ICON Journal of Engineering Applications of Artificial Intelligence
Volume 01 | Issue 01 | 2025
e-ISSN: 3051-3820
p-ISSN: 3051-3812
Journal homepage: https://iconpublishers.com/icon-j-eng-app-ai/

Research Article

DOI: 10.5281/zenodo.15868628

Industrial Applications of Heat Pipes and its Project Design Systematics

Emin Taner ELMAS *
Assistant Professor Dr., Vocational School of Higher Education for Technical Sciences, Division of Motor Vehicles and Transportation Technologies, Department of Automotive Technology, Iğdır University, Turkey & Graduate School of Natural and Applied Sciences - Major Science Department of Bioengineering and Bio-Sciences, Iğdır University, Turkey
ORCID ID: https://orcid.org/0000-0002-7290-2308

Corresponding author: Emin Taner ELMAS
Email: e.taner.elmas@igdir.edu.tr
+90 (0) 543 733 64 21

Received Date: 05 June 2025
Published Date: 12 July 2025

Abstract

In this article, a general overview of Industrial Applications of Heat Pipes and its Project Design Systematics is considered and explained.

With this study; it is aimed to develop the “heat pipe technique”, which will be a new alternative technology in the evaluation of high temperature waste gases of water tube or flame tube steam boiler, hot water boiler, hot water boiler, incinerator, any equipment that produces heat energy or a power generating unit – machine’s exhaust “within the framework of waste heat recovery principles and methods” and to implement it as a “heat recovery unit” and at the same time to prepare a project that will enable the development of new products on the subject in a way that will also have the feature of an R&D (Research and Development) project and to realize the production of the machine.

The high temperature exhaust waste heat produced by the boiler or heat energy producing equipment described above leaves the system as waste gas by being directly discharged from the chimney in many engineering applications. However, the high temperature waste gases of the equipment in question have a very significant amount of heat energy and it is necessary to utilize this energy.

Waste energy can be recovered in some applications by installing economizers and can be used for both feed water preheating and similar purposes. If the temperature and flow rate of the waste gas are sufficiently high (for example, as in the exhaust gas of a gas turbine), the waste heat can be directed directly to a waste heat recovery boiler and it is possible to provide superheated water, steam and even superheated steam production.

Within the scope of our project, instead of conventional recovery units that serve this purpose today, a new technology will be developed using the “heat pipe” system. Design parameters will be analyzed for optimum design and the feasibility of the project will be revealed.

The implementation of the project will be a new technological gain, and the recovery of waste heat will provide an extremely important benefit to both the companies and businesses that will implement the system and the country's economy in terms of energy and fuel savings. [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [52], [53], [54], [55], [56], [57], [58].

Keywords: Energy, Energy Transfer, Fluid Mechanics, Thermodynamics, Heat Transfer, Mathematics, Heat Pipe, Heat Pipe Air Recuperator, Energy and Fuel Saving, Waste Heat Recovery, Exhaust gases, Project Design Systematics.

INTRODUCTION

Definition of Heat Pipe, Working Principle and Areas of Use:

Heat pipe: It is a two-phase, closed, high heat transfer device. It can be made in a classical circular shape (pipe type), as well as in a planar or many other shapes. The heat pipe basically consists of a closed chamber with some working fluid, the air removed. A suitable wick is placed on the chamber wall to regulate the flow of the working fluid.

During operation, the heat in the evaporator region vaporizes some of the working fluid and in a short time the inside of the chamber becomes saturated with pure steam. Since the chamber wall will be relatively cold in the condenser region due to the heat being drawn from the system, condensation begins in this region. The condensed liquid particles return to the evaporator and the cycle is completed. Gravitational force or capillary, centrifugal, osmotic, magnetic etc. forces are used to bring the condensed fluid back to the evaporator. The most commonly used method is to use capillary forces.

The fluid that transforms from the gas phase to the liquid phase by giving its latent heat in the condenser is returned to the evaporator with the help of a wick that has a porous structure in the heat pipes. This porous structure can be knitted or woven from a separate material, or it can be a mechanically formed groove in the inner surface of the heat pipe or a porous structure produced with powder metallurgy. Many different fluids can be used as heat transfer fluids with phase transformation in the heat pipe, depending on the operating conditions.

