non-isothermal creep age forming process"	Al-Cu-Mg
48.	2018	"N. Ab,Razaka,b, C.M. Daviesa, K.M. Nikbin"	"Testing andassessmentof cracking in P91 steels under creepfatigue loading conditions"	Steel

4Identifying also Describing Studies

The exclusion criteria to titles (wherein available, abstracts) became accomplished with the studies all the research papers, background history and practice history and definitions given by the researchers.

Applications of the exclusion criteria to take a full copy of papers then studies that papers and comparing the material used in papers then came consensus.

5 The In-Depth studies- Review

Every the research included inside the systematic map was as well included within the in-depth analysis.

Studies all the definition, researcher research, theories, background history, data here following question is arise

- Which material is best?
- Which material is affordable?

The following parameters are kept in mind while choosing a composite material for a particular application

- Strength
- Stiffness
- Attractiveness

- Weight
- Temperature –dependent behaviour
- Thermal insulation
- Thermal conductivity
- Toughness
- Formidability
- Join ability
- Oxidization
- Wear Resistance
- Affordability

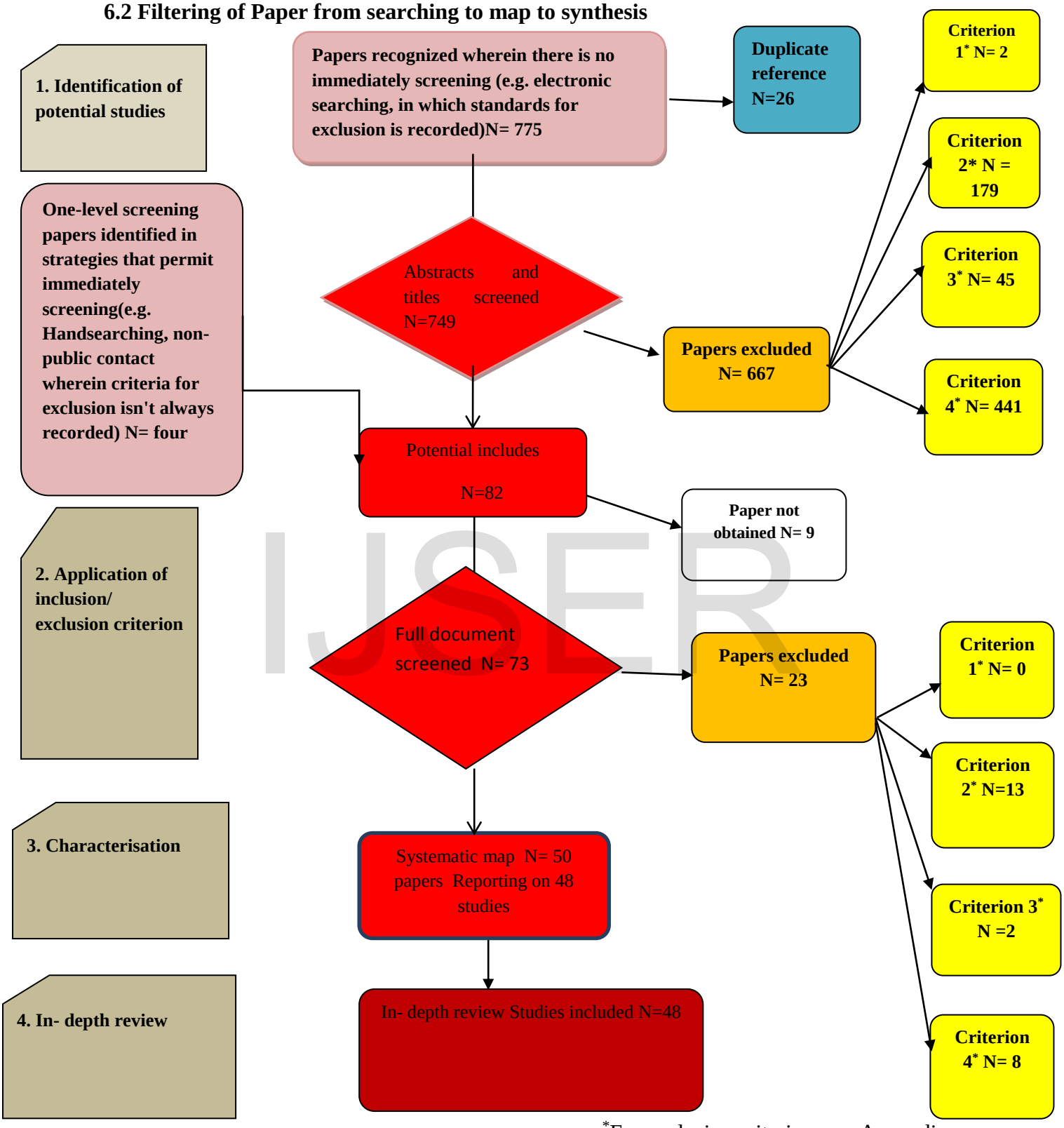
6Identify and Describing Studies: Results

6.1Studies Included from Searching and Screening

After except for from copies, 749 papers had been identified through an electronic are looking for the use of the preferred search method (the primary compare database). In the primary level of screening on titles and abstracts. The four exclusion codes had been implemented to his 667exclusion. The exclusion applied to each of this excluede paper as shown fig.

