

VORTEXBLAZE ARENA: NEO-FUTURISTIC ARCHITECTURAL DESIGN FOR AN INTERNATIONAL BASKETBALL ARENA IN SURABAYA

Mukhamad Adril Rifky Pratama^{1*}, Respati Wikantiyoso², Hery
Budiyanto², Junianto²

¹*Architecture Study Program, Faculty of Engineering, Universitas Merdeka Malang*

²*Supervising Lecturers of the 5th Architectural Design Studio, Architecture Study Program, Universitas
Merdeka Malang*

Jl. Puncak Jaya 36, Malang, 65146, Indonesia

**Email of Corresponding Author: femasdramadhani11@gmail.com*

ABSTRACT

The development of basketball in major cities requires international-standard facilities that not only meet technical standards but also reflect the identity and spirit of modern sports. Surabaya, a metropolitan city with a strong basketball fan base, currently has only a limited number of international-scale basketball arenas. Therefore, this design aims to create an international basketball arena in Surabaya that can accommodate large-scale sports activities and events while also serving as a city landmark. The design method used is a neo-futuristic architectural approach, which emphasizes the expression of dynamic, futuristic, and symbolic forms of energy and movement in basketball. The VortexBlaze design concept is implemented through the transformation of the building's mass and facade, inspired by vortexes and flames (blaze) as symbols of rhythm, strength, and the spirit of competition. The design results show a basketball arena with an expressive, dynamic facade that creates a strong visual identity and meets international standards for basketball arenas. This arena is expected to support the development of basketball in Surabaya and strengthen the city's image as a center for international sports activities and events.

Keywords: Basketball International Arena; Neo-Futuristic Architecture; Dynamic Form; Sustainable Design

INTRODUCTION

The development of basketball in Indonesia over the past few years has shown significant improvement, both in athlete performance and in public enthusiasm for national and international competitions. This indicates that basketball growth is progressing. However, the challenges of improving sports performance in Indonesia are partly due to the limited availability of sports facilities. The quality of Indonesian sports facilities falls behind those of developed countries.

Therefore, providing adequate facilities will ultimately help achieve optimal performance in the future (Purwantoro, Santoso, & Istijanto, 2023).

In the context of urban development, international-standard sports facilities are no longer understood solely as competition venues but rather as part of a city's infrastructure system that plays a significant social, economic, and cultural role (Xia & Jiang, 2024). Sports arenas serve as public spaces that bring diverse segments of society together, creating dynamic collective experiences and strengthening a city's image nationally and globally. Sports arenas are now emerging as multifunctional urban spaces that not only accommodate sporting activities but also serve social, commercial, educational, and health functions, thereby supporting regional sustainability and strengthening the resilience of urban communities (Akhmanova, 2025).

Surabaya holds a strategic position as the second-largest metropolitan city in Indonesia, with significant potential to develop international-standard sports facilities. A thriving basketball ecosystem supports the city, the presence of professional clubs such as the CLS Knights and Pacific Caesar, and adequate urban infrastructure, including regional and international transportation access. Furthermore, Surabaya's long history as a host to numerous basketball tournaments and support from the government and private sector strengthen its position as a hub for sports activities. However, the availability of international-standard basketball arenas remains insufficient to meet their potential, thus preventing optimal development of the sports industry, tourism, and athlete regeneration.

Based on these conditions, the design of the Basketball International Arena in Surabaya is proposed as an architectural solution to address the limited availability of international-standard sports facilities. A neo-futuristic architectural approach is applied to present a dynamic, modern, and visionary form of expression, in line with basketball's character, synonymous with speed, energy, and movement (Fathurillah, Beddu, & Asnur, 2023). This design aims to create a basketball arena that not only serves as a competition venue but also as a city landmark, an inclusive public space, and a strategic element in improving Surabaya's image as a city with global competitiveness in sports. It does this by using expressive building masses and facades that align with international standards and sustainability principles.