The most commonly used fluids at medium temperatures are water, methanol, ammonia and other refrigerants. Aluminum, copper, steel, ceramic or other materials that can work in harmony with the working fluid used depending on the operating conditions can also be used as heat pipe material. The most important issue in material selection is that it is compatible with the fluid, that is, there is no gas production during the operation of the heat pipe.

Heat pipes can be manufactured in a wide temperature range, in different sizes, in fixed or flexible shapes, cylindrical, planar, rotary or in accordance with the place and purpose of use. Heat pipes and systems can be used in many industrial application areas, from cooling computer CPUs to nuclear power plants, from spacecraft to electronics industry, from control of various processes to solar energy applications, air conditioning - air conditioning facilities. In addition to these, they can be used in the design and application of systems that will provide heat recovery from high-temperature waste exhaust gases, as will be examined in our current study. [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [52], [53], [54], [55], [56], [57], [58].

Method, Findings and Discussion

Previous Studies and Importance of the Current Project:

The previous studies on the technology of heat recovery using heat pipes, whose general introduction, working principle is explained and technical application areas are specified above, generally cover air conditioning systems. In other words, heat recovery systems that operate on a principle similar to the heat pipe air recuperator developed and manufactured within the scope of our current project generally have a usage area in the form of low temperature applications in today's technology. The heat pipe air recuperator system within the scope of our current study, unlike the previous studies on this subject; is a high temperature application and provides the emergence of new industrial usage areas in a different and wider way than the previous ones.

Within the scope of our project, the heat of the high temperature exhaust waste gas produced by a boiler or a heat energy generating equipment is recovered by means of a designed "heat pipe air recuperator" and hot air is obtained in return. In this study, the heat pipes in the pipe bundle forming the designed prototype heat pipe air recuperator basically consist of three sections: evaporator, adiabatic section and condenser. In the recuperator, finned pipes are used in order to increase the heat transfer surface area and therefore the heat transfer capability. A mesh wire wick structure with a porous structure is used inside the heat pipes. Demineralized water is the working fluid inside the heat pipes. The exhaust gas and fresh air are connected to each other by means of a heat pipe air recuperator in the form of a horizontally positioned two-channel system. The exhaust gas flows from the lower channel and the fresh air flows from the upper channel.

The high temperature exhaust gases passing through the evaporator section of the recuperator cause the working fluid to boil and turn into vapor. The vapor formed in the evaporator section moves rapidly towards the cold end of the heat pipe. The fresh air flowing in the opposite direction with the high temperature exhaust gas flows over the condenser section, allowing the vapor to condense and transfer its latent heat to the air. Thus, the cold fresh air entering the heat pipe air recuperator is heated. In this study, the thermal and mechanical design of the prototype recuperator suitable for the targeted purpose was made and its constructive project was prepared. The manufacturing of the duct system and the carrier assembly connected to the designed heat pipe air recuperator was carried out.

Project Design Systematics and Design Parameters:

The project systematic and design parameters are explained below in items.