The four papers for hand screening and 82 papers are potential includes also nine papers are not obtained. The full copies of the final 73 papers have been screened through the exclusion/ inclusion criteria. The four exclusion codes were applied to this then 23 excluded. Then systematic map on 50 papers but 2 papers are not found than reporting on only 48 papers.

6.2 Filtering of Paper from searching to map to synthesis



*For exclusion criterion, see Appendix

Appendix: Inclusion and exclusion criterion

For paper towards the included inside systematic diagram, it can be satisfies following criteria:

1) The papers present on web of sciences published from 1950 to 2018.
2) It reports a study on research paper and data collect by the researchers.
3) These study deals with composite materials.
4) The study deals with the used of material in composite structure the papers based on it published in journal or conference.

Exclusion codes: criterion used for excluding a paper
EXC1: Paper not publishes any journal or conference from 1950 to 2018.
EXC 2: Papers not about material.
EXC 3: Not a report on original data collect or experiments done by the researcher.
EXC 4: Papers not deals with the material used in composite structure.

6.3 Characteristics of the includes studies

The after apply inclusion and exclusion criteria 48 paper are selected all that paper focus on the main review question material used in composite structure. These papers written in English language and source of paper are web of sciences. These paper selected paper written by the different country writers like India, China, Japan, USA, France, and Australia.

7 In- Depth Review: Results

Forty-eight papers meet the inclusion criteria used for the in-depth review.

Key finding of included studies

Willian et al. (1950) had used steel as a composite material. Creep test were performed at 110^0F, 250^0F and 300^0 F temperatures. The influence of temperature on the strees-strain relation at 80^0F at room temperature before heating at 250^0 F for 48 hours.

B.A. Field et al (1989) had used steel as composite material in this paper American specification for ASTM A36 use to formulate equation from which elastic, plastic, creep and total strain was calculated, also correlation measure between A149 and SS41 steels.

Keisuke Matswura et al. (1991) had used aluminium composite strengthened with aluminium composite reinforced through alumina fibers at tap of 573K to 773 K mechanism of excessive high temperature 573K to 773 K the mechanism of excessive temperature deformation and fracture of the composite. In the immoderate strain variety, the creep deformation proceeds thru the network fracture of fibers and the plastic deformation of the matrix. The creep curves confirmed the “primary”, “secondary” and “tertiary” stages. The crucial strain which superb the various low and immoderate strain levels have become on 500 MPa at 573 K and 450 MPa at 773 K

M. Karayaka et al. (1993) had used silicon carbide, Al2XXX- T4 alloy. “Thermo mechanical fatigue (TMF)” and “isothermal fatigue” of unreinforced and SiCp-reinforced Al2xxx-T4 alloy had been examined. Thermo mechanical fatigue experiments had been carried out under T min = 100°C,T max = 200°C and T min = 100 °C,T max = 200°C situations, and isothermal experiments were carried out on 200°C and 300 °C. Based on stress range, giant

enhancements in fatigue existence have been discovered with reinforcement below both isothermal and thermo mechanical loading conditions.

D.J. Baker et al. (1994) had used steel as a composite material in analytical model to elevating temperature due to fire. The model incorporate thermal, creep and elasto-plastic effects which represents cloth factors of behaviour of metallic columns whilst uncovered to hearth. The thermal, pressure and creep associated deformations calculated for every load degree show the usual pattern of the domination of thermal results inside the path of the early segment, by a gradual increase in stress and creep component at temperature 600°C.

N. Adefris et al. (1996) had used 1Cr- 1Mo- 0.25V steels non-linear finite detail (FEM) analyses, concerning severa creep deformation law, in addition to experiments with maintain instances of a 100 s and 15 min were carried out on compact type specimens with desk bound cracks. The foremost aim expressions meant for approximating the small- scale creep parameters, (C_t)avg, for 1Cr- 1Mo- 0.25V metal at 538°C (a a 100°F). Here (C_t)avg is a consultant cost for the creep parameter C_t, averaged over a keep period below the conditions of creep- fatigue loading. These expressions were after that useful to crack increase records received from specimens examined beneath the numerous hold instances and calculate values of C_t contrast properly with measured values,.

B. Skrotzki et al. (1999) has used TiAl alloy,uniaxial creep of duplex near gamma TiAl alloy in constant creep test between 650 to 750 degree C and strees level between 150MPa to 350MPa. Primary creep movement of ordinary dislocations (first process) and mechanical twinning (second process) control plastic deformation while only a few super dislocations were observed. At the creep rate minimum a third process, dynamic recrystallization, was observed. It results in a decrease of local back stresses. The overall creep rate is a result of the superposition and the interaction of these three elementary processes.

Guowei Li et al. (2000)had used the four copper alloys "Cu-Ag-P, Cu-Cr-Zr, Cu-Ni-Be and Cu-Al_2O_3". The bending fatigue test are conducton two-layered specimen of "copper alloy", "stainless steel "and "thermal ratchet ting" were observed at 250^0 C.. The test specimen had been modeled through two dimensional elastic-plastic-creep finite-element model using the "ABAQUS software". To equal the measurements, a number one thermal-creep regulation became developed for Cu-0.28 pct Al_2O_3 for stress level up to 500 MPa and strain rates from 10^{-8} to 10^{-2} s^{-1}. Specifically, "$\dot{\varepsilon}(s^{-1})=1.43\times10^{10}$ exp $(-197{,}000/8.31\ T(K))\ (\sigma(MPa))^{2.5}\ (t(s))^{-0.9}$".

