



HANUMAN SUVANNAMACCHA” (2000) - A CERAMIC SCULPTURE FROM
SILPAKORN UNIVERSITY ART CENTRE BANGKOK, THAILAND



By
Miss Prerana KAUSHIK

An Independent Study Submitted in Partial Fulfillment of the Requirements
for Master of Arts CULTURAL HERITAGE CONSERVATION AND
MANAGEMENT

Silpakorn University

Academic Year 2023

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ลิขสิทธิ์ของมหาวิทยาลัยศิลปากร

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Advisor Dr. Thanya Lunchaprasith

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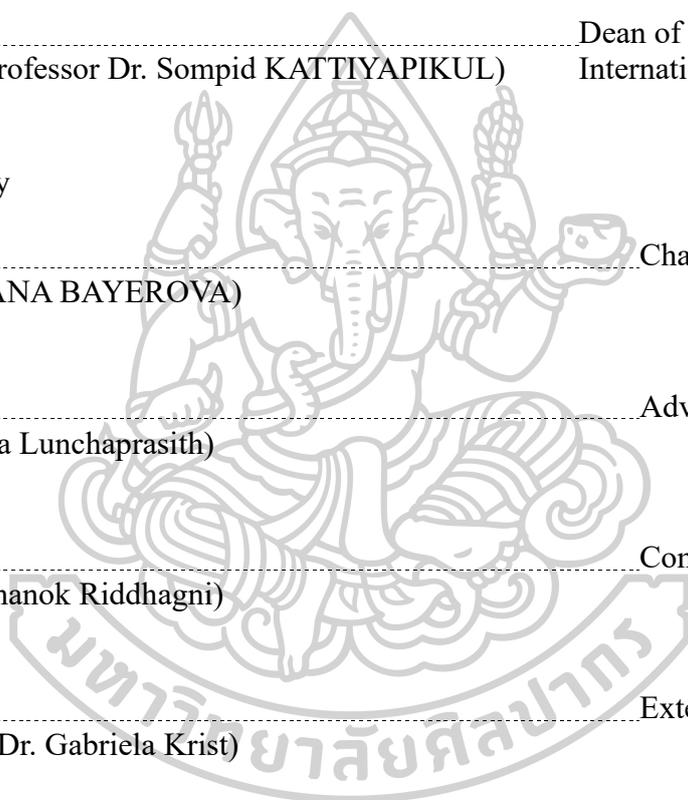
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BANGKOK, THAILAND Thesis advisor : Dr. Thanya Lunchaprasith

“Hanuman Suvannamaccha” (2000) - A Ceramic Sculpture from Silpakorn
University Art Centre Bangkok, Thailand.

Conservation and Restoration

This artwork, created for the National Ceramic Exhibition in the year 2000, portrays a tale from the Cambodian and Thai Ramayana, known as Ramakien. The Ramayana is an ancient Hindu epic that holds immense cultural and religious significance in India and Southeast Asia. Over time, the Ramayana has been retold in various texts. Crafted from black clay sourced from the Mae Rim River and fired at 1250 degrees Celsius, the sculpture now shows signs of deterioration. One Hanuman’s ear and certain decorative elements from Suvannamaccha’s headgear have been broken and lost. The object is covered in dust and dirt. To conserve and restore this delicate ceramic artwork, epoxy resin is being used for reconstruction of broken and lost parts. The conservation treatments are aimed to be minimally invasive and reversible. After the restoration process is complete, the sculpture will be stored at the Silpakorn University Art Centre Bangkok, Thailand.



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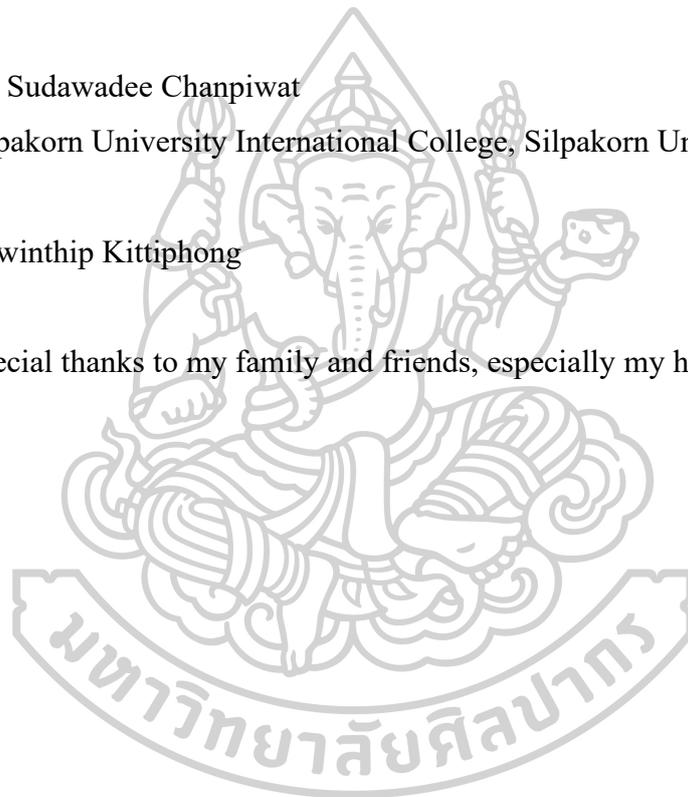
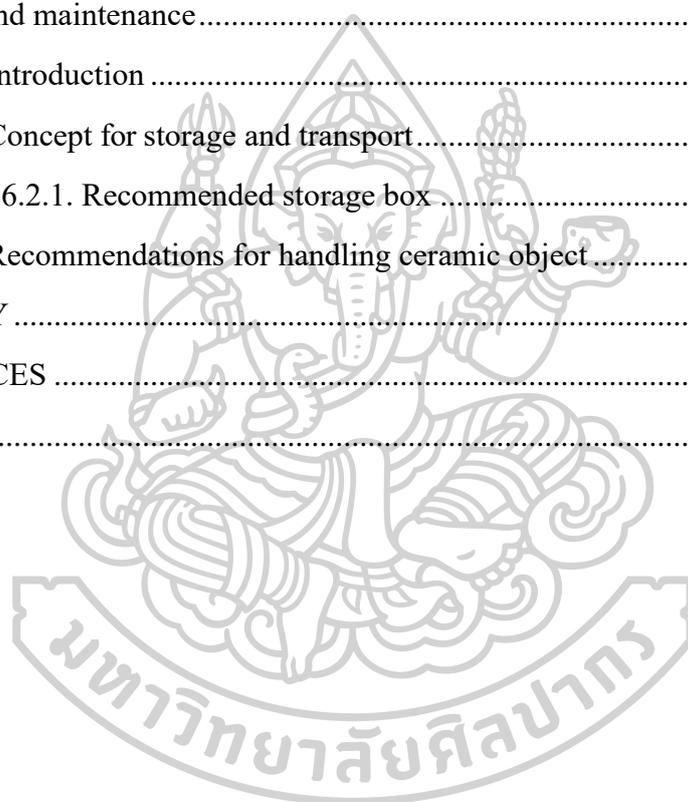


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INTRODUCTION

This master's thesis is dedicated to the conservation of a ceramic sculpture called "Hanuman Suvannamaccha", (2000) which is based on the legends of the Thai and Cambodian Ramayana. The sculpture portrays the love story of Hanuman and Suvannamaccha. It is currently housed at the Silpakorn University Art Centre, a renowned art institution affiliated with Silpakorn University in Bangkok, Thailand.

The sculpture is brought to the conservation laboratory of Silpakorn University International College (SUIC) for necessary conservation treatment. It is a testament to the exceptional ceramic craftsmanship and skills of Thailand, representing an important aspect of the country's traditional arts and crafts heritage. The artist behind the sculpture, Nakorn Ananda Pradit, hails from Chiang Mai, Thailand, and is well-known for his artistic contributions in the country. The Object has been stored in the storage area of the Silpakorn University Art Centre for an extended period. The sculpture has accumulated dust and suffered damages, which have adversely affected its present condition.

At the start of this work, numerous questions arise. What is the story of Hanuman and Suvannamaccha? How did it originate? What materials and techniques constitute ceramic sculpture? What type of materials are necessary for restoration? How to store artefact in storage and What factors need to be consider before transporting and handling the artifact in future?

The primary emphasis of this master's thesis is on conserving and restoring ceramic the sculpture, addressing damages and ensuring both current and long-term preservation. In the first chapter, there are explanations about the Indian and Thai Ramayana, the story of Ramayana, the cultural and art historical background of Hanuman Suvannamaccha, as well as comparable ceramic objects from the same artist. The second and third chapters document information gathered during the technological and condition survey.

Chapter four thoroughly discusses about conservation concepts prior to implementing treatments, while chapter five provides a detailed account of the actions taken to accomplish the intended objective. Additionally, chapter six is dedicated to the formulation of a comprehensive storage concept, encompassing considerations for transportation and handling.



1. Hanuman Suvannamaccha (2000)

Inv. Nr.:	พช.10-2543-ท-2-019	
Artist:	Nakorn Ananda Pradit	
Title/Description:	Hanuman Suvannamaccha	
Technique:	Stoneware pottery	
Dimensions: (h x w x d)	38 x 25 x 45 cm	
Dating:	2000 (western calender)	
Provenance:	Silpakorn University Art Centre	
Owner:	Silpakorn University ¹	

Figure 1 : Hanuman Suvannamaccha.

The sculpture depicts two figures: Suvannamaccha, a half-human and half-fish creature, and Hanuman, the monkey god. Hanuman is depicted holding Suvannamaccha with both hands, while Suvannamaccha is shown in a dancing pose, sitting on a water wave (figure 2).

The Hanuman Suvannamaccha sculpture is in good overall condition. It has various shades of red and grey. At the lower part of the sculpture, there is the artist's signature, accompanied by the year of creation stated as 2543 B.E. in Thai calendar years and 2000 A.D. in the Western calendar.² The sculpture is affixed to a wooden base, which

¹ "Hanuman Suvannamaccha," Silpakorn University's Fine Arts Collection, accessed January 30, 2023,

http://www.resource.lib.su.ac.th/awardsu/web/artdetail.php?item_id=1075#inbox/_blank.

² Teawkha Jong, personal communication with author, June 7, 2023.

appears to be constructed from solid wood pieces. The base is made of teak wood, which is commonly used in Thailand. It has a dark-reddish brown colour, and despite being painted black on the top surface, the wood grain is still visible, adding to its aesthetic appeal.

The attention to detail in the sculpture is remarkable, particularly in the intricate work on the clothes, jewelry, and headgear. The artist has skillfully captured the beauty and intricacy of these elements, adding to the overall aesthetic appeal of the sculpture. The clothing of the figures, including their patterns and textures, presents the artist's talent and craftsmanship. The jeweled headgear adds a touch of grandeur and elegance to the composition. Level of details in the sculpture highlights the artist's dedication to portraying the characters of Suvannamaccha and Hanuman in a captivating and visually stunning manner. The utilization of black clay in the sculpture of Hanuman Suvannamaccha demonstrates the artistic and technical skills involved in working with this specific clay type. The natural properties of the black clay, combined with the artist's expertise, have resulted in the creation of a visually striking and culturally significant ceramic artwork.

The sculpture depicts inspiration from the Thai and Cambodian Ramayana legends, specifically showcasing the love affair between Hanuman and Suvannamaccha.³ In these legends, Hanuman, a revered figure in Hindu mythology, encounters Suvannamaccha, a mythical creature often depicted as a golden mermaid.⁴

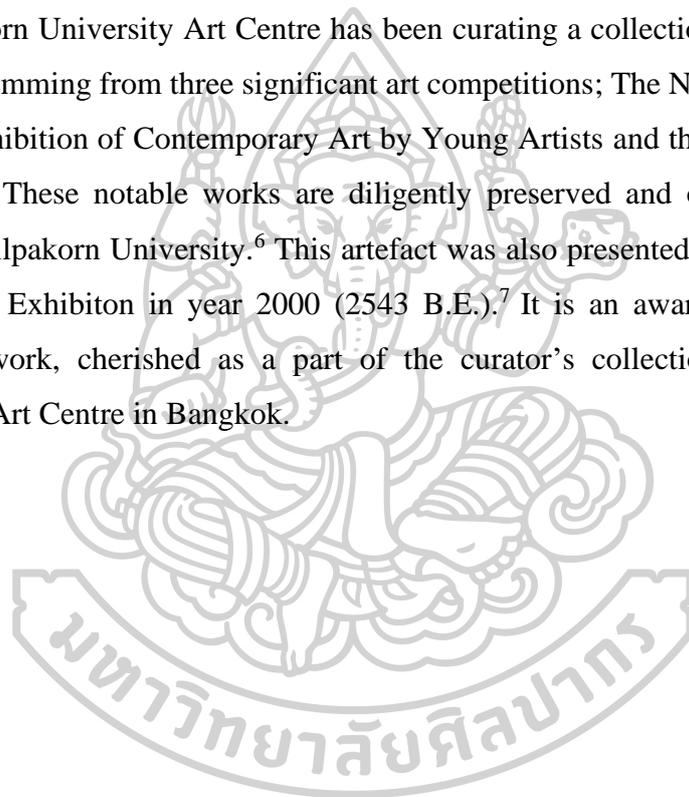
The Hanuman Suvannamaccha sculpture is crafted from black clay sourced from the *Mae Rim River*. During the firing process, the sculpture was subjected to temperatures of 1250 degrees Celsius. It is noteworthy that the artist intentionally did not apply any paint or glaze layer to the sculpture. As a result of the firing, the black clay underwent a transformation in colour. The originally black clay turned into a whitish-grey shade,

³ "Hanuman in the Ramakien," The Story of Suvannamaccha and Hanuman, accessed April 5, 2023, <https://sites.google.com/view/hanuman-in-the-ramakien/ramakien-intro>.