1. Selection of heat pipe materials.

2. Determination of the type of working fluid for the heat pipe.
3. Determination of the wick material and wick structure to be used for the heat pipe.
4. Selection of heat pipe diameter and wall thickness.
5. Selection of heat pipe fin geometry.
6. Selection of heat pipe fin size and fin material.
7. Determination of the working temperature of the working fluid in the heat pipe.
8. Determination of the composition of the waste exhaust gas to be used for the heat pipe air recuperator.
9. Determination of the waste exhaust gas inlet and outlet temperatures and gas flow rate.
10. Determination of the inlet and outlet temperatures of the air to be heated by utilizing the heat to be recovered in the heat pipe air recuperator and air flow rate.
11. Determination of the body material and material wall thickness of the heat pipe air recuperator.
12. Finding the power - capacity value that can be obtained with each heat pipe in the recuperator by making calculations and experiments for the case of using wick (cage wire) with different pore openings (mesh number), and thus determining the maximum heat capacity that can be obtained from a heat pipe.
13. Confirming the suitability of the calculated heat pipe heat capacity value after verifying the heat pipe limiting values (limit values).
14. Determination of the total heat capacity - power value of the heat pipe air recuperator.
15. Calculation of the total heat transfer surface area for finned tubes in the recuperator, the ratio of finned surfaces to total surface, etc. values related to the fin structure.
16. Determination of the placement geometry of the finned tubes inside the recuperator body.
17. Preparation and project design of the mechanical constructive design of the heat pipe air recuperator and preparation of the manufacturing technical drawing.
18. Calculation to ensure fully developed flow condition for the exhaust gas at the inlet of the heat pipe air recuperator.
19. Checking whether the flow velocities for the exhaust gas and air duct are proportionally within the design limits.
20. Calculation of the amount of working fluid to be placed in each heat pipe.
21. [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [52], [53], [54], [55], [56], [57], [58].

Conclusion

Calculation of Limit Values for Heat Pipes has been carried out and as conclusion; each limit value must be calculated and compared with the power-capacity value. The definitions of the limits mentioned are as follows;

- Capillary Limit
- Viscous Limit
- Sonic Limit
- Entrainment Limit
- Boiling Limit
- Condenser Limit

At this stage, all the limiting values defined above will be compared with the power-capacity value obtained for the heat pipe and the compliance of the capacity with the limiting value will be evaluated. If compliance with the limiting values is not achieved, the power-capacity value will need to be reviewed again.

Considering the hydrodynamic and thermal inlet lengths, the condition where the inlet effects are limited and fully developed flow occurs can be determined as follows:

In order to obtain fully developed flow at the inlet of the exhaust gas into the heat pipe air recuperator, the gas will need to flow for a certain distance within the inlet channel before entering the recuperator. In order to determine the distance required for the formation of the fully developed flow in question and thus to calculate the gas inlet side channel length, it is first necessary to determine whether the flow in the channel is laminar or turbulent.

In this case, the first determining parameter to be calculated will be the Reynolds number.

As a result, it is seen that the heat pipe air recuperator meets the performance conditions for both the exhaust gas side pressure loss and fresh air side pressure loss values.

There is a total of 18 pipes in the Heat Pipe Air Recuperator to be filled with working fluid. The amount of working fluid to be filled into each pipe is determined by calculation, and the inside of the pipes is vacuumed before filling and the air inside is removed. Then the fluid filling is carried out.

Since “water” is selected as the working fluid for the heat pipe, the calculated amount of demineralized boiler feed water will be used in the filling process.

Wick materials made of stainless steel material and having two different pore numbers (mesh) are placed inside the pipes.

Since both types of wicks are placed in two layers inside the pipes, in this case, a total of 4-layer wick structure is obtained, with 120 mesh wicks in 2 layers and 200 mesh wicks in 2 layers, and placement is provided inside the pipes of the recuperator.

The basic principle in calculating the amount of working fluid (water) filling is as follows: The fluid should fill the entire inner surface of the heat pipe and the wick in the liquid phase and the middle steam flow section in the steam phase. In order to calculate the total amount of water to be placed in the heat pipe, the 200 mesh and 120 mesh wicks and the middle steam flow section will be considered separately and the total amount of water required will be calculated.

As a result; It was decided that 20 ml of water (demineralized boiler feed water) was the appropriate amount as the working fluid in each heat pipe.

The velocity control for the exhaust gas channel and air channel is appropriate.

Thus, it is possible to say that the dimensioning (channel section width and channel section height) is appropriate for both channels. [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [52], [53], [54], [55], [56], [57], [58].

Biography of the Author:

Asst.Prof. Dr. Emin Taner ELMAS is a Mechanical Engineer having degrees of B.Sc., M.Sc., Ph.D., and was born in Sivas in 1974. He completed his doctorate at Ege University, Graduate School of Natural and Applied Sciences, Mechanical Engineering Department, Thermodynamics Science Branch, and his master's degree at Dokuz Eylül University, Mechanical Engineering Department, Energy Science Branch. He also completed his undergraduate education at Hacettepe University, ZEF, Mechanical Engineering Department and graduated from the faculty with honors in 1995 and became a mechanical engineer. He was awarded a non-refundable scholarship by the Turkish Chamber of Mechanical Engineers in his 4th year because he was the most succesful student during his first 3 classes study at the faculty. He graduated from İzmir Atatürk High School in 1991.