A.Paquinet al.(2001) had used as a steel composite material a self –constant model evolved to provide an explanation used for the elastic-visoplastic behaviour of heterogeneous material be carried out to low carbon steels to simulated tensile exams at diverse strain charges in low temperature. Comparisons among three paintings-hardening fashions explain to the account of dislocation annihilation improve the effects on simulation at huge lines. The evolution of the Lankford coefficients and texture improvement are also correctly simulated. Some micro structural factors of deformation together with the saved electricity and the evolution of the go with the go together with the go with the flow rate are referred to. By together with the dislocation density on each slip device as internal variable, intragranular heterogeneities are underscored

Sasaki K et al. (2001) had used 40Pb/ 60Sn solder alloy, the first propose a smooth constitutive version used for visco plasticity which comprises the elastic, plastic and creep strain independently. The creep pressure remains evaluated through the changed Norton's law

at serval temperature variety. The plastic stress is evaluated with the aid of the usage of the flow rule the usage of again stresses superior through a Ziegler type of hardening rule. The creepstress is evaluated via the modified "Norton's law". The applicability of this constitutive version is evaluate through natural tensile take a look at, creep check and cyclic tension-compression loading take a look at to illustrate the improvement of viscoplastic deformation of 40Pb/60Sn alloys. The test have been performed over several temperature range and strain expenses. As a cease end result, it come to be discovered that the material constants used within the constitutive model might be resolute by means of way of way of smooth checks at the side of natural tensile and cyclic anxiety-compression loading test.

Ken-ichi ohuchi et al.(2003) had used Pb/Sn solder alloys. In this paper describe a constitutive version for solder-alloys with method to decide the fabric parameter. Firstly, a constitutive model that divide the inelastic deformation into plastic and creep elements in proposed and numerical approach for determination of material parameters.

Vikas Hasija et a.l (2003) had used polycrystalline Ti-6Al alloys and developed experimentally validate computational model used for titanium alloys which can use plastic anisotropy and time –based totally plasticity for analysing creep and stay phenomena. A time-established crystal plasticity machine is advanced for hcp crystalline shape, with the addition of micro structural crystallographic orientation distribution.

S. Berbenni et al. (2004) had used steels, HSL. Dual-Phase steels superior a micromechanical model primarily based on new and non- traditional self- everyday additives accomplished for describe the elastic- viscoplastic behaviour metal with high-quality microstructures in sizeable variety of strain rates.

Hidenari Takagi et al. (2005) had used Al-Mg as a composite material, indentation creep tests of an Al- five. Three mol% Mg robust answer alloy turned into accomplished using a microirdenter to be able to examine creep homes can extracted at temperature ranging 546 K to 590 K. When the common same stress σ_m inside the place underneath the indenter decreases to a significant pressure σ_c some stage in the creep indentation, the creep stress exponent n adjustments from 4.9 to 3.0. The calculated σ_c- cost decreases from 122 to 52 MPa with growing temperature, whilst the corresponding indentation pressure charge $\varepsilon_c$increases from 1.22×10^{-3} to 2.00×10^{-3}per sec. The temperature dependence of σ_c and ε_c is type of in settlement with the outcomes derived from dislocation concept. Results agree properly with the ones of traditional uniaxial creep tests.

G. Sasikala et al.(2008) had used 9Cr- 1Mo(P91) grade steel, for modify 9Cr-1Mo(P91) metallic inside the normalized and temperature (NT) situation with additionally multiplied thermal ageing, the elastic-plastic fracture longevity parameter.

Akhtar S. Khan et al.(2009) has used aluminium alloy (Al6061- T6511) and studies the initial with subsequent yield surface in Al6061- T6511, subsequent yield surface determine during tension, free end torsion, also yield surface obtain followinglinear, bi-liner, and non linear unloading route finite plastic deformation. The experimentally results are found on annealed 1100 Al and on together Al alloys in tension- tension stress space

G. Bles et al.(2009) had used polyamide 6-6(PA66) fibre strap and performed experimental tensile tests happening polyamide-based(PA66), experiment results was prepared by a "visco-elastic-hysteresis model", base going on superimposition of three stress component.

A. Rusinek et al. (2009) had usedTRIP steels(C, Mn, Si) as a composite material studies the impact of heat generation for the duration of plastic deformation in new sheet metallic with high energy on mechanical behaviour relaxation tests with high temperature.

Masaaki Tabuchi et al.(2009)had used Cr steel explain the techniques and mechanism of Type IV creep damage by Mod.9Cr–1Mosteel elements. Long-term creep checks for base metallic, simulated high-quality-grained HAZ, and weld joint have been carried out at 550°C, 600°C, and 650°C. The experimental creep damage distributions have been compared by calculated versions the use of finite detail method and harm mechanics analysis

Akhtar S. Khan et al. (2010) had used Al6061-T6511 and annealed 1100Al, steel, OHFC copper as a composites material subsequent yield surface for aluminium alloys for three proportional loading paths. In paper comprephen size experimental result a subsequent yield surface under hension-tension strees-strain.

J. Brnic et al. (2010) had used50CrMo4 steel as a composite material and find a few interesting experimentally determined referring 50CrMo4metal mechanical properties for material since uniaxial tensile assessments at lower and elevated temperature.

T.H. Hyde et al. (2010) had used P91 weld(C, Mr, Si, N, Cr, Mo, Wb, Cr,V) material, creep crack growth test going on compact tension(CT) specimen machined from 9P1 element on a constant load at 650^0C temperature. In this paper experimental creep crack growth test on 9P1 material uniaxial test at temperature range 650^0C.