LOCATION DESCRIPTION

The site selection for the "Vortexblaze" International Basketball Arena in Surabaya was based on an analysis of urban planning and the needs of international sports facilities. The selected site must align with the Surabaya Regional Spatial Plan (RTRW), specifically zones designated for public facilities, sports areas, trade and services, or strategic city areas. This ensures the arena can be integrated without violating land use regulations and strengthens the city's role as a regional hub.

From a land availability perspective, the site is designed to accommodate the arena's basic needs, parking areas, open public spaces, and supporting facilities, including plazas, commercial areas, and integrated pedestrian corridors (Figs. 1 and 2).

Furthermore, accessibility and public transportation infrastructure are priorities, as the international scale demands optimal connectivity to road networks and mass transit, as well as easy access to various areas of the city and beyond, including connections to airports, terminals, and accommodation centers (Sarwadi, 2021). In terms of environmental carrying capacity, the selected location is on stable land, free from flood-prone areas, and has the potential to be integrated with urban green spaces to reinforce the principle of sustainability. So, choosing the arena site not only meets the rules and technical requirements but also delivers a representative, integrated, and long-lasting sports facility that helps the City of Surabaya move forward.



Figure 1. Surabaya City Development Area Map

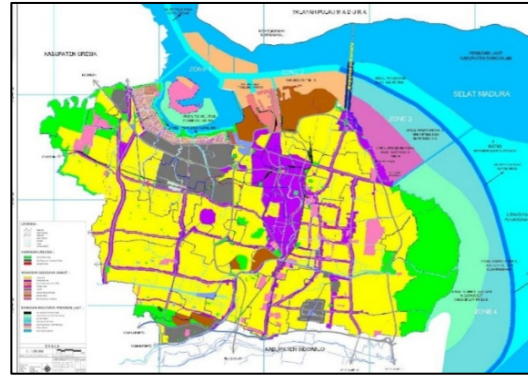


Figure 2. Surabaya City Spatial Plan (RTRW) Map

The selected location (Fig.3 and 4) for the design is on Jl. Jawar, Pakal District, Surabaya City, with coordinates -7.231205, 112.616571. This site has a total area of approximately 48.9 hectares, with existing conditions consisting of relatively spacious, undeveloped fishpond land (Figure 3-4). Based on the RDTR mapping, Site A is classified as SPU (Other), thus supporting the development of large-scale public facilities. The central site regulation stipulates a maximum KDB of 50% (equivalent to 14.2 hectares); a maximum KLB of 1.5 (equivalent to 42.3 hectares); and a minimum KDH of 20% (approximately 5.64 hectares). In addition, the area development plan includes a directive for a 6.5-hectare urban forest, which could be a key element in strengthening green space and advancing the concept of regional sustainability.

In terms of accessibility, the site has direct connectivity to the collector road network via Jl. Jawar Surabaya, which directly borders the site area, thus facilitating access from various parts of the city. The adequate land area and the condition of the existing fish ponds provide optimal flexibility for the processing of architectural mass, vehicle circulation arrangements, and the arrangement of open public spaces. However, the environment in Pakal District presents design challenges that must be addressed, including the risk of seasonal flooding from overflowing rivers and fish ponds, air pollution from heavy truck traffic and infrastructure projects, and pollution from home industries. The presence of the Benowo Waste-to-Energy Plant also has the potential to generate emissions that increase health risks, such as acute respiratory infections (ARI) in children. Inadequate drainage infrastructure causes flooding during heavy rains, so the site design must integrate adaptive and sustainable water and environmental management systems.