Asst. Prof. Dr. ELMAS has completed his military service as a NATO Officer in Bosnia and Herzegovina. He was a "Reserved Officer" as a "2nd Lieutenant" as an "English-Turkish Interpreter". He was also a "Guard Commander" and served in Sarajevo, Camp Butmir within the SFOR task force of NATO. He has been awarded with 2 (two) NATO Medals and Turkish Armed Forces Service Certificate of Pride (Bosnia & Herzegovina).

In addition to his academic duties at universities, he has worked as an engineer and manager in various industrial institutions, organizations and companies; He has served as Construction Site Manager, Project Manager, Management Representative, Quality Manager, Production Manager, Energy Manager, CSO-CTO, CBDO, Factory Manager, Deputy General Manager and General Manager.

Asst. Prof. Dr. Elmas is Department Head and is an Assistant Professor of Automotive Technology at the Department of Motor Vehicles and Transportation Technologies at Vocational School of Higher Education for Technical Sciences at IGDIR UNIVERSITY, Turkey. He is also an Assistant Professor of Bioengineering & BioSciences at the same university. He has nearly 30 years of total experience in academia and in industry.

He has served as a scientific referee and panelist for ASME, TUBITAK and many scientific institutions, organizations and universities, including NASA.

"Mechanical Engineering, Energy Transfer, Thermodynamics, Fluid Mechanics, Heat Transfer, Higher Mathematics, Evaporation, Heat Pipes, Space Sciences, Automotive, Bioengineering, Medical Engineering Applications, Neuroengineering, Medical Technique" are his academic and scientific fields of study; "Heating-Ventilation Air Conditioning Applications, Pressure Vessels, Heat Exchangers, Energy Efficiency, Steam Boilers, Power Plants, Cogeneration, Water Purification, Water Treatment, Industrial Equipment and Machinery, Welding Manufacturing, Sheet Metal Forming, Machining" are his industrial experience fields.

Asst. Prof. Dr. Emin Taner ELMAS is also a musician, saz (baglama) virtuoso player and ney (Nay, Turkish Reed Flute) performer. He has a YouTube Music Channel (Emin Taner ELMAS) which includes some of his sound recordings of him playing the saz-baglama and blowing the ney. He composed the poem written by the great poet Âşık Veysel ŞATIROĞLU under the name of "Raşit Bey" in memory of his father Judge (Hâkim) Raşit ELMAS as "Raşit Bey Türküsü", wrote it down, notated and published it as an academic article and broadcasted this song on his own music channel. He wrote the poems entitled "Canım Babam" and "Geldim Babam" which he wrote also in memory of his father and published in an academic literature journal, and composed instrumental musics for these poems. He also composed an instrumental song called "Annem Annem Türküsü" and gave it to his mother, Lawyer Tuna ELMAS, as a gift on Mother's Day, 11.05.2025. He continues his artistic studies by writing various poetry, lyrics and also realizing musical composition and repertoire works.