⁴ Abhilash MS, "Suvannamaccha Golden Mermaid," accessed April 5, 2023, <https://www.hindudevotionalblog.com/20suvannamaccha-golden-mermaid.html>.

while certain parts of the sculpture developed a reddish hue. This change in colour is attributed to the nature of the clay mixture used and the specific firing conditions employed during the creation of the sculpture. Insights provided by Natee Anuntapadit, the artist's son, indicate that the alteration in colour is a deliberate outcome influenced by the artist's chosen clay composition and the firing process,⁵ resulting whitish-grey and reddish tones contribute to the unique aesthetic of the sculpture, showcasing the artist's mastery in manipulating the clay medium and the transformative effects of high-temperature firing.

The Silpakorn University Art Centre has been curating a collection of award-winning artworks stemming from three significant art competitions; The National Exhibition of Art, the Exhibition of Contemporary Art by Young Artists and the National Ceramics Exhibition. These notable works are diligently preserved and overseen by the Art Centre of Silpakorn University.⁶ This artefact was also presented at the 10th National Pottery Art Exhibiton in year 2000 (2543 B.E.).⁷ It is an award-winning unglazed pottery artwork, cherished as a part of the curator's collection at the Silpakorn University Art Centre in Bangkok.



⁵ Natee Anuntapadit (Artist's son), personal communication with author, May 19, 2023.

⁶ "Collections - Art-Centre Silpakorn University," accessed August 3, 2023, <http://www.art-centre.su.ac.th/collections1.html>.

⁷ "Hanuman Suvannamaccha," Silpakorn University's Fine Arts Collection.



Figure 2 : Hanuman Suvannamaccha (2000), 38 x 25 x 45 cm.

1.1. Ramayan / Ramakien

Ramayan is one of the two major Sanskrit epics of ancient India, the other being the Mahabharata. It is an epic poem attributed to the sage Valmiki and tells the story of Lord Rama, who is considered to be the seventh incarnation of Lord Vishnu. The history of Ramayan is deeply rooted in Indian mythology. The Ramayan is believed to have been written during the 2nd century BCE. The story of Ramayan has been passed down through generations through various forms of oral and written traditions, including religious texts, folk tales, and classical literature.⁸

The Ramayana was introduced to Southeast Asia by Indian traders during the initial centuries of the Common Era.⁹ The Thai Ramayana, also known as the Ramakien, is the national epic of Thailand and an adaptation of the Indian epic Ramayana.¹⁰ At the commencement of the Bangkok era, the inaugural monarch, also known as King Rama I of the Chakri dynasty, undertook the task of collecting stories about Rama¹¹ from both spoken and written sources. This effort was prompted by the decline of Ayuthaya in 1767 A.D., which had led to the imminent loss of a substantial portion of Thai literary works. King Rama I combined all these materials, and in 1798, he created a highly detailed Thai version of the Ramayan known as the Ramakien (meaning ‘Rama’s Glory’).¹² King Rama I’s Ramakien is an extensive poetic rendition crafted in the Thai

⁸ Devdutt Pattanaik, *Sita: An Illustrated Retelling of the Ramayana* (New Delhi: Penguin Books, 2013), xiv-xviii.

⁹ Misra Bibhu Dev, “2200-Year-Old Mermaid Reliefs Raise Age-Old Question: Are Mermaids Real,” *Earth Mysteries*, January 14, 2012, <https://www.bibhudevemisra.com/2021/01/2200-year-old-mermaid-reliefs-of.html>.

¹⁰ “Hanuman in the Ramakien,” Introduction, accessed April 5, 2023, <https://sites.google.com/view/hanuman-in-the-ramakien/ramakien-intro>.

¹¹ “Rama” is a revered heroic figure in Hindu mythology, known as the seventh incarnation (avatar) of the god Vishnu. He is the central character in the ancient Indian epic, the Ramayana.

¹² Singaravelu, “The Rama story in the Thai cultural traditional,” *JSS 070 0g Singaravelu RamaStoryInThaiCulturalTradition.pdf* thesiamsociety.org (March, 1982): 55-56.

metrical klon verse style. It comprises 102 folios, with each folio encompassing 24 pages. Each page is graced with four lines, encompassing roughly 20 words per line. This cumulative opus comprises an impressive 52,086 verses, intricately woven into a narrative spanning 195,840 words.¹³

Regional interpretations have undergone adjustments from the original depiction to align with local context and perspectives. Additionally, the title of Rama was adopted by subsequent Thai monarchs. Furthermore, the ancient Siamese capital, Ayuthaya, not only holds historical significance but also serves as a symbolic bridge to legendary Indian city of Ayodhya. This interplay of names establishes a mental connection between the two realms.¹⁴

The Ramakien has been adapted into various art forms, including dance, music, and theater, and is often performed during cultural festivals and religious ceremonies. In addition to the main characters from the Ramayana, such as Rama, Sita, and Hanuman, the Ramakien includes many additional characters and subplots.¹⁵

The principal figures within the Ramakien embody diverse aspects of human existence, effectively reflecting the multifaceted nature of life. These characters are held in high regard by the Thai populace, who perceive them as archetypes of societal dynamics. This enduring resonance with the Rama legend persists within Thai society due to its capacity to encapsulate and resonate with the intricate tapestry of human experiences.¹⁶

1.1.1. Story of Ramayana

Ramayan story of Prince Rama and his journey to rescue his wife, Sita, from the demon king Ravana. The epic is filled with adventure, devotion, and moral lessons that are

¹³ Singaravelu, "The Rama Story in the Thai cultural traditional," 57.

¹⁴ Songkran, "The Thailand pages Ramakien Ramayana", accessed August 6, 2023, <https://www.songkran.eu/Ramakien- -Ramayana.htm>.

¹⁵ "Hanuman in the Ramakien," Introduction.

¹⁶ Singaravelu, "The Rama Story in the Thai Cultural Traditional," 69.

highly revered in Hindu culture. Prince Rama, the eldest son of King Dasharatha, is banished from his kingdom of Ayodhya due to a promise made by his father to one of his wives. Accompanied by his faithful wife Sita and loyal brother Lakshmana, Rama willingly embraces his exile and sets off into the forest for a period of fourteen years. During their exile, Ravana, the powerful demon king of Lanka, becomes captivated by Sita's beauty and hatches a plan to abduct her. Disguised as a holy man, Ravana tricks Sita and takes her away to his kingdom of Lanka. Upon discovering Sita's disappearance, Rama and Lakshmana are devastated and vow to rescue her.

On their journey, Rama and Lakshmana encounter Hanuman, the mighty monkey god, who becomes a devoted ally and aids them in their mission. Together, they march towards Lanka to confront Ravana and free Sita. A great battle ensues between Rama's army and Ravana's forces. Rama displays his exceptional bravery and skill, eventually confronting Ravana directly and defeating him in a fierce duel. With Ravana's demise, Sita is rescued and reunited with Rama. Having accomplished their mission, Rama, Sita, Lakshmana, and Hanuman, along with their monkey army, return to Ayodhya. Rama is joyfully crowned as the king.¹⁷

1.2. Cultural and art historical background

Hanuman is a prominent character in the Ramayan, and is one of the most revered and beloved figures in Hindu mythology. Hanuman is a vanara,¹⁸ and is considered to be the greatest devotee of Lord Rama. Hanuman is known for his immense strength.¹⁹ Hanuman, the illustrious monkey king and devoted aide to Rama, embodies virtues of loyalty, selflessness, ingenuity, and resourcefulness. In the Ramakien, his significance is even more pronounced than in the Ramayana. Possessing immortal status and

¹⁷ Valmiki, *Valmiki's Ramayana*, trans. Arshia Sattar (n.p.:Rowman & Littlefield Publishers, 2018).

¹⁸ "Vanara" can be interpreted in two distinct ways: "va-nara", implying sub-human or less than human, and "vana-nara," suggesting forest people. In Valmiki's narrative, he also refers to them as "kapi," which translates to monkeys. Pattanaik, Sita: *An Illustrated Retelling of the Ramayana*, 157.

¹⁹ Pattanaik, Sita: *An Illustrated Retelling of the Ramayana*, 157.

magical prowess, Hanuman is born of Phra Phai, the wind god, adorned in radiant, diamond-white fur. Revered as Phra Ram's mightiest warrior.²⁰

In Thai iconography, Hanuman is a prominent figure in the Ramakien, holding a more prominent role than his Indian counterpart. Unlike the devoted Hanuman in the Indian epic, the Thai Hanuman is portrayed as playful and flirtatious. An example from the Ramakien depicts him falling in love with the mermaid Suvannamaccha and having a child named Macchanu with her.²¹

Suvannamaccha is a character from the Ramakien. In the Ramakien, Suvannamaccha is a beautiful golden mermaid who falls in love with Hanuman. Different versions of the story attribute different origins to Suvannamaccha. In some accounts, she is described as the daughter of Ravana, the primary antagonist of the Ramayana. In other versions, she is known as the queen of the sea, who is devoted to Ravana and worships him.²²

Suvannamaccha was sent to stop Hanuman from building a bridge to Lanka to rescue Sita, who had been kidnapped by Ravana. Under the command of Ravana, Suvannamaccha is instructed to gather the sea creatures and obstruct the construction of a bridge being built by Lord Rama's army. The bridge is intended to help Lord Rama and his army cross the ocean and reach the kingdom of Lanka to rescue Sita, who has been abducted by Ravana. Hanuman's army of monkeys hesitate to enter the water, but then Hanuman himself bravely ventures into the sea. A confrontation ensues between Hanuman and Suvannamaccha. However, Hanuman's unwavering devotion to Lord Rama and his display of valor charm Suvannamaccha. She is captivated by Hanuman's bravery and decides to cease fighting and she ultimately decided to help him in his mission.²³

²⁰ Songkran, "The Thailand Pages Ramakien Ramayan."

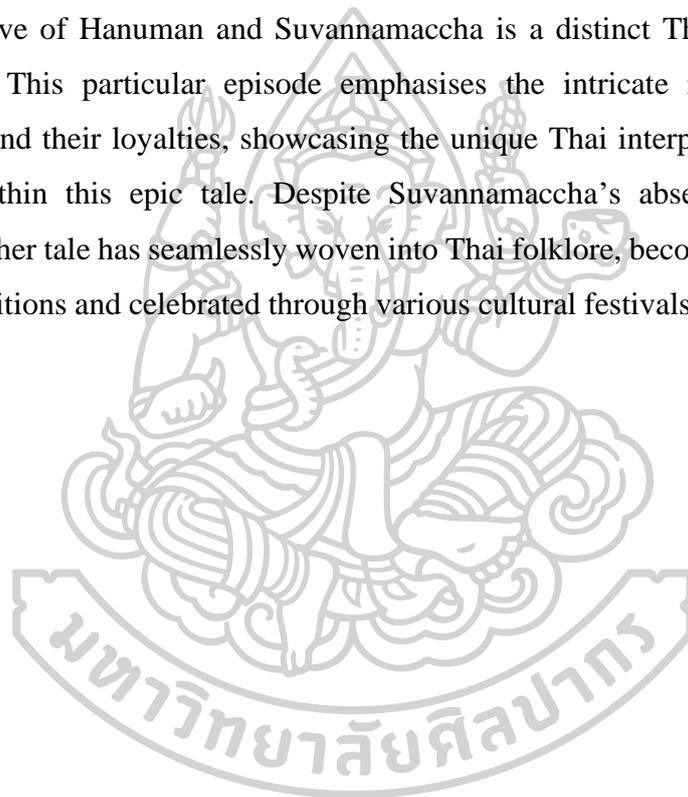
²¹ Uday Dokras, "Hanuman in Various Southeast Asian Texts and Places," *INAC*, (2022): 15.

²² Pattanaik, *Sita: An Illustrated Retelling of the Ramayana*, 216.

²³ Pattanaik, *Sita: An Illustrated Retelling of the Ramayana*, 214-215.