M. Tabushi et al.(2010) had used Cr. 92 steel and find the type-4 cracks initiate the fine-grained HAZ extended term of steel on high temperature. In this paper CGC test and RRT test by using ("9Cr-0.5Mo-1.8W-V-Nb") steel.

Stefanie Feih et al.(2011) had used aluminium alloy present a finite-element(FE) modelling for predict the deformation softening additionally failure of compression loaded aluminium structure exposed to fire. The FF model is used on this paper use is the basis used for appearing complicated deformation with failure analysis compression- loaded aluminium structure in fire.

Lei Zhao et al. (2012) had used P92 steel as a composite and find creep tests on exclusive micro zone in P92 metal weld joint: base metallic, weld steel, pleasant grain warmth artificial sector with coarse grain heat affect quarter additionally find full deflection curves at some stage in creep from which the creep homes of various weld joint micro zone will be derive. In this paper finite element technique (FEM) with continuum harm mechanics comes to be used to analyze the variant of the creep damage, strain and pressure.

H.Wang et al. (2012) had used magnesium alloy AZ31as a composite material and develop large stress elastic visco-plastic self-consistent(EVPSC) model were used to studies the lattice strain evolution in extrudes magnesium alloy AZ31 in uniaxial tension and compression.

M. Basirat et al. (2012) had used 9Cr-1Mo steel. The assessment of creep deformation of modified 9Cr–1Mo metallic specimens. In this paper observe the creep conduct of the changed 9Cr–1Mo metallic the "Orowan's equation" with the flow and climb-control dislocation movement.

Lei Zhao et al. (2012) had used ASME P92 steel and find the calculation of creep crack increase behaviour within ASME P92 metallic weld be a part of 6500C become finished the usage of elastic–plastic–creep finite detail technique (FEM) and theoretical prediction fashions. In this paper the creep crack boom behaviours calculated by way of the FEM and expected by means of the changed NSW model under simple strain circumstance agreed properly with experimental consequences.

Y.C. Lin et al. (2013) had used 2024-T3 Al alloy(Aluminium alloy) Al-Cu-Mg as a composite material. To find exposure of 2024-T3 Al alloy toward an elastic loading, moreover used for "creep age forming "also with new production procedures on immoderate temperature, which bring about the fixed creep deformation. The excessive temperature creep behaviour of 2024-T3 Al alloy changed into studied through the use of the steady-strees uniaxial tensile creep experiments below the temperatures of 423, 448 and 473 K. In this paper creep constitutive fashions may be used to provide a correct and specific estimate of the excessive-temperature creep behaviours for 2024-T3 Al alloy and power strees law used to calculated secondary creep.

S.B. Narasimhachary et al. (2013) had used 9Cr- 1 Mo (P91) steel material. The material operated t high temperature which might be subjected to cyclic loading make crack increase behaviour beneath creep-fatigue situations. In this paper Creep–fatigue crack development tests become performed on modified 9Cr–1Mo (P91) metallic on625^{0}C underneath consistent load amplitude conditions with numerous preserve instances thru compact type specimens.

F.Moreno et al. (2013) had used rubber analysed the response of bituminous mixes synthetic with rubber toward plastic deformation. Crumber rubber modifier (CRM) brought by means of way of the dry machine also as the wet process had been experienced.

Tahior Mahmood et al. (2013) had used 0.5% Cr- 0.5 % Mo-0.25% V low alloy of metallic as a composites materials on this paper application of recent multiaxial creep version developed with the aid of with stress traixiality towards predict failure time of a detail mode of 0.5% Cr-0.5% Mo-0.25% V low alloy of metal. The consequences prove that the proposed version is capable of predicting failure instances of the detail made from the above-stated fabric with an accuracy of 4.0%.

A Siebert- Timmer et al. (2013) had used AX30 & EZ33 magnesium alloy. The magnesium alloy bars, section and tube considerably use within the aerospace and industry wherein temperature less than a 100 C. In this paper compressive creep overall performance and microstructure balance.

Lei Zhao et al. (2014) had used P92 steel as a composite material and creep crack increase behaviour of P92 metallic welded joint, creep crack tests had been finished at the compact anxiety specimen through thick thickness with thin thickness, the crack tip of which had been placed on specific awesome zone of weld joint. In this paper experimentally creep growth test is used on P92 steel under temperature conditions

S. Venugopal et al. (2014)had used9 Cr-1 Mo steel (P91)as a composite material and find changed 9Cr-1Mo metal (P91) weld joints working at extended temperatures are widely recognized to be liable to premature failure because of cracking within the warmth affected vicinity due to the gradients in microstructure, popularly known as Type IV cracking. In this paper creep growth test applied on 9Cr-1Mo steel (P91) at different temperature range.

Paulo Roberto et al. (2014) had used7050 TAF aluminum alloy. The CAF process use to combine creep additionally precipitation hardening which be fantastically dependedent on time additionally high temperature. CAF cycles 7XXX alloy use time 20h and temperature range 120^0 C to 190^0 C. In this paper CAF test was perform using the alloy &050 in intermediate condition name TAF.

AkhioNakamara et al. (2014) had used Cu-Zr amorphous alloy a thermal quasistatic simulation of shear deformation changed into performed used for realistic version Cu-Zr amorphous alloy to research feature feature of elasticity and plasticity of the material.