Figure 3. Existing Site Map

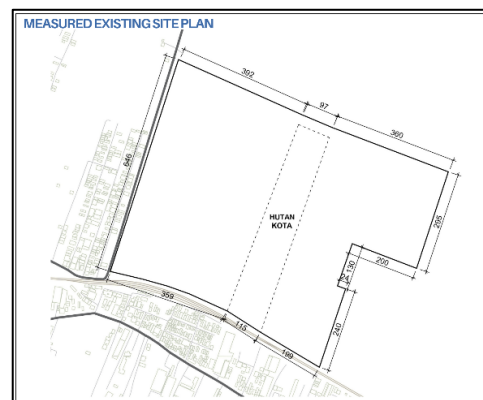


Figure 4. Measured Existing Site Plan

THE SITE ANALYSIS

Site analysis identified existing conditions, resulting in design responses that address issues while optimizing existing potential. The site's general division into two separate areas by urban forest necessitated an optimally integrated design response. The analysis resulted in an integrated spatial management concept that supports user mobility (Fig.5)

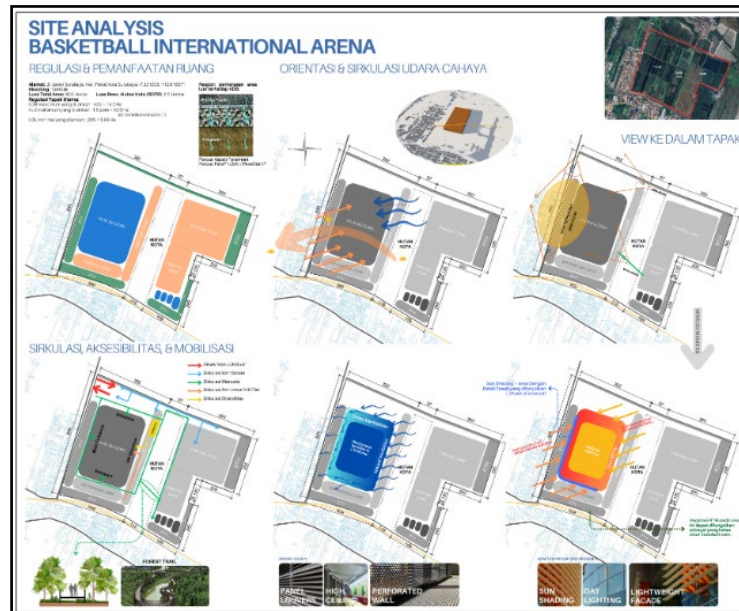


Figure 5. Site Analysis

Orientation and climate issues require buildings to have adequate protection and optimize light and air circulation. Design responses to orientation and climate include spatial planning, openings, and material selection that adapt to tropical climate conditions. Aesthetic aspects are based on an analysis of the building's and area's potential visibility from strategic points or directions.

CONCEPTUAL APPROACH AND WARFARE THEME

The design of the VortexBlaze Basketball Arena was developed through a conceptual approach that emphasizes the dynamics of basketball, realized through neo-futuristic architecture. The arena is envisioned not only as a venue for matches but also as a medium to express the energy, movement, and intensity of competition. This neo-futuristic approach translates the movement, speed, and visual power of basketball into a dynamic, expressive architectural form that addresses the challenges of contemporary sports architecture in an urban setting.

The central design concept is inspired by the rotational motion of a basketball, which generates rhythm, momentum, and centrifugal force. This principle of motion is interpreted through a vortex concept, forming the basis for mass formation, spatial organization, and building orientation. The vortex symbolizes control and the continuity of movement, reflecting how the strategy and tempo of a basketball game dynamically evolve within the arena (Fig.6). The resulting circular shape strengthens the perception of the arena as a hub of activity while providing clear spatial organization for users.

The combination of the vortex concept with the blaze element symbolizes the fighting spirit, energy, and determination of athletes. "Blaze" embodies the emotional intensity and competitive

spirit that arise in every match. Together, the vortex and blaze elements create a warfare theme that positions the arena as a symbolic battlefield, where strategy, physical strength, and mental resilience intersect. This theme is not represented literally, but rather is expressed through dynamic, layered, and visually engaging architectural forms.