The Ramakien Murals at Wat Phra Kaew in Bangkok, Thailand, vividly depict the heroic encounter between Hanuman and the mermaid Suvannamaccha (figure 5).²⁴ Additionally, a Thai rubbing from the west wall of Wat Po Temple in Bangkok portrays the embrace between Suvannamaccha and Hanuman, dating back to the 18th century (figure 4).²⁵ Another same kind of instance is found at Wat Phananchong (figure 3).²⁶ This illustrates that both the characters of the object hold significant importance in Thai culture.

This narrative of Hanuman and Suvannamaccha is a distinct Thai adaptation of the Ramayana. This particular episode emphasises the intricate relationships among characters and their loyalties, showcasing the unique Thai interpretation and cultural nuances within this epic tale. Despite Suvannamaccha's absence in the original Ramayana, her tale has seamlessly woven into Thai folklore, becoming an integral part of their traditions and celebrated through various cultural festivals and performances.²⁷



24 Royal Museums Greenwich, "What is a Mermaid and what do they Symbolize," accessed August 7, 2023, <https://www.rmg.co.uk/stories/topics/what-mermaid>.

25 "Harvard Art Museums, "Thai Rubbing from the West Wall Hanuman Suvammaccha," accessed August 11, 2023, <https://harvardartmuseums.org/collections/object/203120?position=2>.

26 "15 Wat Phananchong | Flickr," accessed August 7, 2023, <https://www.flickr.com/photos/anandajoti/albums/72157634435277243/with/9190770004/>

:

27 Hanuman in the Ramakien, "The story of Suvannamaccha and Hanuman."



Figure 3 : Hanuman Suvannamaccha at Wat Phananchong.



Figure 4 : Hanuman Suvannamaccha.



Figure 5 : Hanuman and Suvannamaccha, 1831.

1.2.1. Other objects of artist (Nakorn Ananda Pradit)

All three objects are from Nakorn Ananda Pradit same artist of “Hanuman Suvannamaccha” and two are in the collection of the Silpakorn University Art Centre²⁸ and the third (figure 7) from [Amazing Thailand Erotic Art Museum by Kamavijitra](#).²⁹

Each of the three objects possesses a significant place within the realm of Thai literature signifying their importance and cultural relevance. Through these objects, the author has openly conveyed their deep affection and ardor for the characters found within the tapestry of Thai literary traditions. The author’s desire extends beyond mere appreciation; they aspire to uphold and conserve these objects, aligning their preservation with the rich heritage of Thailand itself.³⁰

Kinnaree (figure 6), is mystical character within the Buddhist mythology, exhibiting a captivating fusion of forms, including both human and bird forms.³¹ Manora kinnaree is a prominent figure in Thailand, draws her name from “Manohara”. Within the tales encompassed by the “Pannas Jataka”, during the period of AD 1450-1470. The narrative of Manora has given rise to the Manorah Buchayan dance, a dance of remarkable complexity and exclusivity within Thailand’s repertoire of high classical dances.³² The dimensions of the sculpture measure 32 x 20 cm. It was honored with an award at the 9th National Pottery Art Exhibition in 2541 B.E. for its outstanding craftsmanship as unglazed pottery.³³

²⁸ “Kinnaree & Kraitepsingh,” Silpakorn University’s Fine Arts Collection.

²⁹ Kerocha, “Hanuman and Mermaid Suvannamaccha,” Art of Siam 2016, accessed August 14, 2023, <http://artofsiam.blogspot.com/2016/>.

³⁰ “Hanuman Suvannamaccha,” Silpakorn University’s Fine Arts Collection.

³¹ “Kinnaree, a Creature from Buddhist Mythology, Half Human,” accessed August 24, 2023. <https://www.flickr.com/photos/jlascar/48213963367>.

³² “Kinnara-Tibetan Buddhist Encyclopedia,” accessed August 24, 2023, <http://tibetanbuddhistencyclopedia.com/en/index.php?title=Kinnara>.

³³ “Kinnaree,” Silpakorn University’s Fine Arts Collection.



Figure 6 : Kinnaree.



Figure 7 : Hanuman Suvannamaccha (2010).³⁴

³⁴ Kerocha, "Hanuman and Mermaid Suvannamaccha."



Figure 8 : Kraitepsinha (Singha).

Kraitepsingha (Singha) (figure 8) is a creature bearing the closest resemblance to a lion and holds the esteemed role of being one of Buddha's protectors. Revered for their embodiment of strength, leadership, bravery, and power, Singhas are regarded as potent symbols within Thai culture.³⁵ The sculpture is sized 40 x 50 x 40 cm. It *received an award for being* exceptionally well-made pottery without any glazing during the 8th National Pottery Art Exhibition in 2539 B.E.³⁶

All the three ceramic sculptures are made from black "Mae Rim" clay. It was fired at a high temperature of 1250 degrees Celsius.³⁷ Upon a thorough comparison with the central object, Hanuman Suvannamaccha (figure 2), distinct resemblances emerge in terms of technique, materials, colour tones, and specific ornamental features. Akin facial expressions are conveyed, and the consistent presence of pointed adornments and accessories can be noted throughout the collection.

³⁵ "Thai Mythical Creatures You'll See at Buddhist Temples in Thailand," accessed August 24, 2023, <https://bodegahostels.com/thai-mythical-creatures/>

³⁶ "Kraitepsingh", Silpakorn University's Fine Arts Collection."

³⁷ "Kinnaree & Kraitepsingh," Silpakorn University's Fine Arts Collection.

1.3. Silpakorn University Art Centre

In 1979, Silpakorn University inaugurated the Art Centre. The Silpakorn University's Art Centre is housed within two former royal structures: the Grand Hall and the Pannarai Wing, originally part of Wang Thapra palace. Built during King Rama I's reign as Bangkok's capital was established, the West Palace was later granted to Prince Jetsadabodin (later King Rama III) and his successors by King Rama II. In King Rama V's time, it became Prince Narisara Nuvativongse's residence.³⁸

The Art Centre at Silpakorn University ranks among Thailand's leading art institutions and is situated within the historic Wang Thaphra palace campus. Its core mission is to elevate contemporary art by nurturing emerging artists both domestically and globally. This encompasses fostering Thai contemporary art education, organizing art exhibitions, facilitating international exchanges, and hosting various artistic endeavors. The Art Centre actively engages in educational initiatives. These encompass art workshops, educational programs, collection management, archiving, artist grants, artist-in-residence programs, and the establishment of a comprehensive learning centre.³⁹

The Silpakorn University Art Centre has been curating a collection of award-winning artworks stemming from three significant art competitions: The National Exhibition of Art, the Exhibition of Contemporary Art by Young Artists and the National Ceramics Exhibition.⁴⁰ It has amassed an impressive art collection originating from the National Art Competition organised by the University. This curated exhibition finds its home within the Silpakorn University Art Gallery, operating under the "Open Collection" theme, where artworks are presented in a unique manner resembling storage space,

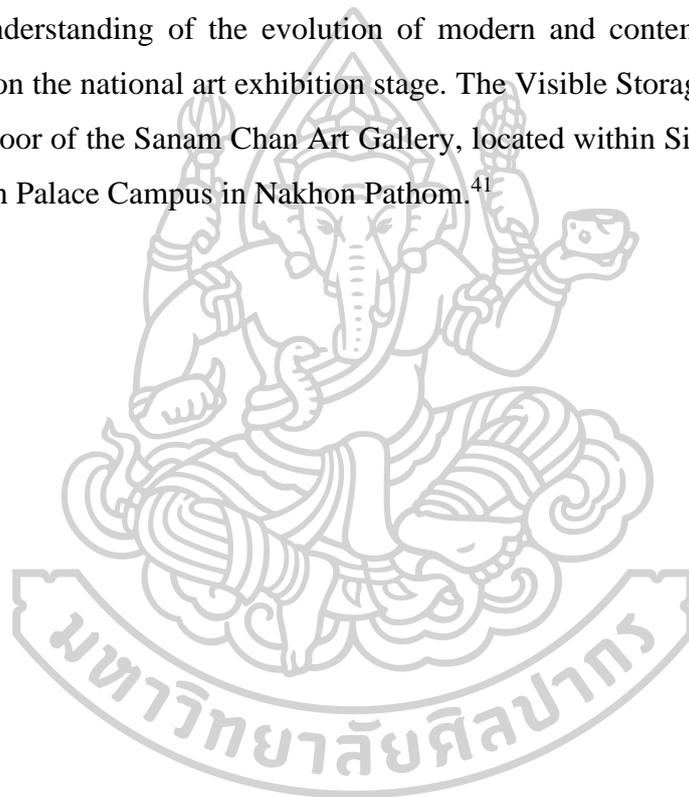
³⁸ "Art Centre History - Art-Centre Silpakorn University," accessed August 3, 2023, <http://www.art-centre.su.ac.th/art-centre-history.html>.

³⁹ "About Us เกี่ยวกับเรา - Art-Centre Silpakorn University," accessed August 3, 2023, <http://www.art-centre.su.ac.th/about-us-3648358536373656361836233585363336103648361936341.html>.

⁴⁰ Art-Centre Silpakorn University, "Collections."

allowing the audience an engaging and accessible encounter. The National Ceramics Exhibition commenced in 1986 and has seen 19 successful iterations till 2018. Within the collection of the Silpakorn University Art Centre, there reside 275 ceramic objects from these exhibitions. Notably, among these objects, three belong to Nakorn Ananda Pradit, including the Hanuman - Suvannamachha.

The aim of this initiative extends beyond mere exhibition, serving as a means to share these invaluable pieces with the public. This endeavor enriches art education and fosters a deeper understanding of the evolution of modern and contemporary Thai art, as showcased on the national art exhibition stage. The Visible Storage Gallery is situated on the 1st floor of the Sanam Chan Art Gallery, located within Silpakorn University's Sanam Chan Palace Campus in Nakhon Pathom.⁴¹



⁴¹ "Visible Storage Gallery - Art-Centre Silpakorn University," accessed, August 3, 2023, <http://www.art-centre.su.ac.th/visible-storage-gallery.html>.

2. Technological survey

This chapter aims to comprehensively collect detailed information about the technologies, methods, and processes used within the field of ceramics and wood. An in-depth survey can serve to provide insights for decision-making, drive research and development endeavors, aid in strategic planning.

2.1. Ceramic body

Clay is the main material for ceramic products. The natural material has a unique plasticity, both in its raw state as excavated from clay pits and after being ground and mixed with water. It comprises of one or more clay minerals, typically with the inclusion of free silica and other impurities. The primary clay mineral found in most clays is kaolinite, which forms the major component. The presence of kaolinite imparts specific properties and characteristics to different types of clay, making it widely used in various applications such as ceramics, pottery,⁴² and building materials due to its plasticity and molding capabilities.⁴³

The black clay, also known as *Mae Rim Sangkhalok* clay or black ware clay, is a specific type of clay found in the Mae Rim district of Chiang Mai province in northern Thailand. Its name is derived from the region where it is primarily sourced.⁴⁴ Black *Mae Rim* clay is characterised by its deep black color, which is attributed to the high iron content present in the clay sourced from the Mae Rim River. This unique composition gives the clay its distinct appearance and contributes to its properties. The

⁴² Pottery made from impure clays results in a porous and lightweight material. To enhance durability, these pieces require thicker walls. The color palette spans shades such as buff, grey, red-brown, and dark brown.

Byus and Oakley, *Conservation and Restoration of Ceramics*, 14.

⁴³ Arthur Dodd and David Murfin, *Dictionary of Ceramics*, 3rd ed. (London: A & C Black Publishers Ltd, 1994), 63.

⁴⁴ Sumrit Mopoung and Prasak Thavornnyutikarn, "Adsorption of Arsenate on Clays," *NU Science Journal* 1, no. 1 (2004): 1.

clay is known for its plasticity, which refers to its ability to be easily molded and shaped, and its good workability, allowing for various ceramic techniques to be applied.⁴⁵

Ceramic refers to a broad category of materials that are created through the firing or baking of non-metallic minerals, typically clay, at high temperatures. The resulting products can vary widely in terms of composition, properties, and uses. Ceramics are known for their diverse applications, ranging from decorative pottery and sculptures to industrial components.⁴⁶

Ceramics exhibit several key characteristics, including hardness that provides resistance to wear and abrasion. However, Ceramics are also brittle, making it susceptible to cracking or breaking under stress. Ceramics are prone to thermal shock, meaning it can crack when exposed to rapid temperature changes. It can withstand high temperatures without melting or deforming. Some ceramics can also be intrinsically transparent, allowing light to pass through it.⁴⁷

The firing of ceramics stands as a pivotal phase in the production journey, entailing subjecting clay objects or ceramic materials to elevated temperatures to bring about desired alterations in both physical and chemical attributes.⁴⁸ Prior to firing, air drying of the clay objects is crucial to eliminate moisture content. This drying process is executed gradually to avert potential cracks or deformations. Depending on the object's size and thickness, this drying procedure can extend from several days to weeks, facilitating the gradual evaporation of water as the object solidifies. Amid the high-temperature firing stage, an array of chemical and physical transformations unfold, inducing changes in the properties of the clay. These alterations transpire at distinct

⁴⁵ Sumrit, "Adsorption of Arsenate on Clays," 1-4.