Y.C. Lin et al. (2015) had used Al-Cu-Mg alloy and find two-level creep-getting older behaviour of Al–Cu–Mg alloy is calculated with means of uniaxial tensile creep exams over wide stages of temperature and external pressure. In this paper creep-aging experiment is used under different temperature condition.

Yatinder Kumar et al. (2016) had used 9 Cr-1 Mo steel as a composite material and findThe creep crack increase (CGC) phenomena in warmness affect zones (HAZ) of Mod. 9Cr-1Mo(P91) metal. In the ones research, stable load creep crack increase tests have been contains at one of a kind implemented hundreds at 898 ok as in step withASTME1457.

Zhong Chen et al. (2016) had used DP980-1, DP980-2,DP980-3, DP600-1,DP600-2,DP600-3,HSLA-1,HSLA-2,HSLA-3,IF-1,IF-2,IF-3,BH340,DP780,TRIP780,TWIP,CP1180,SS301, SS304, SS316, Al7075, Al6016, Al5754, Brass 260, MgAZ31, MgAZ61, TiCP Grade2QP980, TBF980 following composite materials. Tensile test became carried out by 26 commerical sheet alloys a large range strength, crystal structure and ductility. The realistic and theoretical suggestions of those consequences are stated. On the practical aspect, the effects offer a proper away course to improving implemented constitutive models within the transitional regime. An example of a software program and outcomes is furnished. On the theoretical aspect, the consistency of the impact used for a massive style of metals indicates answer to question on the major deformation mechanisms

Yongzhong Ni et al. (2017) had usedP92 steel as a composite material. The creep test was executed on P92 steel specimens by notches of three distinct size on temperature 6500 C. The result confirmed to the specimens switched from displaying ductility in the direction of showing brittleness at their centre and on the notch root beneath multiaxial pressure, however to various ranges.

Pankaj Thakur et al. (2017) had used rubber, plastics and copper as a composite material. The elastic-plastic stresses and angular speed required for yielding rotating shells for

incompressible and compressible materials, the effect of density discussed numerically on strees. The seth transition theory used in this paper.

Hongyang Jing et al. (2017) had used P91 steel as composite material. The creep-fatigue interactionbase on continuum harm mechanics, mathematical analyses of creep-fatigue crack boom of P91 steel on6250C the usage of compact specimens were done. Inside this paper creep-fatigue crack growth model on P91 metallic at 625^0C temperature.

Pankaj Thakur et al. (2017)had usedAl-SiCp as a composite material and the effect of amazing linear thermal gradient on the stable creep conduct of a revolving functionally graded Al-SiCp disc. In this papersherby's law is used to find out creep conduct of a revolving functionally graded Al-SiCp disc.

Nishi Gupta et al. (2017) had used Al-SiCp as a composite material and the impact of linear thermal gradient taking place constant nation creep behaviour of rotating disc capability graded Al-SiC_pinvestigate. In this paper Sherby's law is used.

Xinjun Yang et al.(2017) had used TA2 and R60702 as a composite material. The creep behaviour of "TA2" and "R60702" at low as well asin-between on multiaxial creep deformation. The creep model modified in low with intermediate temperature creep lifestyles evaluation. At the room temperature, extensive number one creep stages were decided within the creep stress–time curve of TA2 . The attempting out instances of specimens had been "650 h for 240 MPa, 270 MPa, 330 MPa, and 2500 h for 300 MPa", respectively. Meanwhile, the elongations on the forestall of the exams were "0. 5%, 2.1%, 7.1%,10.4%" for"240 MPa, 270 MPa, 300 MPa, and 330 MPa", respectively. Comparing by the result at specific stresses, the outlines are similar, and the creep pressure rate decrease by the increase of deformation at 293 K. It want to be stated that the number one creep conduct lasted extra than 2500 h, when the strain is 2 hundred MPa. It method that there's no smooth consistent creep degree in the room temperature creep of TA2, even as the pressure differs from 240 MPa to 330 MPa.

Yongqian Xu (2018) had used Al-Cu-Mg as a composite material. The creep age form technique (CAF) has been advanced used for produce massive plane components. Normally, in CAF, the component wants to experience heat, soaked and cooling tiers. Inside order to build up immoderate accuracy of the creep-age common additives, the non-isothermal deformation conduct of "Al-Cu-Mg" alloy modified into investigate with the creep developing vintage, thermal growth, warmness tensile also creep age forming exams. In non-isothermal creep developing older method, every the elastic as well as thermal deformations broaden in the heating level. In this paper thermal expansion checks, Creep age formation exams, spring back checks are performed

N. Ab et al. (2018) had used steel as a composite material find cracking in P91 steels underneath creep- fatigue loading situations. In this paper the creep growing test on P91 steel at temperature between 600^0C and 650^0C hold for 600s.