References

1. Elmas, Emin Taner, ELMAS's Theory of Thermodynamics": A Scientific Approach for 5th Law of Thermodynamics -A Theoretical Application Example for Medical Thermodynamics. Op Acc J Bio Sci & Res 2(1)-2020. DOI: 10.46718/JBGSR.2020.01.000030
2. Emin Taner ELMAS*. Medical Treatment Method of Alzheimer's Disease & Parkinson's Disease by the Help of the Natural Musical Sound of Nây-ı Şerîf, Instrument of Ney (Ney: Turkish Reed Flute, Nay). IJCMCR. 2024; 42(3): 004 DOI: 10.46998/IJCMCR.2024.42.001039
3. Elmas, Emin Taner (2020) Medical Treatment Method of "Bio-robotic Resonance and Thermodynamical Interaction" with Analogy of "Frequency – Resonance Setting Formation" on the Application of "Algorithm for Smart Drugs Controlled by a Bio-robotic System" developed for the "Treatment of Covid-19, Coronavirus and Virus Infections". Open Access Journal of Biogeneric Science and Research (BGSR), Op Acc J Bio Sci & Res 1: 1. DOI: 10.46718/JBGSR.2 020.01.000007.
4. Elmas Emin Taner (2020) Scope of Applications for Medical Technique at Science and Engineering, Open Access Journal of Biogeneric Science and Research (BGSR), Op Acc J Bio Sci & Res 1: 1. DOI: 10.46718/JBGSR.2020.01.000002.
5. Emin Taner ELMAS (2024) System Design and Development of a Novel Unique Neuro-Physical Medical Treatment Method for SMA-SPINAL MUSCULAR ATROPHIA-Disease and for Similar Neurological Muscle Diseases. Herculean Res 4(1):90-97
6. Fevzi Daş, Emin Taner Elmas and İhsan Ömür Bucak, Book Chapter: Innovative Use of Machine Learning-Aided Virtual Reality and Natural Language Processing Technologies in Dyslexia Diagnosis and Treatment Phases; From the Edited Volume Digital Frontiers - Healthcare, Education, and Society in the Metaverse Era;(2024) , Written By Fevzi Daş, Emin Taner Elmas and İhsan Ömür Bucak, DOI: 10.5772/intechopen.1006621, IntechOpen Limited, UNITED KINGDOM; indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)
7. Emin Taner ELMAS (2024) Design of Bionic Eye and Artificial Vision System; a Unique Project "Mobile Bio-Eye-Tronic System". Herculean Res 4(1):97-100 https://dx.doi.org/10.70222/hres23
8. Emin Taner ELMAS*. Project for "Amphibious Mobile Snow Track Ambulance" for Healthcare System. Am J Biomed Sci & Res. 2024 22(4) AJBSR.MS.ID.002990, DOI: 10.34297/AJBSR.2024.22.002990
9. Emin Taner ELMAS*. The first "Olive Seedlings" and "Artichoke Seedlings" Planted in Iğdır Province, Turkey. Am J Biomed Sci & Res. 2024 22(5) AJBSR.MS.ID.002996, DOI: 10.34297/AJBSR.2024.22.002996
10. Emin T. Elmas, & İhsan Ö. Bucak. (2023). Modeling and Simulation of Smart-Drug Algorithms Through Frequency Modulation for the Treatment of Covid-19 and Similar Viruses. Global Journal of Research in Medical Sciences, 3(5), 1–6. https://doi.org/10.5281/zenodo.10051793
11. Emin T. E., & İhsan Ömür B. (2024). FM Modulated Smart Drug Algorithm for the treatment of Cancer Cells. In Global Journal of Research in Medical Sciences (Vol. 4, Number 1, pp. 1–6). https://doi.org/10.5281/zenodo.10463529
12. Emin Taner ELMAS. (2023). Prototype Desıgn, Productıon and Functıonıng of a Portable (Movable), Home-Type (Domestıcal) Hemodıalysıs Machıne (Unıt). In Global Journal of Research in Medical Sciences (Vol. 3, Number 6, pp. 11–12). https://doi.org/10.5281/zenodo.10252972
13. Elmas, Emin Taner (2019) Thermodynamical Balance Associated with Energy Transfer Analysis of the Universe Space as a Pressure Vessel Analogy. Journal of Applied Sciences, Redelve International Publications 2019(1): RDAPS- 10002.