⁴⁶ Susan Buys and Victoria Oakley, *Conservation and Restoration of Ceramics*, (London, UK: Butterworths, 1993), 1-2.

⁴⁷ Michel W Barsoum, *Fundamentals of Ceramics* (n.p.: IOP Publishing Ltd, 2003), 7-8.

⁴⁸ Dodd and Murfin, *Dictionary of Ceramics*, 122.

temperature points within the firing process.⁴⁹ Ceramics can be broadly categorised into three groups, each distinguished by their firing temperature, type of clay, and inherent physical characteristics. These categories encompass earthenware (like terracotta), stoneware, and porcelain.⁵⁰

Earthenware ceramics undergo firing at lower temperatures, typically ranging between 950-1100 degrees Celsius. Notably, they possess a porous structure, readily absorbing water unless coated with glaze. During firing, sintering occurs. Sintering is a process where particles are compacted and heated below their melting point, leading them to bond together. Conversely, vitrification, a transformative process that renders materials glassy or partially glassy, is not achieved at these lower temperatures in earthenware ceramics. These ceramics are often soft and susceptible to scratches. The red coloration frequently seen in earthenware results from the presence of naturally occurring iron in the clay.⁵¹

Stoneware ceramics, fired at higher temperatures ranging from 1100-1300 degrees Celsius, less porous and more durable products compared to earthenware. They possess enhanced scratch resistance and exhibit partial vitrification. Common hues for stoneware include brown and grey.⁵²

Porcelain, on the other hand, demands very high firing temperatures, exceeding 1300 degrees Celsius. This ceramic type is famed for its exceptional traits: translucence, extreme hardness, brittleness, and delicacy. The raw clay used in porcelain is intricate to handle and necessitates precise firing conditions. The resulting porcelain body is

⁴⁹ Buys and Oakley, *Conservation and Restoration of Ceramics*, 7-11.

⁵⁰ National Park Service, "[Appendix P: Curatorial Care of Ceramic, Glass, and Stone Objects](#)," (PDF format) NPS Museum Handbook, Part 1, (Washington, D.C.: National Park Service, 2000), 3.

⁵¹ S.K.Duggal, 3rd ed., *Building Materials* (New Delhi: New age international (P) Ltd., 2008), 40.

⁵² Duggal, *Building Materials*, 42.

fully vitrified and impervious to water, rendering it non-porous. This material exhibits such a high degree of vitrification that the glaze and body of porcelain are nearly indistinguishable in cross-section.⁵³

The traditional technique of Thai ceramics begins with clay preparation. Clay is typically sourced from the ground and undergoes a thorough cleaning and refining process to eliminate impurities like stones and organic matter. It is then mixed with water to achieve a pliable and workable consistency. Once the clay is prepared, it is shaped into the desired form using various techniques. In the case of Hanuman Suvannamaccha, it was hand-built, meaning the clay was molded and formed by hand. Artists may also employ tools such as, knives, spatulas and wooden stamps to create intricate patterns on the surface.⁵⁴

After shaping, the object is left to dry completely. This step is crucial to remove excess moisture and prepare it for the firing process. After drying the object is fired in a kiln at high temperatures. The firing transforms the clay into a solid and durable ceramic object. To ensure its protection from dust and debris during this time, it is common to cover the object. The firing temperature and duration are determined by factors such as the type of clay used and the desired outcome. In the case of this sculpture, it was fired at a temperature of 1250 degrees Celsius.⁵⁵ As a result, the firing of the black clay caused it to undergo a transformation in color. Some parts turned whitish-grey, while others took on a reddish hue (figure 9). This change in colouration is a characteristic of the clay mixture and the firing process.⁵⁶

⁵³ Duggal, *Building Materials*, 41

⁵⁴ Phongphan Chaiyanil, (ceramic artist) personal communication with author, March 11, 2023.

⁵⁵ "Hanuman Suvannamaccha," Silpakorn University's Fine Arts Collection.

⁵⁶ Natee Anuntapadit, (Artist's Son), personal communication with author, May 19, 2023.



Figure 9 : Back side of female headgear in whitish-grey colour.

The presence of iron compounds in the clay plays a significant role in this color change.⁵⁷ As the kiln reaches the bisque firing⁵⁸ temperature, the iron compounds react with oxygen in the kiln atmosphere, leading to a change in their chemical state.⁵⁹ This reaction gives rise to the reddish color observed on the fired clay. The exact shade of red can vary based on various factors, including the specific composition of the clay and the firing conditions. Since iron oxide is one of the main minerals present in the clay, it is likely responsible for the reddish colouration.

In the Hanuman Suvannamaccha sculpture, there are some cracks present. It is important to note that these cracks are likely a result of the firing process during the creation of the sculpture. To address the stability of these cracks, the artist previously applied glue as (figure 10). Examining the glue type is not possible with the naked eye.

⁵⁷ Sumrit, "Adsorption of Arsenate on Clays," 3.

⁵⁸ Biscuit firing is the process of kiln firing potteryware before it is glazed. For example, earthenware is typically biscuit-fired at temperatures ranging from 1100°C to 1150°C, while bone china is biscuit-fired at higher temperatures, usually between 1200°C to 1250°C. The biscuit firing stage prepares the pottery for glazing, providing a stable foundation for further decoration and finishing. Dodd, & Murfin, (1994). *Dictionary of Ceramics*, 29.

⁵⁹ Dodd and Murfin, *Dictionary of Ceramics*, 178.

While it may not be easily noticeable under normal lighting conditions, the application of UV light reveals blue colour fluorescence emit from the glue within the cracks (figure 11). If needed in the future, the glue could be scientifically analysed by using Fourier Transform Infrared Spectroscopy (FTIR).



Figure 10 : Glue used by artist, marked with black box.



Figure 11 : Visible fluorescence from the glue on crack in the sculpture in UV-light.

1.1. Wooden base

The sculpture's wooden base is made from hardwood. It's probable that the chosen wood is teak.

Wood, tough and fibrous, constitutes a significant portion of a tree's structure. It's a natural, virtually ageless polymer. Wood holds numerous advantages that make it a preferred choice over many other materials. It's readily accessible, though this availability might change in the future. It's easy to transport and handle, boasts thermal insulation, sound absorption, and electrical resistance. These benefits collectively contribute to wood's extensive use in various aspects such as doors, windows, walls, furniture and toys etc.⁶⁰

Teak trees are found in many parts of South and Southeast Asia, and a big portion of the world's teak comes from forests in Myanmar. Other countries where teak trees grow include Bangladesh, India, Indonesia, Malaysia, Thailand, and Sri Lanka. But teak trees can also be found far from Asia, in places like Africa and the Caribbean.⁶¹ Teak wood is a commonly used wood in Thailand known for its durability, natural resistance to decay, and attractive grain patterns. Teak is wood, scientifically known as *Tectona grandis*.⁶²

Deciduous teak trees have wide, flat leaves. While annual rings are often not clearly visible, except for varieties like poplar and basswood, teak yields dense, resin-free hardwood. It can grow up to 50 meters tall. It can also live for about 100 years when it

⁶⁰ S.K.Duggal, 3rd ed., *Building Materials* (New Delhi: New age international (P) Ltd., 2008), 91.

⁶¹ Ted Todd, "Where does the best Teak wood come from," (June 11, 2021), [https://www.tedtodd.co.uk/journal/where-does-the-best-teak-wood-come-from/#:~:text=Teak mainly originates in Eastern,of the fastest growing hardwoods.](https://www.tedtodd.co.uk/journal/where-does-the-best-teak-wood-come-from/#:~:text=Teak%20mainly%20originates%20in%20Eastern,of%20the%20fastest%20growing%20hardwoods.)

⁶² "Teak (*Tectona grandis*)," accessed June 7, 2023, <https://chestofbooks.com/architecture/Building-Construction-3-3/Teak-Tectona-grandis.html>.

gets plenty of sunlight.⁶³ Its remarkable durability, makes it suitable for both indoor and outdoor use. It has natural oils and silica content that contribute to its resistance against moisture, rot, and fungal growth. Teak wood is a dense hardwood with high tensile strength, making it highly resistant to warping, cracking, and bending. Its density also provides excellent stability and longevity. Teak wood is known to have a distinct aroma, often described as spicy or leathery. The presence of a strong and spicy smell suggests that the wood could be teak.⁶⁴

Teak wood typically has a rich, dark-reddish brown color, which matches the description provided. It is valued for its warm and appealing hue. It has a prominent and beautiful grain pattern, often featuring straight or wavy lines. The fact that the wood grain is still visible through the black paint suggests that the base is made of a wood with noticeable grain, which is characteristic of teak. Teak wood is relatively easy to work with, as it has good workability properties. It can be cut, shaped, and carved with standard wood working tools.⁶⁵

Due to its exceptional durability and strength, teak is a popular choice for wood carving in Thailand. Teak is recognized as one of the most preferred wood types for this purpose. The base is comprised of two components: firstly, the flat wooden base (lumber), and secondly, ornamental slat pieces (figure 13). The wooden base is rectangular in shape and is cut in a tangential cut. The ornamental aspect of the wooden base is created through machine milling and affixed to the main base (figure 12) using glue. Regrettably, due to the object's weight and fragility, the underside of the base cannot be examined.

⁶³ Duggal, *Building Materials*, 92.

⁶⁴ Tood, "Where does the best Teak wood come from."

⁶⁵ Hoadley, R. B. *Understanding Wood* (N.p: The Taunton Press, 2000, 2013).



Figure 12 : Wooden base.

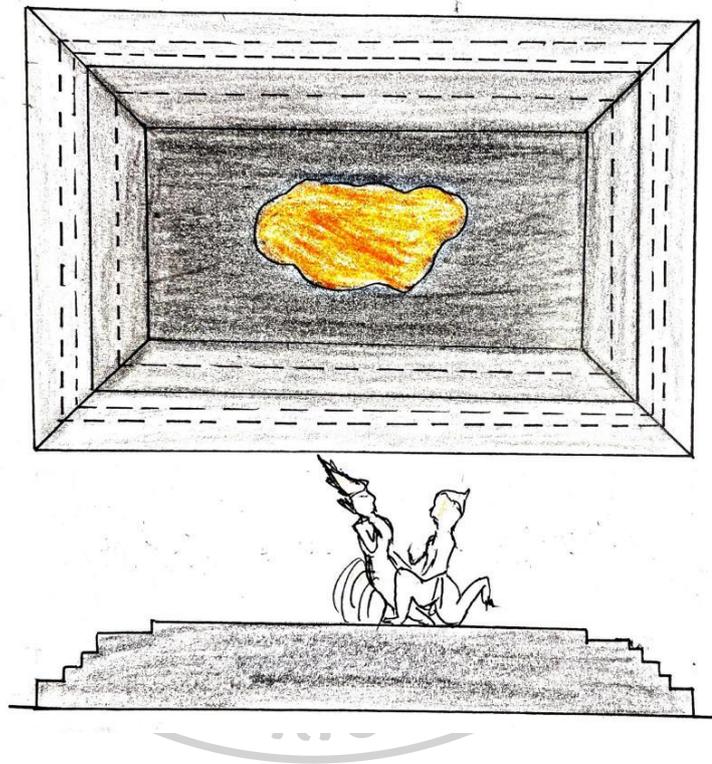


Figure 13 : Plan and section of wooden base.

3. Condition survey

This chapter will focus on the condition of both the ceramic and wood components of the sculpture. In general it can be stated that the entire sculpture is covered in a layer of dust and several damages like broken and lost parts of male and female figure are detected. It is important to note that there have been no previous conservation treatments conducted on the sculpture. It was stored in a storage facility at the Silpakorn University Art Centre, where many other objects are also kept.

The condition assessment will delve into the specific issues related to the ceramic and wood elements of the sculpture, taking into account the impact of the accumulated dust and the storage conditions. This evaluation will provide valuable insights for developing an appropriate conservation strategy and to address the existing challenges and ensure the long-term preservation of the sculpture.