8 Discussions & Conclusion

By comparing exclusive properties of composite material it's been determined that Al-SiC have excessive tensile, correct fatigue, fracture residences, high melting factor, immoderate ductility, excessive thermal and electric conductivity and good erosion resistance. Steel have tensile, excessive power to weight ratio because of this that has excessive energy in preserving through unit mass, metal devices might be small and light-weight, no longer like different constructing substances, steel can be effects fabricated and production hugely, bendy, reasonably-priced but Steel is an alloy of iron. These make it responsible to corrosion. This problem can be solved to some extent the use of anti-corrosion applications .It have excessive cost. In high temperature steel loses its properties. Plastic long lasting, low cost, lesser power and heavy chemical compounds requirement in manufacture and light weight. But Plastic is made of a nonrenewable beneficial aid, which offers extra reasons to apply recyclable buying baggage. Copper have high electric conductivity likewise way high thermal conductivity so copper must to a chief advantage for the producing of virtual and electric powered components. Copper is a completely ductile and soft metallic. But price is very pricey and heavier, main to higher delivery costs. The maximum critical dangers of copper cord are its weakness to corrosion that is oxidation. Titanium is exceedingly resistant for chemical attack and maximum power to weight ratio of any metallic those particular homes make Titanium suitable for wide variety of programs. Titanium stiffness to weight ratio as metal is much like steel meaning it is able to be used rather in which weight is an critical interest. But Titanium from a production and engineering mind-set is its excessive reactivity, technique it need to be managed in another manner at some point of all tiers of its manufacturing. It is not suitable at immoderate temperature ranges, above four hundred ranges. Titanium has excessive production cost. Magnesium has small density lesser than aluminium. Magnesium have control load may be larger than the aluminum alloy. Good thermal conductivity, right casting great, exact dimensional stability, smooth to recycle. But Magnesium alloy has poor corrosion resistance and precise protecting solvent need to be delivered at the same time as melting, low elastic coefficient additionally lower using magnesium alloy as a structural material.Aluminium is ligth and very strong. It can be processed in a huge kind of approaches, impact-resistant and very strong.. Aluminium is completely recyclable, electrically conductive. Aluminium is proof against UV radiation, hygienic, magnetically neutral, electrically conductive. Aluminum oxidizes quick, and the ensuing surface coat of aluminum oxide resists further corrosion, by way of air, water, and chemicals. This defensive coating is clear, colourless, and non-staining. Aluminum may be effortlessly colored with the aid of anodization, and holds paint extraordinarily well. Aluminum conducts power even higher than copper. Aluminum is 100% recyclable without losing any of its natural characteristics. Aluminium has the best electricity-to-weight ratio of any metallic. For application in which magnetism needs to be prevented, aluminum is an exquisite desire. But Aluminum require for unique techniques to be welded. It is abrasive to tooling, or greater appropriately, the aluminum oxide coating that paperwork upon it's miles. It is extra highly-priced than steel.Silicon Carbide (SiC) has high hardness, low thermal increase, high thermal consistency, excellent resistance at excessive temperatures, electric conductivity, non linear electric resistance. SiC has many benift used for high voltage, excessive strength and high temperature utility. But Silicon carbide is not available as herbal mineral. Hence excessive furnace strategies are tough to supply the compound from Si. There is issue in doping in SiC fabrication due to its chemical inertness, bodily power and occasional diffusion coefficient of different impurities. Different sorts of fabric defects are produced in SiC substrates with the present manufacturing strategies. High manufacturing and processing charges due to hassle in manufacturing big wafers of SiC with a good deal

much less defects and lack of suitable techniques. Contacts, interconnects and passive components (e.g. Inductors) have to deal with intense situations with reliability and sturdiness with a view to hold SiC functionally energetic in such situation. By comparing different composite and monolithic materials it has been found Al-SiC is the best and cheap material for used.

9Strength and limitation of this systematic review

The maximum essential strength of this review has been to the review procedure has follow by the studies papers and books. The every step of the review worried discussion and explanation. The main drawback of this review that time, cost and access to relevant papers. The main problem found that some papers be not in full length. This means during data extraction, a no. of question that are not stated in the paper.

References

[1] By Willian D.Jenkins and ThomosG.Digges ,"Creep of High-Purity Copper",Journals of theNationalBureav of Standards,vol45, no 2,(1950), pp153-173.

[2] B.A. Field , R.J. Fields, "Elevated temperature deformation of structural steel", New Nist Publication, (1989), pp 1-23.

[3]Keisuke Matswura, Meikon Chou, Nortion Matsuda, "Creep Deformation and Fracture of an Aluminium Composite Reinforced with Continous Alumina Fibers", Materials Transcations, JIM, vol 32, no 11(1991), pp 1060-1070.

[4] M. Karayaka, HuseyinSehitoglu, "Thermomechanical deformation modelling of Al2XXX- T4/SiCPcomposite,"ActaMetallurgicaetMaterialia, vol 41, no 1(1993), pp 175-189.

[5] D.J. Baker and Y.M.Xie, "Elasto-Plastic-Creep Analysis of Restrained Steel Columns Exposed to Fire", Fire Safety Science, vol 4, (1994), pp 1113-1124.

[6] N. Adefris, D.L. Mc Dowell, "Creep- fatigue Crack Growth behaviour in 1Cr- 1Mo- 0.25V steels. Estimation of crack tip parameters", Fatigue & Fracture of Engineering Material & Sciences, vol19, no 4(1996), pp 387-398.

[7]B. Skrotzki, Gunther Eggeler, T. Rudolf, "Creep behaviour and microstructural evoluation of near-gamma- TiAl alloy with duplex microstructure, Zeitschrift fur Metallkunde, vol90, no 6(1999), pp 393-402.

[8] Guowei Li and Brain G. Thomas, "Modeling Creep and Fatigue of Coper Alloys, M&E, pp 1-22.

[9] A. Paquin, S.Berbenni, V.Favier, X. Lemoine, M. Berveiller, "Micromechanical modelling of the elastic- viscoplastic behaviour of polycrystalline steels", Internatinal Journal of Plasticity, vol17, 9(2001), pp 1267-1302.