14. Elmas, Emin Taner (2017) Productivity and Organizational Management (The Book) (Chapter 7): Prospective Characteristics of Contemporary Engineer (By the Approach of Mechanical Engineering) Contribution and Role of the Mechanical Engineer to the Organization Management and Productivity. Machado Carolina, Davim J Paulo (Eds.), DEGRUYTER, Walter de Gruyter GmbH, Berlin / Boston, Spain (ISBN:978-3-11-035545-1)
15. Elmas, Emin Taner (2017) Prospective Characteristics of Contemporary Engineer (By the Approach of MechanicalEngineering) Contribution and Role of the Mechanical Engineer to the Organization Management and Productivity). DeGruyter, Germany (DOI 10.1515 / 9783110355796-007)
16. ELMAS, Emin Taner, & ALMA, M. H. (2025). Iğdır University ISO 50001 Energy Management System Certification Studies. In Global Journal of Research in Engineering & Computer Sciences (Vol. 5, Number 2, pp. 6–24). https://doi.org/10.5281/zenodo.15011984
17. Emin Taner Elmas. Design of Bio-Artificial Liver Organ. J Biomed Sci Biotech Res. 2024. 2(3): 1-4. DOI: doi.org/10.61440/JBSBR.2024.v2.12
18. Harvard Medical School, Harvard Health Publishing, Considering cataract surgery?
19. Harvard Medical School, Harvard Health Publishing, Cataract surgery: What to expect before, during and after.
20. Harvard Medical School, Harvard Health Publishing, Is your blurry vision more than just aging eyes?
21. ELMAS, E. T. (2024). Design of Bionic Ear-Cochlear Implant and Artificial Hearing System; a Unique Project "Mobile Bio-Ear-Tronic System". Journal homepage: https://gjrpublication. com/gjrms, 4(02). http://doi.org/10.5281/zenodo.12751385
22. Emin Taner Elmas. A Review for Combined Cycle Power Plants. Bi¬omed J Sci & Tech Res 58(1)-2024. BJSTR. MS.ID.009087. DOI: 10.26717/BJSTR.2024.58.009087
23. ELMAS, Emin Taner. (2024). Dimensional Unit Analysis Applications for Heat Pipe Design. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 5, pp. 12–26). https://doi.org/10.5281/zenodo.13741540
24. ELMAS, Emin Taner. (2024). Calculation of the Filling Amount of Working Fluid to be Placed in a Heat Pipe. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 5, pp. 100–108). https://doi.org/10.5281/zenodo.13844847
25. ELMAS, Emin Taner. (2024). Providing Fully Developed Flow for Waste Exhaust Gas at the Inlet Region of a Heat Pipe Air Recuperator. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 5, pp. 118–124). https://doi.org/10.5281/zenodo.13931542