3.1. Dust

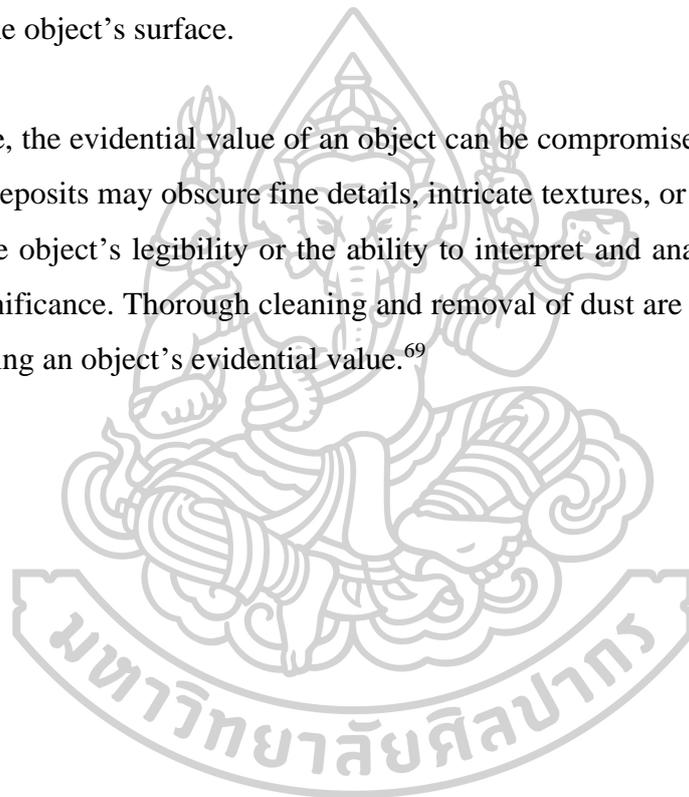
The sculpture was left unattended in storage for an extended period of time. As a result, a significant amount of dust, have accumulated on its surface. This accumulation of debris not only poses a risk to the object's preservation but also disrupts its optical appearance (figure 14, 15 and 16).

Dust is a complex mixture of minuscule particles that hover in the atmosphere, and its composition can exhibit considerable diversity. It encompasses elements such as skin flakes, hair, excretions from mites, mineral-based particles, construction materials, soot, sand, pollen, fungal spores, and various other substances.⁶⁶

⁶⁶ Sophie Krachler, "The mummy collection of the NaturalHistory Museum Vienna Technological analyses and conservation," (Diploma Thesis, University of Applied Arts Vienna, 2022), 61.

When dust particles are in the air, they are referred to as aerosols.⁶⁷ Aerosols are tiny solid or liquid particles that remain suspended in the air for extended periods. Dust particles can absorb moisture from the air around them, leading to increased density and strong adhesion to surfaces. Furthermore, accumulations of dust create an optimal environment for microorganisms to thrive, attracting pests and exacerbating the deterioration of the object. It has a hygroscopic nature, which means it attracts moisture and can also generate acids.⁶⁸ The presence of dust on the surface of objects is visually unappealing and detracts from their aesthetic value. Hence, it is imperative to remove dust from the object's surface.

Furthermore, the evidential value of an object can be compromised by the presence of dust. Dust deposits may obscure fine details, intricate textures, or inscriptions, thereby affecting the object's legibility or the ability to interpret and analyse its historical or cultural significance. Thorough cleaning and removal of dust are essential in restoring and preserving an object's evidential value.⁶⁹



⁶⁷ Marina Paric, "Conservation and Reconstruction of the Ivory Windows of the Sundari Chowk at the Royal Palace in Patan, Nepal," (Diploma Thesis, University of Applied Arts Vienna, 2017), 59.

⁶⁸ Paric, "Ivory Windows," 61.

⁶⁹ H. Lloyd, P. Brimblecombe, K. Lithgow, "Economics of Dust," *Studies in Conservation* 52, no. 2 (2007): 135-146.



Figure 14 : Dust accumulated on the artefact.



Figure 15 : Dust accumulated on the wooden base.



Figure 16 : Dust accumulated on ceramic.

3.2. Ceramic body

One of the ears of Hanuman has been broken and lost (figure 17). This breakage likely occurred due to inappropriate handling, as delicate forms are prone to break easily. Additionally, some smaller decorative elements from Suvannamaccha's headgear have also been broken and are now missing (figure 18). Overall, the artefact is in stable condition and structurally intact. Its fundamental and physical integrity remains unimpaired, suggesting that there are no significant cracks, breaks, or deformities compromising its overall form. The delicate and intricate detailing like the fine elements, patterns, and designs that constitute its aesthetic and artistic features have not suffered much deterioration, distortion, or impairment. This state of being damaged underscores the artefact's overall integrity and contributes to its historical or artistic value.



Figure 17 : The broken and lost ear of Hanuman.



Figure 18 : The broken elements from Suvannamaccha's headgear.

3.3. Wooden base

The wooden base of the sculpture is in a stable condition. However, it has also accumulated dust over time (figure 14). The black paint on the wooden base appears to have suffered damage due to abrasion, possibly from handling or environmental factors. Upon observing an aged photograph (figure 19), it becomes apparent that the wooden base possessed a polished and lustrous surface back in the year 2000. However, this once glossy appearance has since vanished, leaving the base with a markedly different texture and sheen. The wooden base, (figure 20), now displays a lackluster and matte surface. This alteration is likely attributed to the passage of time or potential chemical

modifications within the paint layer. The process of addressing the gathered dust on the wooden base demands a methodical and cautious approach, driven by the imperative to preserve the fragility of the underlying paint layer.



Figure 19 : Wooden base with glossy surface.



Figure 20 : Wooden base without glossy surface.

4. Aim and concept of the conservation

The aim of conservation is to preserve the artifact's current physical state and ensure a consistent optical appearance. This includes restoring missing components for completeness and implementing effective storage and transportation strategies to prevent future damage, thereby securing the artifact's preservation over time.

To achieve the conservation goals, several measures will be discussed and selected for treatment. To restore the sculpture to its intended form, the missing parts will be reconstructed, ensuring that the artwork appears whole and cohesive once again. Furthermore, a comprehensive cleaning process will be carried out to enhance the optical appearance of the object. In order to ensure the long-term preservation of the sculpture, a well-designed storage concept will be created. This will provide the necessary support and protection for the sculpture to ensure its safeguarded for the future.

4.1. Dry surface cleaning

Dust removal is essential for preserving the historical accuracy and aesthetic vision of the maker. It can obscure decorative elements and designs, hindering the true appreciation of the artifacts. Moreover, dust's abrasive nature poses a risk to delicate materials like, ceramics, potentially leading to scratches and degradation over time. Additionally, in humid environments, dust may react with atmospheric acids, further deteriorating ceramics. Therefore, regular dusting is crucial to conserve these valuable object and maintain its integrity for future generations to admire and study.⁷⁰

To remove the dust, the ivory window will undergo a dry cleaning process. To prevent potential abrasion and mechanical damage, the sculpture will be initially vacuumed using soft brushes. This step will help remove loose dust and debris. The remaining dust that cannot be removed from the object through the dry surface cleaning, with sponges an alternative approach is considered. sponges can be utilized in a dry state or

⁷⁰ National Park Service. NPS Museum Handbook: conserveogram, "Removing Dust From Ceramic And Glass Objects," NPS Museum Handbook: Museum Collection, Part I (1993):1.

in combination with an aqueous cleaning solution.⁷¹ Different sponges are possible like Akapad, Wallmaster and Polyurethane sponge.

Akapad sponge include a rigid (blue) plastic handle and a supple (yellow or white) vulcanized latex rubber portion. The soft part of the sponge (white or yellow) is ideal for cleaning. The rubber sponge is made from Styrene Butadiene Rubber infused with vulcanized castor oil. The Akapad sponge is particularly effective for dust removal, but it left lot of residues behind.⁷²

Wallmaster 100% natural latex sponge, typically employed in a dry state, are light brown and primarily consist of isoprene rubber with minor traces of calcium carbonate. While effective for dust removal, and leave less residues.⁷³ However, for delicate objects, a soft surface on the sponge is advisable. Cleaning the surface through dry rubbing can generate friction, potentially leading to abrasion, scratching, depending on the specific mechanical characteristics of the material. Malleable materials help prevent this issue.⁷⁴

The PU⁷⁵ sponges are chosen for their non-scratch and lint-free, very soft and flexible properties, ensuring that no additional damage would occur during the cleaning process. Additionally, being a non-conductive material, the PU sponge generated a static charge upon contact with the object's surface. This static charge is proven to be effective in

⁷¹ Julia M. van den Burg and Kate Seymour, *Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1*, (Amersfoort:Cultural Heritage Agency. 2022), 22.

⁷² Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 23.

⁷³ Juana Segurd Escbar, "Sorbent and abrasive: a critical assesment of the potential role of proprietary synthetic sponges in conservation," *zeitschrift für kunsttechnologie und konservierung*, vol.27,(2013): 273-274.

⁷⁴ Maude Daudin Schotte et al. "Dry Cleaning Approaches for Unvarnished Paint Surfaces," (January 2013), 217.

⁷⁵ PU: Polyurethane, Deffner & Johann, Germany.

attracting and retaining dust particles with minimal pressure, significantly minimizing the risk of abrasion.⁷⁶

By carefully removing the accumulated dust, the conservation aims to restore the object's optical appearance and improve its overall condition. This cleaning process is an essential step, helping to preserve the sculpture's original visual impact and ensuring its long-term preservation.

4.1.1. Wet cleaning

Following the dry surface cleaning, the next step in the conservation process is a wet cleaning method to remove dust and dirt that may have adhered to the surface of the object.

Using water is frequently the safest, most affordable, and highly efficient solvent for eliminating surface dirt and deposits.⁷⁷ Water is a polar molecule; thus, its capacity to dissolve ions and other molecules is attributed to its polarity.⁷⁸ Objects can be cleaned using tap water, distilled water, and deionised water. The purity of water will impact its effectiveness as a cleaning agent.⁷⁹ Tap water in Thailand is classified as hard water, containing heavy metals, germs,⁸⁰ and bacteria. Therefore, it is not safe to use on objects due to its impurities.

Distilled water is essentially water from which nearly all bacterial impurities have been eliminated through the process of distillation. This process does result in the retention

⁷⁶ PU Sponge Safety Data Sheet, Deffner & Johann, 1-3.

⁷⁷ Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 34.

⁷⁸ Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 34.

⁷⁹ Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 34.

⁸⁰ A. Kordach et.al, "Evaluation on the Quality of Bangkok Tap Water with Other Drinking Purpose Water," E3S Web Conf. Volume 30, 06 February 2018, <https://doi.org/10.1051/e3sconf/20183001011>.

of certain water-soluble salts. Distilled water can still contain ions, which means it might not be completely pH neutral.⁸¹

Deionised water has undergone a process to eliminate its mineral content, including water-soluble salts. This process, known as water softening, is accomplished using an ion exchange system. In this system, dissolved ions are substituted with other ions of a similar charge that are considered more desirable. Deionised water is typically expected to have a pH value of 5.8. However, it's important to verify the pH before using deionised water.⁸²

After careful discussion, deionised water is chosen as the safest and most effective choice for wet cleaning. Using soft sponge, along with wooden sticks for delicate areas, the surface will be gently cleaned with deionised water. When applying the swabs, gently roll them over the surface instead of scrubbing back and forth. This rolling motion helps lift the dirt without causing any abrasion or damage to the object. Remember to change the swabs regularly to avoid spreading dirt or contaminants during the cleaning process.⁸³ This process helps to lift and remove any remaining dust and dirt particles that were not eliminated during the dry cleaning stage.

Blitz-fix sponges are crafted from a PVA-based material (Polyvinyl Alcohol). These sponges are firm when dry and require soaking in water to attain softness.⁸⁴ Before

⁸¹ Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 34.

⁸² Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 34.

⁸³ Western Australian Museum, "Treatment," 2017, <https://manual.museum.wa.gov.au/book/export/html/78,1>.

⁸⁴ Esobar, "Sorbent and abrasive: a critical assesment of the potential role of proprietary synthetic sponges in conservation," 275-276.

using them, excess water can be squeezed out to reduce the surface's contact with water. They can be employed repeatedly and do not leave any residues on the surface.⁸⁵ Blitz-Fix sponges⁸⁶, along with deionised water, were utilised for this purpose. It was important to exercise caution during the wet cleaning process, as excessive water could potentially harm the ceramic.

4.2. Reconstruction of lost and broken parts

The reconstruction procedure involves meticulous work to bring back the object's original form and appearance, ensuring that it regains its aesthetic and historical value and secure the open areas. Careful craftsmanship and artistic skill are employed in reconstructing the missing parts and delicately retouching any imperfections, resulting in a fully revitalised and visually appealing artifact.⁸⁷

Due to the delicate nature of the remaining ear of the sculpture, it was not feasible to create a direct mold for reconstructing the missing counterpart so, carved part used as mold. For the task of sculpting a missing ear in ceramic clay or polymer putty, both options were considered. However, creating a mold from the ceramic clay ear proved challenging due to its fragility. Polymer putty which would be hardened after microwave and used to create a mold. After researching and careful consideration, epoxy resin was identified as the most suitable casting material for its favorable properties, workability, and durability, taking into account the storage conditions of the sculpture. Because of time limitations, we were unable to test alternative materials for the reconstruction.

⁸⁵ Burg and Seymour, "Dirt and dirt removal (Dry and Aqueous Cleaning) Paintings Conservation Part 1," 23.

⁸⁶ Blitz-Fix, Deffner & Johann, Germany.

⁸⁷ Isabelle Garachon, "From Mender to Restore: Some Aspects of the History of Ceramic Repair," paper presented at the Interim Meeting of the ICOM-CC Working Group, (October 2010): 7-8.