[10]Katsuhiko Sasaki, Ken-ichiOhguchi, Hiromasa Ishikawa, "Viscoplastic Deformation of 40 Pb/60 Sn Solder Allpoys- Experimentals and Constitutive Modeling", Journal of electronic packaging, vol 123,(2001), pp 379-387.

[11] Ken-ichiOhguchi, Katsuhiko Sasaki, "Elastic- Plastic-Creep simulation of Pb\Sn Solder Alloys by Separation of Plastic and Creep", JSME International Journal Series A Solid Mechanics and Material Engineering, vol 46, 4(2003), pp 559- 566.

[12] VikasHasija, S.Ghosh, Michael J.MillsDeepuS.Joseph, "Deformation and Creep modeling in polycrystalline Ti-6Al alloys", ActaMaterialia, vol 51, 15(2003), pp 4533-4549.

[13]S. Berbenni, V.Favier, X.Lemoine, M. Berveiller, "Micromechanical modelling of the elastic- viscoplastic behaviour of polycrystalline steels having different microstructures", Materials Science and Engineering :A, vol 372, 2(2004), pp 128-136.

[14]Hidenari Takagi, Ming Dao, Masami Fujiwara and Masahisa Otsuka, "Detecting the transition of creep rate- controlling process in Al-Mg solid solution alloy instrumented indentation", Journal of the Japan Institute of Metals and Materials, vol 69, 4(2005), pp 348-355.

[15] G. Sasikala, S.K. Ray, "Evaluation of quasistatic fracture toughness of a modified 9Cr-1Mo(P91) steel", Materials Sciences and Engineering :A, vol 479, 2(2008), pp 105-111.

[16] Akhtan S. Khan, RehanKamzi,AnitPanderf, Thomas Stoughton, "Evoluation of subsequrent yield surfaces and elastic constants with finite plastic deformation Part-1: A very low work hardening aluminium alloys (Al6061- T6511)"Internatinal Journal of Plasticity, vol 25,9(2009), pp 1611-1625.

[17] G. Bles, W.K. Glowacki, A. Tourobi, "Experiments study of the cyclic visco- elasto-plastic behaviour of a polynamits fibre strap" International Journal of Solids and Structures, vol 46, (2009), pp 2693- 2705.

[18]A. Rusinek, J.R. Keepacko, "Experiment on heat generated during plastic deformation and stored energy for TRIP steels", Material and Design, vol30, (2009), pp 35-48.

[19]Masaaki Tabuchi, HimmichiHongo, Yongkui Li, Takashi Watanabe, Yukio Takahashi, "Evalution of microstructures and creep deformation in thr HAZ of P91 Steel weldment", Journal of Pressure Vessel Technology, vol131, (2009), pp 1-6.

[20] Akhtar S. Khan, Amit Pandey, Thomas Stoughton, "Evoluation of subsequent yield surface and elastic constant with finite plastic deformation Part III : Yield surface in tension strees space (Al6061-T6511 and annealed 1100Al)", International Journal of Plasticity, vol 26, 10(2010), pp 1432-1441.

[21]J. Brnic, M. Canedija, G. Tarkalj, D.Lanc, "50 Cr Mo4 steel- Determination of mechanical properties at lowered and elevated temperatures, creep behaviour and fracture toughness calculation", Journal of engineering materials and technology, (2010).

[22] T.H. Hyde, M. Saber, W. Sun, "Creep crack growth data and predection for a P91 weld for 650^0 C", International journal of pressure vessels and piping, vol 87, 12(2010), pp 721-729.

[23] M. Tabushi, A.T. Yokobri Jr., R. Sugiura, M. Yatomi, A. Fuji, K. Kobeyeshi, "Results of Japanese round robin program for creep crack growth using Gr. 92 steel welds", Engineering Fracture Mechnics, vol 77, (2010), pp 3066- 3076.

[24] Stefanie Feih, E. Kandare, B.Y. Lattimer, A.P. Mouritz, "Structural Analysis of Compression Deformation and Failure of Aluminium in Fire", Journal of Structural Enginering, vol 137, 7(2011)

[25]Lei Zhao, Hongyang Jing, Lianyong Hun, JunjieXiu, Yongdin Hun, JunjieXiu, YariaQiao, "Evaluating creep property of distinct zones in P92 steel welded joint by small punch creep test", Material and Design, vol 47, (2012), pp 677-686.

[26]H.Wang, P.D. Wu, C.N. Tome, J. Wang, "Study of lattice Strains in magnesium alloy AZ31 based on a large strain elastic- viscoplastic self-consistent polycrystalmodel"Interntional Journal of solids and structure, vol 49, (2012), pp 2155-2167.

[27] M. Basirat, T. Shrestha, G.P.Potirniche, I. Charit, K. Rink, "A study of the creep behaviour of modified 9Cr-1Mo steel using continum-damage modeling", International Journal of Plasticity, vol 37, (2012), pp 95-107.

[28] Lei Zhao, Hongyang Jing, Yongdiuan Han, JunjieXiu, Lianyong Xu, "Prediction of creep growth behaviour in ASME P92 steel welded joint", Computational Material Science, vol 61, (2012), pp 185-193.

[29]Y.C. Lin, Yu- Chi Xia, Ming –Song Chen, Yu-Qiang Jiang , Lei-Ting Li, "Modeling the creep behaviour of 2024-T3 Al alloy", vol 67, (2013), pp 243-248.