26. Emin Taner Elmas, (2024), ONLINE BOOKLET - E -Print - A Review for Combined Cycle Power Plants: https://biomedres.us/view-reprints/82/a-review-for-combined-cycle-power-plants / DOI: 10.26717/BJSTR.2024.58.009087
27. Emin Taner ELMAS, Doktora (Ph.D.) Tezi, "Yüksek Sıcaklıklı, Isı Borulu, Isı Geri Kazanım Ünitelerinin Tasarım Parametrelerinin Termodinamiksel ve Deneysel Analizi", Tez Danışmanı:Prof. Dr. Ali Güngör, Ege Üniversitesi Fen Bilimleri Enstitüsü Makina Mühendisliği Anabilim Dalı, Termodinamik Bilim Dalı, İzmir, 2011
28. Elmas, Emin Taner, (1999), Yüksek Lisans (M.Sc.) Tezi, "Evaporation Plant For Recyling of Caustic Soda", Thesis Advisor: Prof. Dr. Fehmi Akdoğan, Dokuz Eylül Üniversitesi Fen Bilimleri Enstitüsü Makina Mühendisliği Anabilim Dalı, Enerji Bilim Dalı, İzmir.
29. Emin Taner E. (2023). Thermodynamical And Experimental Analysis of Design Parameters of a Heat Pipe Air Recuperator. Global Journal of Research in Engineering & Computer Sciences, 3(6), 6–33. https://doi.org/10.5281/zenodo.10116309
30. Emin T. E. (2023). Design, Production, Installation, Commissioning, Energy Management and Project Management of an Energy Park Plant Consisting of Renewable Energy Systems Established at Igdir University. In Global Journal of Research in Engineering & Computer Sciences (Vol. 3, Number 6, pp. 67–82). https://doi.org/10.5281/zenodo.10406670
31. ÇELİK ÜRETİMİNDE ELEKTRİK ARK OCAKLARINDA ENERJİ MALİYETLERİNİN VE ENERJİ VERİMLİLİK FAKTÖRLERİNİN ARAŞTIRILMASI INVESTIGATION ON ENERGY COSTS AND ENERGY EFFICIENCY FACTORS OF ELECTRIC ARC FURNACE FOR STEEEL PRODUCTION, Fenerbahçe Üniversitesi Tasarım, Mimarlık ve Mühendislik Dergisi - Journal of Design, Architecture & Engineering Hasan TAMSÖZ *, Emin Taner ELMAS ** FBU-DAE 2021 1 (3): 163-180
32. SİNTER TESİSLERİNDE ENERJİ KULLANIM NOKTALARI VE ENERJİYİ VERİMLİ KULLANACAK YÖNTEMLERİN BELİRLENMESİ DETERMINATION OF ENERGY UTILIZATION POINTS AND THE METHODS USING THE EFFICIENT ENERGY FOR SINTERING PLANTS, Fenerbahçe Üniversitesi Tasarım, Mimarlık ve Mühendislik Dergisi - Journal of Design, Architecture & Engineering Adem KAYA*, Emin Taner ELMAS** FBU-DAE 2022 2 (2): 170-181
33. Emin Taner ELMAS. (2024). The Electrical Energy Production Possibility Research Study by using the Geothermal Hot Water Resources, which is a a kind of Renewable Energy Resource, located at the Region of Mollakara Village which is a part of Diyadin Town and City of Ağrı, Turkey. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 1, pp. 90–101). https://doi.org/10.5281/zenodo.10729333
34. ELMAS, Emin Taner. (2024). Energy Analysis, Energy Survey, Energy Efficiency and Energy Management Research