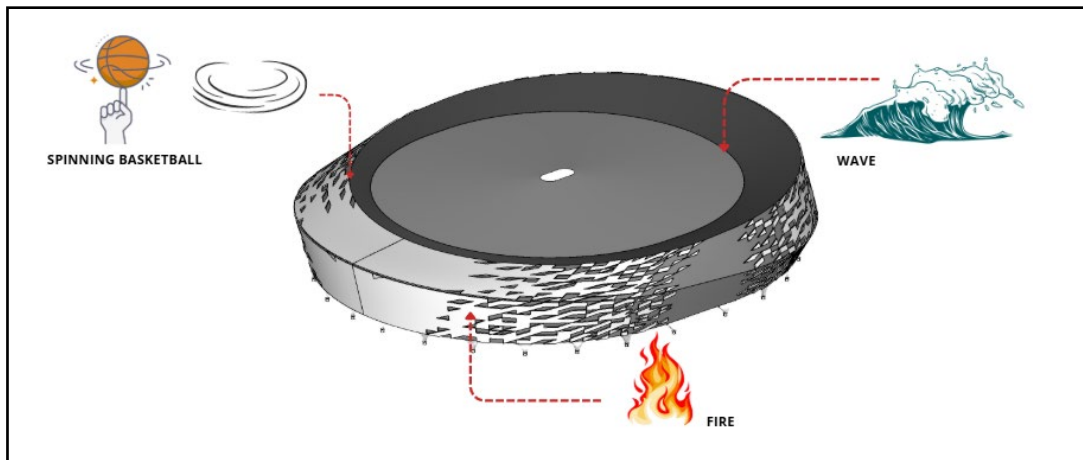


Figure 6. The concept of Building Form

The roof of the arena is designed to slope towards the center of the building, with an asymmetrical slope on one side that resembles the dynamic movement of ocean waves. This configuration represents the character of Tanjung Perak Port as the pulse of international trade in Surabaya, the center of continuous movement of goods, people, and culture. The metaphor of waves is interpreted as a symbol of the flow of energy and mobility that never stops, in line with the VortexBlaze concept that emphasizes the dynamics of movement and the intensity of competition. Architecturally, the roof shape not only serves as a protective element but also an expressive one, strengthening visual orientation towards the main arena and emphasizing the building's identity as a neo-futuristic landmark rooted in Surabaya's maritime context. The roof of the arena is designed to slope towards the center of the building, with an asymmetrical slope on one side that resembles the dynamic movement of ocean waves. This configuration represents the character of Tanjung Perak Port as the pulse of international trade in Surabaya, the center of continuous movement of goods, people, and culture. The metaphor of waves is interpreted as a symbol of the continuous flow of energy and mobility, in line with the VortexBlaze concept, which emphasizes the dynamics of movement and the intensity of competition (Fig.7). Architecturally, the roof shape not only serves as a protective element but also an expressive one, strengthening visual orientation towards the main arena and emphasizing the building's identity as a neo-futuristic landmark rooted in Surabaya's maritime context.

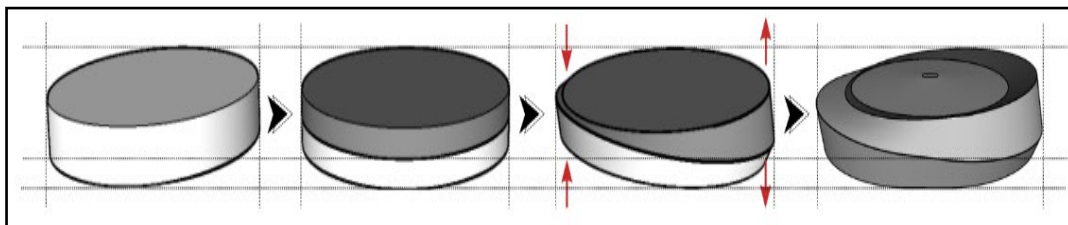


Figure 7. Form transformation

The transformation of the VortexBlaze Basketball Arena's form begins with an elliptical geometry, which is plastically processed to produce a dynamic architectural expression oriented toward the arena's center. The building's mass is modified through the slope and shifting of the roof and wall