[30]S.B. Narasimhachary, A. Saxena, "Crack growth behaviour of 9Cr-1Mo(9P1) steelunder creep-fatigue conditions", Internal Journal of Fatigue, vol 56, (2013), pp 106-113.

[31] F.Moreno, M.Sol, J.Martin, M.Perez, M.C. Rubio, "The effect of crumb rubber modifier on the resistance of asphalt mixes to plastic deformation", Material & Design, vol 47, (2013), pp 274- 280.

[32] Tahior Mahmood, Sangarapillai, Kanapathipilli, Mahiuddia Chowdhury, "A model for creep life prediction of thin tube using strain energy density as a function of streestriaviality under quasi static loading employing elastic- creep & elastic-creep deformation", Frontiers of Mechanical Engineering, vol 8, 2(2013), pp 181-186.

[33] A Siebert- Timmer, M Fletcher, L Bichler , D. Seeliako, "Creep performance of wrought AX30 & EZ33 magnesium alloy, The Canadian Journal of Metallurgy and Materials Science, vol 52, 4(2013), pp 430-438.

[34] Lei Zhao, Hongyang Jing, JunjieXiu, Yongdian Han, Lianyong Xu, "Experimental investigation of specimen size effect on creep crack growth behaviour in P92 steel welded joint", Materials and Design, vol 57, (2014), pp 736-743.

[35] S. Venugopal, G.Sasikala, Vatindra Kumar, "Creep crack of growth behaviour of a P91 steel weld", Science Direct, vol 86, (2014), pp 662-668.

[36] Paulo Roberto Costa Junior, Carslo de MouraNeto, Darrell A. Wade, "Evaluation of a 7050TAF aluminum alloy submitted to creep age forming", Material Research, vol 17, 3(2014), pp 603-611.

[37] AkhioNakamara, Yasushi Kamimurea, Keiichi Edagwa, Shin Takeuchi, "Elastic and plastic characteristics of a model Cu-Zr amorphous alloy", Material Science and Engineering: A, vol 614, (2014), pp 16-26.

[38]Y.C. Lin, Guan Liu, Ming-Song Chen, Jia Li, Hua-Min Zhou, "Effect of two-stages creep- aging processing on mechanical properties of an Al- Cu- Mg alloy", Material & Design, vol 79, (2015), pp 127-135.

[39]Yatinder Kumar, S. Venugopal, G. Sasikala, Shaju K Albert, A.K. Bhaturi, "Study of creep crack growth in a modified 9 Cr- 1 Mo steel weld metal and heat affected zone", Materials Science and Engineering : A, vol 655, (2016), pp 300-309.

[40] Zhong Chen, Hyuk Jong Bong, Dayong Li, R.H. Wangoner, "The elastic-plastic transition of metals", Science & Direct, vol 83, (2016), pp 178-201.

[41] Yongzhong Ni, Hong Xu, Yuan Chang &Xueping Mao, "Elastic- plastic creep demage of notched P92 steel specimens, Materials at High temperatures, vol 35, 4 (2017), pp335-342.

[42] PankajThakur,GauravVerma, D.S. Pathania, SatyaBirSingh, "Elastic-Plastic Transition On Rotating Spherical Shells In Dependence Of Compressibility", Kragujevac J. Sci, vol 39, (2017), pp 5-16.

[43] Hongyang Jing, Dingbng Su, Lianyong Xu, Lei Zhao, Yongdian Han, Ruiwan Sun, "Finite element simulation of creep – fatigue crack growth behaviour for P91 steel at 625^0C considering creep-fatigue interaction", International Journal of Fatigue, vol 98, (2017), pp 41-52

[44] Pankaj Thakur, Nishi Gupta, Satya Bir Singh, "Thermal effect on the creep in a rotating disc by using Sherby's law", Kragujevac J. Sci, vol 39,(2017), pp 17-27.

[45]Nishi Gupta, Pankaj Thakur, Satya Bir Singh, "Effect of thermal gradient on the creep on a rotating disc", Journal for Technology of Plasticity, vol 41,1(2016), pp 13-25.

[46] Xinjun Yang, Xiang Ling, "Application of a composite model in the analysis of creep deformation at low and intermediate temperature", ASME(American Society of Mechanical Engineers), vol 139, 4(2017), pp 041032-1 to 0410132-6.

[47]Yongqian Xu, Lihua Zhan, Minghui Huang, Ruilin Shen, Ziyao Ma, Lingzhi Xu, Kai Wang, Xun Wang, "Deformation behaviour of Al-Cu-Mg alloy during non-isothermal creep age forming process", Journal of Material Processing Tech., vol 255, (2018), pp 26-34.

[48]N. Ab,Razaka,b, C.M. Daviesa, K.M. Nikbin, "Testing and assessment of cracking in P91 steels under creepfatigue loading conditions", Engineering Faliure Analysis, vol 84, (2018), pp 320-330.

Other References

[49] Berghezan, A. Nucleus, “Nucleas A Editeus,1, rhe, chalgrir, Pairs”, vol 8, 5(1966).

[50] Kelly, A., “The natural of composite material, Sci. A mer. Mag”, vol 217, (1967).

[51] Suchetclan Van, “Philips Research Reports, vol 27, (1972).

[52] Deepak Verma, Prakashaope, M.K. Maheshware, A. Shndiyla, “Coir Fibre Reinforcement and Application in Ploymer Composites”, (2013).