carried out at Iğdır University. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 2, pp. 12–30). https://doi.org/10.5281/zenodo.10828077

35. ELMAS, Emin Taner. (2024). A Research Study of Salt Dome (Salt Cave) Usage Possibility for CAES – Compressed Air Energy Storage Systems. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 2, pp. 128–131). https://doi.org/10.5281/zenodo.10980421
36. ELMAS, Emin Taner. (2024). Wankel Rotary Piston Engine Design Project. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 3, pp. 1–4). https://doi.org/10.5281/zenodo.11117047
37. [37] ELMAS, Emin Taner. (2024). An innovative solar dish type collector – concentrator system having an original – unique geometrical mathematical model called as DODECAGON which has 12 equal segments. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 3, pp. 31–38). https://doi.org/10.5281/zenodo.11397848
38. Emin Taner ELMAS*. Waste Heat Recovery Boilers (WHRBs) and Heat Recovery Steam Generators (HRSGs) used for Co-generation and Combined Cycle Power Plants. Op Acc J Bio Sci & Res 12(1)-2024. DOI: 10.46718/JBGSR.2024.12.000284
39. ELMAS, Emin Taner. (2024). Presentation and Curriculum of Division of Motor Vehicles and Transportation Technologies & Department of Automotive Technology at Vocational School of Higher Education for Technical Sciences at Iğdır University, Turkey. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 3, pp. 60–67). https://doi.org/10.5281/zenodo.12536211
40. Emin Taner ELMAS. (2023). Design and Production of a Unique Hand-Made Energy-Efficient 4 x 4 – Four Wheel Drive (4wd – 4 Matic) Traction System Electric Automobile. In Global Journal of Research in Engineering & Computer Sciences (Vol. 3, Number 6, pp. 48–51). https://doi.org/10.5281/zenodo.10359170
41. ELMAS, Emin Taner. (2024). Three – Pass Fire Tube Boilers for production of Steam, Hot Water and Superheated Water. In Global Journal of Research in Engineering & Computer Sciences (Vol. 4, Number 4, pp. 29–38). https://doi.org/10.5281/zenodo.12741030
42. Elmas, Emin Taner, Evaporation Plant for Recycling of Caustic Soda, INTERNATIONAL JOURNAL of ENGINEERING TECHNOLOGIES-IJET Emin Taner Elmas., Vol.3, No.3, 2017
43. Elmas, Emin Taner, (2014), Çağımızın Mühendisinden Beklenenler, Gece Kitaplığı, ISBN:9786053244158
44. Emin Taner ELMAS* and Levent OĞUL. The Effects of Medicine and Music Therapy Practices on Human Health. *IJCMCR. 2025; 50(2): 003*, *DOI: 10.46998/IJCMCR.2025.50.001233*
45. Emin Taner E, Servet K. (2025). Biomechanical Analysis of Transtibial Prosthesis Designed for Runners. Biomedical and Clinical Research Journal, 1(2); DOI: http;/02.2025/BCRJ/007.
46. ET Elmas and MA Cinibulak (2025) Fundamental Scientific and Technical Issues related with the "Hip Replacement Design and Biomechanical Analysis". Journal of Material Science and Nanotechnology, Matsci Nano J, 2025
47. ELMAS, Emin Taner, & KUNDURACIOĞLU, I. (2025). A Model for Second Law of Thermodynamics, Relationship between Health, Disease, Aging, Death Processes and Consciousness, Nervous System and Time. In Global Journal of Research in Medical Sciences (Vol. 5, Number 2, pp. 1–6). https://doi.org/10.5281/zenodo.14973559
48. ELMAS, Emin Taner, & KUNDURACIOĞLU, I. (2025). Metabolic Heat Production with Energy Transfer and Laws of Human Thermodynamics: The Energy Balance of the Human Body. In Global Journal of Research inMedical Sciences (Vol. 5, Number 2, pp. 7–14). https://doi.org/10.5281/zenodo.14973620
49. Elmas ET, Kunduracıoğlu I (2025) Artificial Heart Design and Biomechanical Analysis. Open Access Journal of Medicine and Healthcare, Research Article 1(1): 01-06.
50. ELMAS, Emin Taner, & KUNDURACIOĞLU, I. (2025). Fundamentals of Human Vision System. In Global Journal of Research in Medical Sciences (Vol. 5, Number 2, pp. 103–117). https://doi.org/10.5281/zenodo.15078754
51. ET Elmas (2025) Kitchen Hood Design & Manufacturing Project 3D Modeling, Engineering Calculations, and Technical Drawings for Igdir University Medico Social Building Dining Hall". *Matsci Nano J* 1(1): 102.
52. Emin Taner ELMAS, İsmail KUNDURACIOĞLU. *Signal Transduction System in Neurons. International Journal of Research in Medical and Clinical Sciences. 2025;3(1): 26-35.*
53. Emin Taner ELMAS, İsmail KUNDURACIOĞLU. *An Introduction to Sound and Sound Perception System for Human Ear. International Journal of Research in Medical and Clinical Sciences. 2025;3(1): 36-49.*
54. Emin Taner ELMAS, İsmail KUNDURACIOĞLU. *Medical Structure of the Human Respiratory System. International Journal of Research in Medical and Clinical Sciences. 2025;3(1): 50-63.*
55. Emin Taner ELMAS, İsmail KUNDURACIOĞLU. *Medical Structure and Hemodynamics of the Human Circulatory System. International Journal of Research in Medical and Clinical Sciences. 2025;3(1): 64-81.*
56. Emin Taner ELMAS and İsmail KUNDURACIOĞLU. General Aspects of Advanced Biomechanics. Biomed J Sci & Tech Res 61(5)-2025. BJSTR. MS.ID.009658.
57. Emin Taner Elmas and İsmail KUNDURACIOĞLU. Conservation Laws and the Main Physical Parameters for Advanced Biomechanics. Biomed J Sci & Tech Res 61(5)-2025. BJSTR. MS.ID.009659.
58. Emin. T. Elmas, M. Şimşek (2025). Bionic Prosthetic Robotic Artificial Hand Design and Biomechanics Analysis. *Journal of Medical Discoveries. RPC Publishers*. 2(1); DOI: https://www.doi.org/rpc/2025/rpc.jmd/00311