An epoxy resin system consists of two components: the epoxide group-containing resin and the hardener. The resin component contains the epoxide groups, while the hardener reacts with these groups, leading to cross-linking of the molecules.⁸⁸

Epoxy resins are known for their mechanical resilience and transparency after drying. These synthetic polymers are produced through a process called polyaddition. The reaction involves combining epoxy compounds, such as epichlorohydrin, which is a polyhydric alcohol or phenol, with a main hydroxylic component called bisphenol A. The reaction between epichlorohydrin and bisphenol A, facilitated by alkyls, results in the formation of chain-like precondensates, also known as diepoxides.⁸⁹

As epoxy resins undergo the hardening process, these initial precondensates are integrated further by introducing either acidic or basic curing agents. The central mechanism of hardening primarily revolves around cross-linking the diepoxide chains at normal room temperatures. Throughout this hardening phase, epoxy resins experience marginal shrinkage and leverage their intricate three-dimensional framework to transform into remarkably chemically resilient synthetic polymers.⁹⁰

The drying or curing time of epoxy resins can vary depending on several factors, including the specific formulation and environmental conditions. Generally, the drying process occurs in two stages: the liquid state and the post-gelation or solidification stage. The first stage, often referred to as the initial curing or gelation, is relatively fast and typically takes minutes to hours. During this stage, the epoxy resin undergoes a chemical reaction with the hardener, leading to the formation of a cross-linked network. The speed of this stage can be influenced by factors such as the specific epoxy resin formulation and the temperature. The second stage, known as post-gelation or post-

⁸⁸ Velson Horie, *Materials for Conservation: Organic Consolidants, Adhesives and Coatings* (New York: Routledge, 2010), 289.

⁸⁹ Epoxy Resin Committee, "Assessment of Potential BPA Emissions in Key Applications of Epoxy Resins," 3.

⁹⁰ Raju Thomas et al., "Introduction in Epoxy Resins," accessed May 12, 2023, https://application.wiley-vch.de/books/sample/3527333347_c01.pdf,1-3.

cure, occurs after the initial curing and can take a longer time to complete. This stage involves the gradual diffusion of unreacted epoxy groups within the cured resin. As the unreacted groups move through the resin, the material continues to strengthen and may undergo changes in its physical properties. The duration of this stage can vary significantly, ranging from months to years, depending on the specific epoxy formulation and the conditions under which it is stored.⁹¹ It's important to note that during the post-cure stage, the epoxy resin may experience a glass transition temperature (Tg).⁹²

When restoring a loss in a ceramic object, the surface finish can be distinguished from the original ceramic material by exhibiting different characteristics. The texture of the loss compensation might appear smoother or rougher compared to the original surface, depending on the restoration technique and materials used. Additionally, the reflectance of the restored area can differ, resulting in a glossier or more matte appearance compared to the surrounding ceramic surface. These variations in surface finish can arise due to differences in the materials and methods employed during the restoration process.⁹³

4.2.1. Gluing reconstructed part

The chosen adhesives for joining ceramics must possess reversible properties and excellent aging characteristics. They should be capable of being redissolved if needed, while also avoiding yellowing, brittleness, or loss of adhesion over time. These qualities ensure that the adhesives maintain their effectiveness in preserving the ceramic without causing any long-term damage.

⁹¹ Thomas et al., "Introduction in Epoxy Resins."

⁹² Tg: Glass transition temperature is the point of transition in an amorphous material, from a hard state into a molten or rubber-like state, as the temperature increases, Horie, V., *Materials for Conservation. Organic consolidants, Adhesives and Coatings*, (New York 2010). 22.

⁹³ Eve Bouyer, "A Study of Approaches to the Visible Restoration of Ceramics," 77-78.

Paraloid B-72, which is an ethyl methacrylate and methyl acrylate copolymer, has demonstrated its remarkable suitability as an adhesive for a wide range of materials, particularly ceramics and glass.⁹⁴ One of its advantageous properties is that it can be easily removed or diluted using acetone. As a result, conservators can work with flexibility and precision when applying or adjusting the adhesive. Paraloid B-72 is readily available from conservation materials suppliers, making it a widely accessible and popular choice in the field of conservation and restoration.⁹⁵

When compared to other adhesives, Paraloid B-72 does have a lower Young's modulus and stress at break. This is because Paraloid B-72 is a thermoplastic acrylic polymer with linear chains that lack cross-linking between them. The absence of cross-linking results in a lower strength at break compared to thermosetting adhesives that have a network structure and are mechanically more rigid and resistant.⁹⁶ This flexibility can be advantageous in certain applications where the adhesive needs to accommodate movement or stress without breaking or failing.⁹⁷

Paraloid B-72 has advantages such as good stability, resistance to UV-visible radiation, aging and reversibility.⁹⁸ These properties make it a suitable choice for conservation and restoration applications where minimizing damage to the original object is a priority.⁹⁹ Paraloid B-72 has outstanding long-term aging properties, maintaining reversibility in various solvents, and exhibiting no tendencies to discolor, harden, or become brittle with time. However, it is worth noting that its glass transition temperature (T_g), the temperature at which it starts to soften, is

⁹⁴ Stephen P. Koob, "Manipulating Materials: Preparing and Using Paraloid B-72 Adhesive Mixtures," *Objects Specialty Group Postprints*, Vol, 25, (2018): 1.

⁹⁵ Western Australian Museum, "Treatment," 5.

⁹⁶ Ablum et al., "Curing Adhesives for the Conservation of Glass – Preliminary Results," (n.d.): 169.

⁹⁷ Ablum et al., "Curing Adhesives for the Conservation of Glass," 165.

⁹⁸ Koob, "Manipulating materials: Preparing and Using Paraloid B-72 Adhesive Mixtures," 1.

⁹⁹ Ablum et al., "Curing Adhesives for the Conservation of Glass," 168.

relatively low (40 degrees Celsius). The adhesive sets rapidly, but as time passes, it exhibits signs of deterioration, such as shrinking, yellowing, and becoming brittle.¹⁰⁰

The isolation layer plays a crucial role in enhancing adhesion and reinforcing porous substrates. It renders the substrate more compatible with the adhesive by fostering interaction between the two. This ultimately leads to improved adhesion and the creation of a stronger and more uniform bond.¹⁰¹

To bond the reconstructed ear of Hanuman, 30% Paraloid B-72 was utilised. Concentrated solutions of B-72 in two frequently employed solvents.¹⁰² On the other hand, Paraloid B-66 has a higher glass transition temperature of 50 degrees Celsius.¹⁰³ The conclusion drawn is that, considering Thailand's temperature, Paraloid B-66 would be a more appropriate choice. Nevertheless, it is important to acknowledge that the object will be stored in a controlled environment.

In such controlled environments, where temperatures are typically lower than the ambient temperature, the choice of Paraloid B-72 with a glass transition temperature of 40 degrees Celsius should still be suitable for bonding the reconstructed ear. The lower temperature conditions within museums will not exceed the glass transition temperature of Paraloid B-72, ensuring the stability and effectiveness of the bonding material. It is essential to consider the specific storage and exhibition conditions of the sculpture to select the appropriate conservation material. In this case, Paraloid B-72 remains a

¹⁰⁰ S. Koob, "The Use of Paraloid B-72 as an Adhesive and Its Application for Archaeological Ceramics and Other Materials," *Studies in Conservation* 31 (1986): 7.

¹⁰¹ Koob, "The Use of Paraloid B-72 as an Adhesive and Its Application for Archaeological Ceramics and Other Materials," 11.

¹⁰² Podany et.al, "Paraloid B-72 as a Structural Adhesive and as a Barrier within Structural Adhesive Bonds: Evaluations of Strength and Reversibility," 14-33.

¹⁰³ Kremer Pigment data sheet of Paraloid B-66.

suitable option for bonding the reconstructed ear, as it meets the requirements for temperature stability in a museum environment.

4.2.2. Filling

By using the filling material and following a layering and drying process, the individual parts that couldn't be reproduced with silicone molds were meticulously sculpted and integrated into the object. The goal was to achieve a visually pleasing result where the repaired areas seamlessly merged with the overall aesthetics of the object.

The filling materials, either malleable or in fluid form, are utilised. Careful consideration is given to the thermal expansion of the filling material, and detachable fills are often favored for their versatility. These fills must adhere well to the original artifact, possess suitable strength and density, maintain reversibility for future conservation needs, and facilitate adjustments by incorporating dyes or pigments to match the colour retouching seamlessly.¹⁰⁴

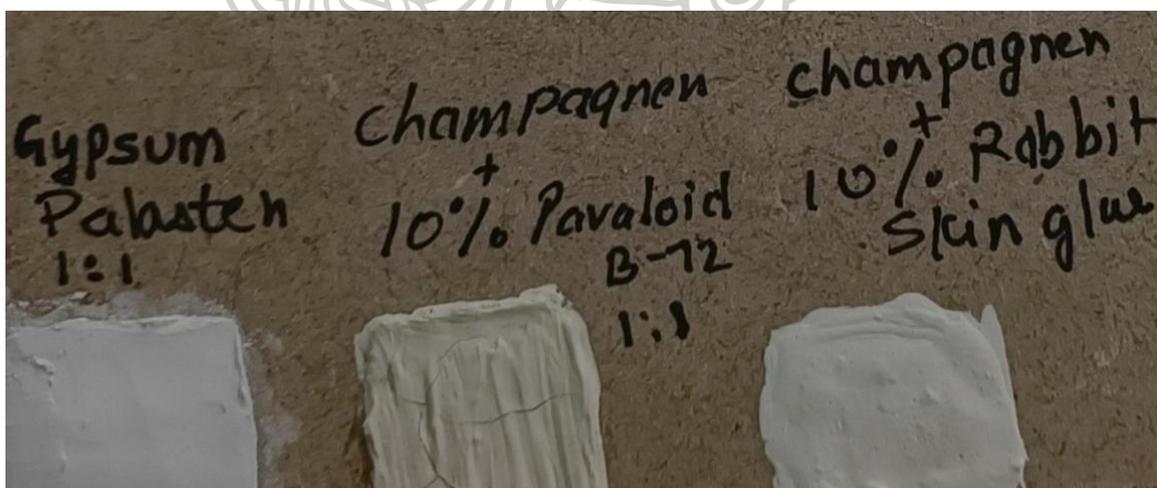


Figure 21 : Test series of different filling materials.

¹⁰⁴ "Recent Advances in Glass and Ceramics Conservation," presented at the Interim Meeting of the ICOM-CC Working Group, (September 2019): 207.

An other broken elements from female headgear, filling materials will be used. In order to determine the most appropriate filling materials in terms of work ability, strength, and reversibility, a series of tests were conducted (figure 20). These tests aimed to identify the material that would yield the best results considering the specific climate and conditions the sculpture would be exposed to. The combination of 10% Paraloid B-72 with Champagne Chalk and 10% rabbit skin glue with Champagne Chalk exhibited favorable workability when compared to gypsum plaster, which has a rapid drying time. 10% Paraloid B-72 and 10% rabbit skin glue with Champagne Chalk can be undone using acetone and hot water, respectively, although rabbit skin glue tends to degrade more readily.

After thorough evaluation, it was determined that a mixture of 10% Paraloid B-72 in ethanol: acetone (1:1) with Champagne Chalk demonstrated the highest compatibility with the object as compare to 10% rabbit skin glue with Champagne Chalk and gypsum plaster with water (1:1). This combination ensures a successful and durable conservation outcome, providing the necessary stability, reversibility and preservation for the sculpture under the given climate conditions.

4.3. Retouching

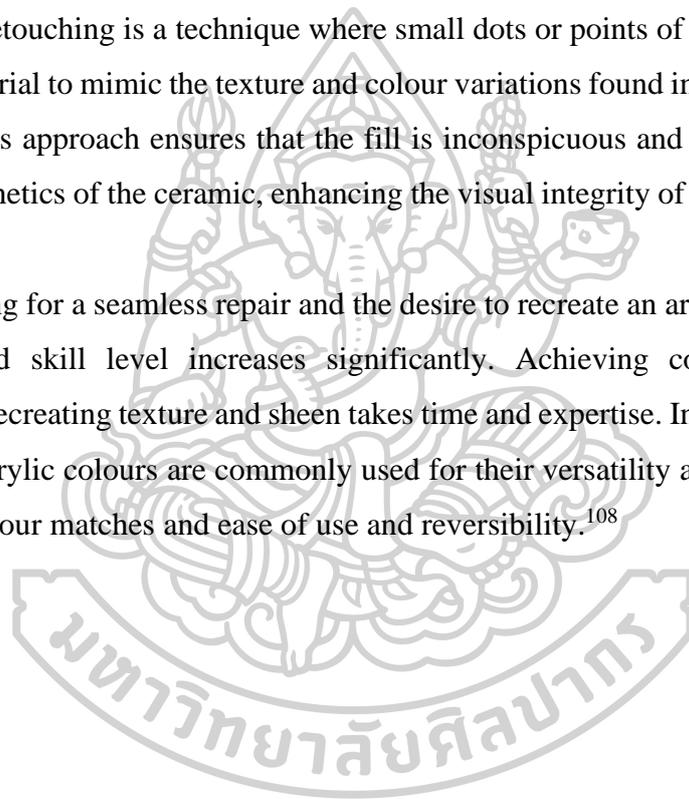
Retouching plays a crucial role in enhancing the appearance of an object and restoring its original state. It involves meticulous work to accurately match the original appearance of the ceramic surface and apply suitable colours to blend with the reconstructed parts. The process of retouching reconstructions is intricate yet essential in achieving a cohesive and visually pleasing result. To ensure reversibility and flexibility in the retouching process water and acrylic colours were employed. Acrylic colours offer the advantage of being easily reversible, easy to handle or removal if necessary in the future. Watercolours proved to be challenging to work with, resulting in a patchy finish when compared to acrylic paints. The choice of acrylic colours

enables conservators to achieve precise colour matching and seamless integration of the reconstructed areas with the surrounding original surface.¹⁰⁵

Matching the filling material to the colour of the clay body is a common approach in ceramic restoration. In many cases, the colour of the clay body is distinct from the predominant colour due to the presence of glazes or slips on the surface. To achieve a seamless restoration, pointillist retouching is employed.¹⁰⁶

Pointillist retouching is a technique where small dots or points of colour are applied to the fill material to mimic the texture and colour variations found in the original ceramic surface. This approach ensures that the fill is inconspicuous and harmonizes with the overall aesthetics of the ceramic, enhancing the visual integrity of the restored piece.¹⁰⁷

When aiming for a seamless repair and the desire to recreate an artist's work and style, the required skill level increases significantly. Achieving colour matching and accurately recreating texture and sheen takes time and expertise. In ceramic restoration, high-end acrylic colours are commonly used for their versatility and ability to achieve accurate colour matches and ease of use and reversibility.¹⁰⁸



¹⁰⁵ Buys and Oakley, *Conservation and Restoration of Ceramics*, 140-151.

¹⁰⁶ Isabelle Garachon, "From Mender to Restorer: Some Aspects of the History of Ceramic Repair," paper presented at the Conference (October 2010): 8.

¹⁰⁷ Garachon, "From Mender to Restorer: Some Aspects of the History of Ceramic Repair," 8.

¹⁰⁸ Storms, "Water-Based Acrylics: Repairing Broken Ceramics," 19.

5. Measures carried out

5.1. Dry surface cleaning

Soft brushes and a vacuum cleaner were employed to ensure efficient dust removal. The vacuum nozzle was positioned at a distance of approximately one inch from the object's surface, while a gentle artist's brush was used to brush away the dust towards the nozzle, allowing the vacuum to promptly absorb it (figure 22). The vacuum utilised adjustable suction power, which was reduced to a minimum when cleaning smaller or delicate areas of the object.



Figure 22 : Removal of dust with help of brush and vacuum cleaner.



Figure 23 : Dry surface cleaning in progress.



Figure 24 : Before and after dry surface cleaning, signature of artist with date on the lower part of sculpture.



Figure 25 : Before and after the dry surface cleaning with PU sponges.

Following the dry surface cleaning, latex-free PU sponges with high density were employed to further clean the object (figure 25). While the majority of the dust was successfully eliminated through the dry cleaning method, fine particles that remained were addressed using the PU sponges. By employing these cleaning techniques, the dust layer was successfully removed from the ceramic sculpture and wooden base, restoring their visual appeal and preserving their integrity.

5.1.1. Wet cleaning

The object was delicately cleaned by lightly dampening in deionised water, the Blitz-Fix sponge. To address difficult-to-reach areas, small sections of the sponge were attached to wooden sticks, enabling gentle cleaning (figure 26). This approach aimed to ensure a comprehensive and meticulous cleaning of the object while minimising any risks associated with water exposure.



Figure 26 : Wet cleaning with Blitz-Fix sponge on a wooden stick.

5.2. Reconstruction of lost and broken parts

To reconstruct the lost part of Hanuman's ear, the following process was followed, the polymer clay was used to recreate the shape of the original piece. The clay form was then microwaved for 5 minutes to harden it (figure 27). The hardened clay replica was placed on a wooden stick and suspended inside a plastic jar (figure 28). Petroleum jelly was applied to both the replica and the jar as a lubricant. The prepared forms were filled with silicone (Kiwosil – Abformsilikon RTV-2 - S25) mixed with 2-5% hardener-S. The filled forms were left to dry for one day. Once the silicone had dried, the replica was carefully pulled out of the silicone mold (figure 29). Epoxy resin (Epoxyharz 37-140®) and its hardener (Epoxyhärter 37-600®) were mixed in a ratio of 2:1. Chalk powder and pigments were added to achieve the base colour of clay. The mixed epoxy resin was poured into a silicone mold and left to harden for 24 hours. After the epoxy

resin had fully hardened, the replica was removed from the mold, and the final shaping and leveling were performed using various grinding tools (figure 30).



Figure 27 : Replica of ear from polymer clay.

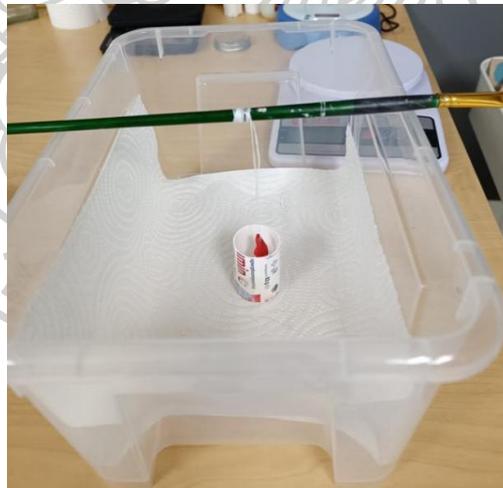


Figure 28 : Replica placed on a wooden stick and suspended inside a plastic jar.

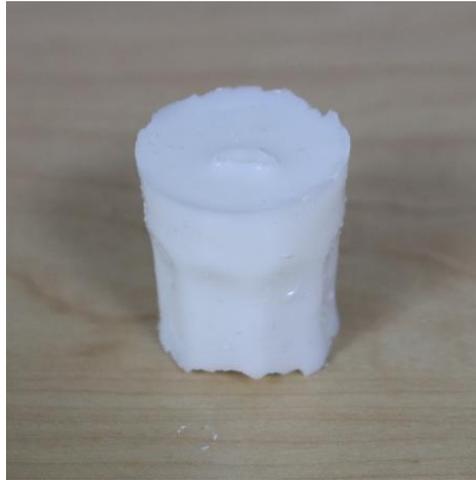


Figure 29 : Silicone mold for replica of ear.



Figure 30 : Replica of ear after leveling.

5.2.1. Gluing reconstructed part

To attach the reconstructed ear to the broken part of Hanuman's ear, an isolation layer consisting of 4% w/w of Paraloid B-72 was applied to the broken part of Hanuman's ear (figure 32). This layer helps to create a barrier between the original object and the adhesive, ensuring that the adhesive does not directly come into contact with the surface of the object. A mixture of 30% w/w Paraloid B-72 in an acetone-ethanol mixture with a ratio of 1:1 was prepared. This adhesive mixture provides a strong bond between the reconstructed ear and the broken part (figure 33). However, it was noted that acetone

evaporates quickly, which may affect the bonding process. By using Paraloid B-72 as an adhesive, it helps to ensure a stable and long-lasting attachment.



Figure 31 : Placing the reconstructed ear with the layer.



Figure 32 : Applying 4% Paraloid B-72, isolation help of a tweezer.



Figure 33 : Gluing of the reconstructed ear using 30% Paraloid B-72.



Figure 34 : Gluing the reconstructed ear.

5.2.2. Filling

To reconstruct the small and distinct decorative elements of Suvannamaccha's headgear that could not be reconstructed with silicone molds. Another reconstruction technique involving filling material was used. The filling material consisted of 10% Paraloid B-72 in a mixture of ethanol and acetone, with a ratio of 1:1, along with Champagne Chalk. The Paraloid B-72 was mixed with ethanol and acetone in equal proportions, along with Champagne Chalk. This mixture created a liquid form of the filling material. Using a fine brush, the liquid filling material was carefully applied to the broken area in layers. Each layer was allowed to dry overnight before applying the next layer. This gradual layering ensured proper adhesion and allowed for controlled drying. Once the filling material had dried completely, the surface was smoothed and leveled. This process involved refining the surface to ensure a seamless transition between the original surface and the repaired area. It aimed to create a cohesive result where the repaired area blended harmoniously with the surrounding original surface (figure 35).



Figure 35 : Reconstruction of decorative elements by using filling materials.

5.3. Retouching

To begin the retouching process, a base coat consisting of Bologna chalk was applied onto the reconstructed parts. This coarse gypsum powder, mixed with a binding medium of 10% Paraloid B-72, was carefully brushed onto the surface to create a clay-like texture and enhance the adhesion of subsequent layers (figure 36). Using thin brushes, to apply a thin wash of the first layer of colour onto the retouched areas. This initial layer helped to establish the overall color tone and provided a foundation for subsequent detailing. To achieve more intricate and nuanced effects, a stippling technique was employed, where small dots or strokes were carefully applied to mimic the texture and patterns of the surrounding original surface (figure 37). After the retouching process was completed, the object was allowed to dry thoroughly (figure 38). This drying period is crucial as it allows the retouched colours to settle and bond with the surface, ensuring their longevity and stability.



Figure 36 : Base coat of Bologna chalk.



Figure 37 : Applying acrylic colours with brush.



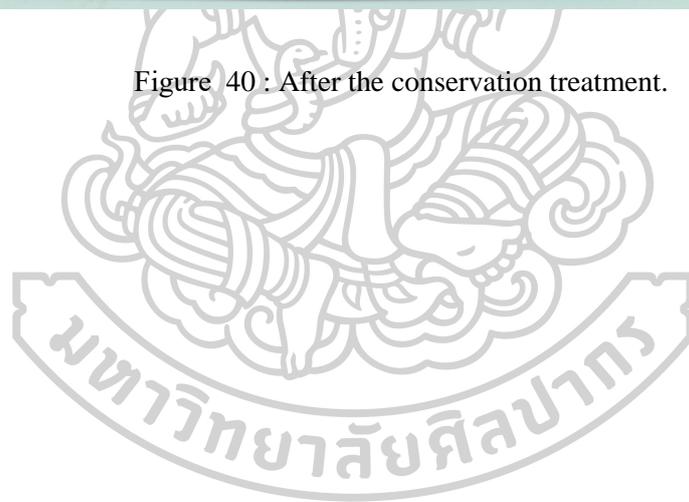
Figure 38 : Retouched reconstructed ear by using acrylic colours.



Figure 39 : Before the conservation treatment.



Figure 40 : After the conservation treatment.



6. Care and maintenance

6.1. Introduction

The primary goal of storage, whether in a large museum or a private home, is to protect objects against the agents of decay. This includes protecting them from inappropriate temperature and relative humidity conditions, excessive exposure to light, pests, dust, pollutants, and improper handling.

Objects stored in boxes or other storage containers within a storage room require careful packing to protect them from physical damage and to prevent deterioration. The use of appropriate materials, such as acid-free tissue paper, padding, and archival-quality boxes, helps safeguard the objects from dust, pests, and fluctuations in temperature and humidity. Adequate labeling and documentation are necessary for easy identification and retrieval.

6.2. Concept for storage and transport

After the conservation treatment, the artifact will be placed in storage at the Silpakorn University Art Centre until the next exhibition. Ceramics are highly delicate and prone to damage, particularly during storage. One of the most common causes of ceramic damage is improper stacking. The storage plan for the ceramic sculpture “Hanuman Suvannamachha” encompasses precise documentation of the object’s measurements and the establishment of suitable storage box for the ceramic artefact. It’s evident that the ceramic object is extremely fragile and demands particular care during handling, transportation and storage. The updated storage concept will provide protection for the object against a range of potential sources of damage.

It’s advisable to steer clear of using carpets in storage areas due to their tendency to collect dust and possibly harbor insects. Carpets can become a greater concern in the event of flooding and might release organic vapors that could be harmful to certain materials.¹⁰⁹

¹⁰⁹ S. Anstey, M. Myers and I. M. Godfrey, “Handling, Packing and Storage,” <https://manual.museum.wa.gov.au/book/export/html/143>,” 2.

To mitigate the potential for unintended collisions, it is advisable to position the storage box in less frequently traversed zones within the storage room. Label it as “Very Fragile and Heavy.” This strategic placement minimises the chances of inadvertent contact, safeguarding both the objects stored within and ensuring their long-term preservation.

The concept entails the use of new acid-free, wooden box for the object instead of storing it on an open shelf or covering it with cloth. Furthermore, the object will be separate from other objects, less prone to accident, it will enhancing its future handling. The storage box should be secure, easy to handle, low-maintenance, and offer a stable environment for the object.

Given the inherent brittleness of ceramic objects, it is crucial to provide adequate padding to cushion them against any shocks or impacts. When packing and shipping these objects, always use a two boxes to ensure an extra layer of protection. This method helps reduce the risk of damage during transportation and handling, safeguarding the ceramic pieces throughout their journey.

To ensure the proper protection of ceramic objects, it is recommended to pack them in individually contoured foam wells. Polyurethane foam is effective as a shock absorber, but it is an unstable material. On the other hand, polyethylene foam is stable but has abrasive cut edges. It is essential to isolate the ceramic object from the foam by placing soft tissue or washed cotton flannel between them. This prevents any potential damage caused by direct contact with the foam’s abrasive edges.

When suitable, consider employing a trolley, forklift, or a similar equipment for moving objects across smooth surfaces. Trolleys should be equipped with rubber wheels to ensure a gentle transportation and swivel wheels to aid in maneuvering through tight spaces. If navigating rough terrain is necessary, manual lifting is preferred to minimize the risk of vibration or shock damage. Avoid dragging or pushing objects across surfaces.¹¹⁰

¹¹⁰ Anstey, et al., “Handling, Packing and Storage,” 3.

Objects with extremely delicate surfaces and appendages demand special care and attention during handling. The technique is most effective when the top and front of the crate are designed to be removable. Having removable panels allows for easy access to the fragile object wrapped in tissue and enables secure placement within the crate. It simplifies the process of packing and unpacking the item, reducing the risk of accidental damage during handling. With removable top and front sections, one can ensure that the fragile object remains well-protected and properly cushioned while providing convenient access for inspection or transportation as needed.¹¹¹

6.2.1. Recommended storage box

Storing objects within boxes is a common and beneficial practice. A box serves as an additional barrier against ambient conditions, limits the object's movement, and shields it from light, insects, and dust.¹¹²

When creating a storage container, a wooden box proves to be the most suitable choice. Wood's non-interaction with ceramics ensures compatibility, and its strength allows it to bear the object's weight while facilitating safe transportation and handling. Designing a custom, handmade wooden box with a sliding lid. For added support, incorporate appropriately shaped Ethafoam™ PE30 at the base to cushion the object. Enhance protection by securing the object in place with cotton tape if need.

The object's extreme delicacy, there is no room for error when constructing the storage box for it. Considering the object's weight, it's advisable to use larger pieces or boards for crafting the box. Begin by measuring the dimensions of the intended box. Since the goal is to accommodate a ceramic object, ensure that the measurements align perfectly with the object's dimensions.

For the construction of the wooden box, you will require four boards for the sides, one for the base, and another for the lid. Utilise a table saw or router equipped with a guide to fashion a straight, horizontal groove near the top and inner part of the box. The

¹¹¹ National Park Service. NPS Museum Handbook: Appendix P: "Curatorial Care of Ceramic, Glass, and Stone Objects," NPS Museum Handbook: Museum Collection, Part I (2000): 24.

¹¹² Anstey, et al., "Handling, Packing and Storage," 8.

groove's depth should be around 1/8", enabling the lid to glide smoothly into place. Make sure to replicate identical grooves on three sides of the box (figure 41). The grooves should be oriented inward.

Using glue, attach the sides together at right angles to fortify the joints. At this stage, the assembly will resemble a square without the base or lid attached. To reinforce the structure further, employ corrosion-free nails, wood screws, or dowels. Similarly, secure the base and sides by applying glue and then using nails, wood screws, or dowels. Create a groove for the lid and gently slide it into the grooves, ensuring a snug fit over the top of the box (figure 42). Lastly, affix handles on both sides for convenient object transportation.

To secure the object, employ an Ethafoam tray that conforms to the wooden base (figure 43) offering comprehensive support and protection for the stored object.

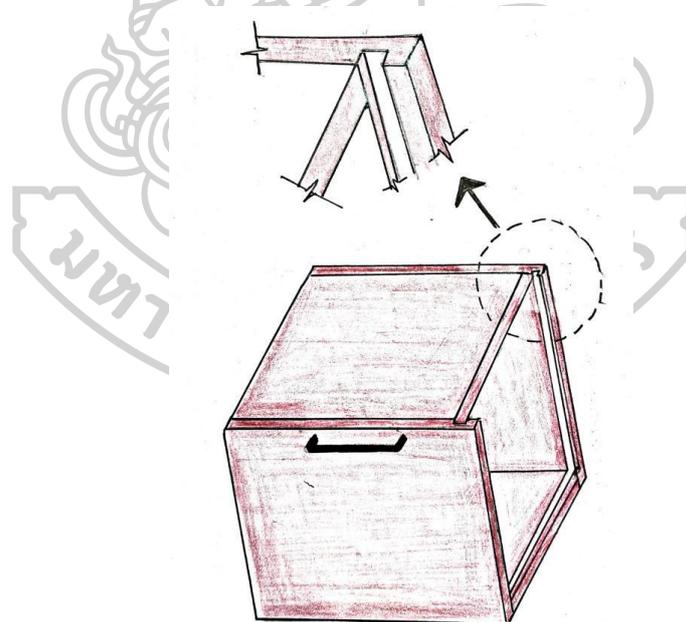


Figure 41 : Wooden storage box showing details of groove.

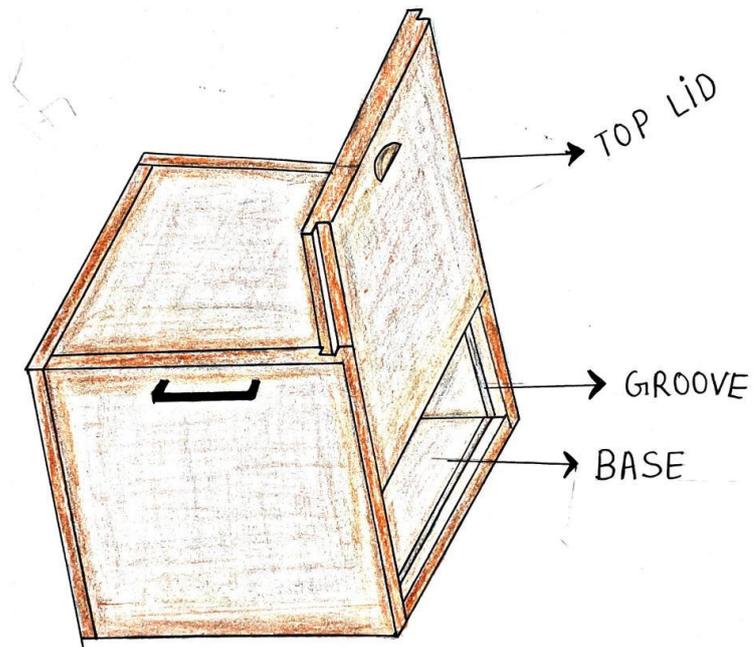


Figure 42: Custom handmade wooden box with sliding lid.

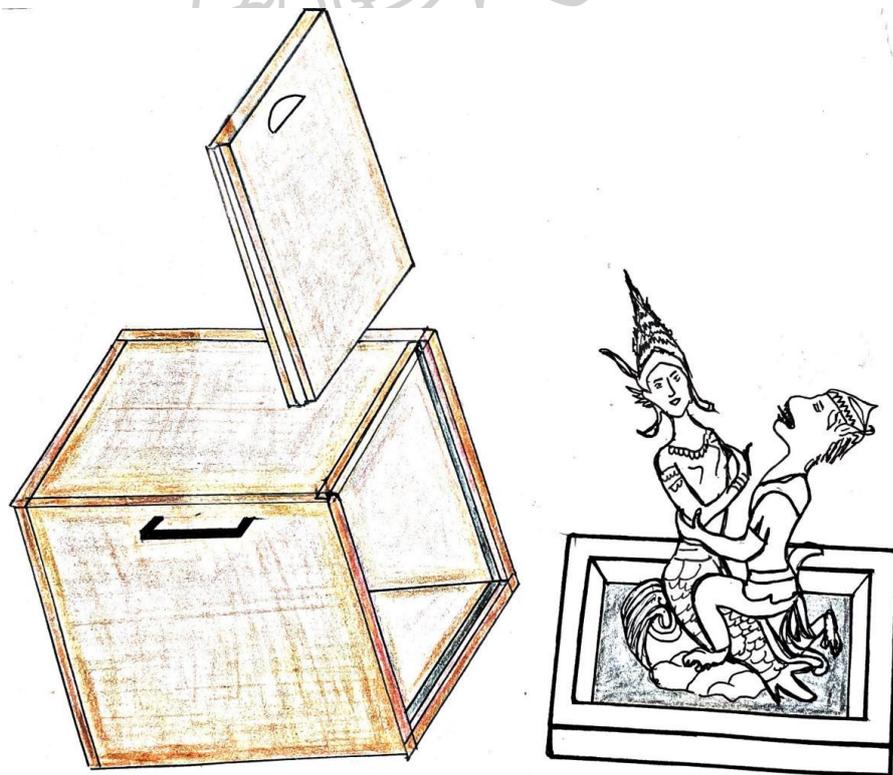


Figure 43 : Concept plan of wooden storage box for “Hanuman Suvannamaccha” sculpture, with Ethafoam tray.

Storing items in boxes offers numerous benefits by safeguarding against environmental factors, minimizing movement, and dust. Crafting a wooden box is a fitting choice due to its compatibility with ceramics, transportation, and customization design, including a sliding lid. Adding Ethafoam™ PE30 enhances safety. The base's contour seals protection, completing an efficient storage solution.

6.3. Recommendations for handling ceramic object

Before proceeding with handling, carefully inspect the object and take note of any unstable repairs, loose parts, hairline cracks, or vulnerable appendages. Being observant of these potential vulnerabilities will help ensure cautious and safe handling of the artifact.

Refrain from using cotton gloves when handling ceramics as their surfaces can be slippery. Instead, choose to use clean, bare hands or wear well-fitting latex or nitrile gloves. Therefore, refrain from exposing the delicate surfaces to moisture, oils, and acids naturally present on bare hands, as these elements have the potential to disrupt over time.¹¹³

Avoid using tape or sticky labels on ceramic objects, the tape and labels can leave behind residues on the object's surface, leading to potential staining or dust accumulation. To ensure the proper preservation of these artifacts, it is best to employ alternative labeling methods that do not directly interact with the object's surface.¹¹⁴

¹¹³ NPS Museum Handbook, Part I (2000), 13.

¹¹⁴ NPS Museum Handbook, Part I (2000), 13.

Only handle when necessary. Exercise extreme caution when handling, and plan movements meticulously to prevent any risk of breaking the object. Support the object by placing one hand directly beneath its center of gravity, while using the other hand to stabilize and prevent any shifts.¹¹⁵



¹¹⁵ Judith A. Logan and Tara Grant, "Caring for Ceramic and Glass Objects - Preventive Conservation Guidelines for Collections - Canada.ca," <https://www.canada.ca/en/conservation-institute/services/preventive-conservation/guidelines-collections/ceramics-glass-preventive-conservation>, 33.

SUMMARY

The ceramic sculpture “Hanuman Suvannamaccha” from the Silpakorn university Art Center, Bangkok, Thailand is a good example of Thai craftsmanship. It dates back to 2000. The ceramic sculpture depicts Hanuman Suvannamaccha, a legendary figures from the Thai Ramayana, which is widely recognized and esteemed in Southeast Asia. Nakorn Ananda Pradit is a renowned artist in Thailand known for his contributions to the fields of art and craft. The ceramic sculpture received recognition and an award during the the national ceramics exhibition in the year 2000. The object was kept in storage for long period of time. There are another examples of ceramic objects from same artist in the Silpakorn University Art Centre.

During a conservation workshop held in Thailand in the winter of 2023, all the necessary conservation treatments were successfully conducted for the ceramic sculpture. Throughout the conservation process, the primary focus was on employing minimally invasive and reversible measures to ensure the object’s safety. Selecting the appropriate materials for reconstructing the lost and broken parts proved to be the most difficult aspect of the conservation process. To begin, the delicate sculpture underwent a meticulous cleaning procedure that involved both dry and wet surface treatments. This thorough cleaning aimed to remove dirt and contaminants without causing any harm to the object itself. Special care was taken to preserve the sculpture’s original properties throughout each stage of the conservation treatment.

In the course of this master’s thesis the reconstruction was carried out. In cases where parts were missing, a reconstruction technique was employed. A custom-made silicone mould was created, accurately matching the shape of the missing section. Epoxy resin was then cast into the mould, resulting in a reconstructed piece that seamlessly integrated with the original sculpture. For smaller individual parts, filling materials were directly applied to the sculpture to reconstruct them. To ensure the workability, strength, and reversibility of the filling and reconstruction materials, a series of tests were conducted. These tests helped determine which materials would yield the best results while maintaining the object's original properties.

Additionally, a concept plan for the storage of the object was included in this thesis. This plan aims to minimize the chances of accidents and contribute to the preservation of the sculpture's longevity for future generations. Overall, the conservation of Hanuman Suvannamaccha required a careful balance between preserving the object's originality and employing effective reconstruction techniques. The conservation process aimed to safeguard the sculpture while maintaining its integrity.



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