planes to create a sense of movement, energy flow, and intensity that reflects the character of basketball. The deformation of the volume simultaneously creates a visual hierarchy that directs focus to the playing space, strengthens the audience's orientation, and improves the quality of natural lighting and ventilation through the arrangement of elevations and mass openings. This approach produces a building form that is not static but appears as an expressive, progressive architectural entity, in line with neo-futuristic principles that emphasize innovation in form, spatial dynamics, and a strong visual identity in the context of contemporary sports facilities.

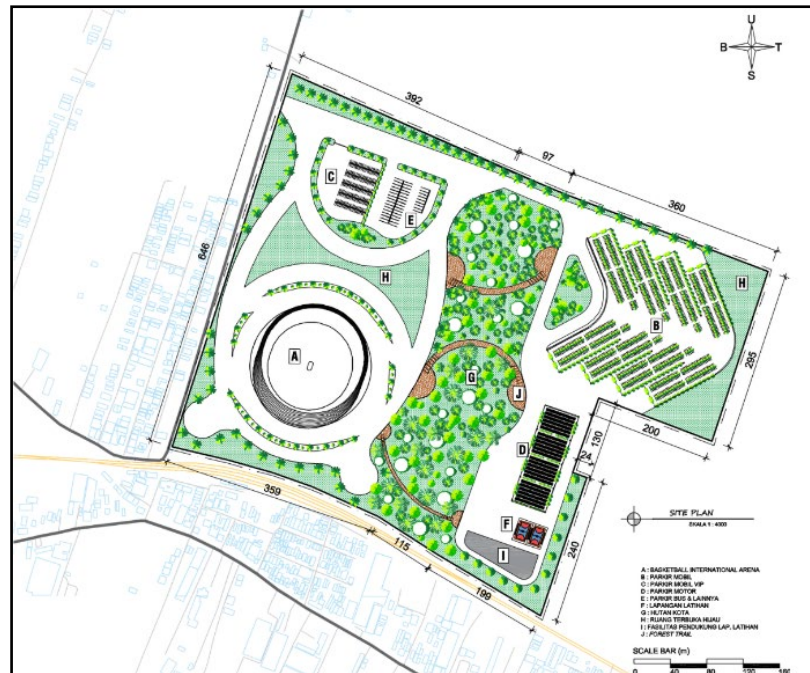


Figure 8. Site plan

The design of the VortexBlaze Basketball Arena integrates the urban forest into the site's spatial and environmental systems. Vegetation elements are not merely passive open spaces but active ecological components that help shape the area's overall environmental quality. The urban forest is used to support thermal comfort, improve air quality, and create a more humane transition between the building and its surrounding context (Fig. 8).

The integration of space within the area is also achieved through the design of a continuous, accessible pedestrian network. Footpaths are designed to clearly and comfortably connect various activity zones, while simultaneously providing a spatial experience focused on the interaction between users and the landscape. Public spaces, such as viewing areas and transition spaces, are designed to create visual connections with green elements, allowing users not only to move functionally but also to experience a richer and more contextual spatial quality.

This approach aligns with the principles of nature-based design, which hold that integrating vegetation and human movement enhances environmental resilience and enriches the area's overall spatial experience. Thus, the urban forest within the VortexBlaze Arena acts as a connecting element between architectural functions, ecological systems, and public activities. The application of a neo-futuristic approach, combined with the Vortex and Blaze metaphors, produces an expressive, dynamic, and forward-looking architecture that is also responsive to Surabaya's environmental context and local character. The integration of massing, spatial organization, and landscape elements emphasizes the arena's role as a center of public activity and

a city landmark, thereby strengthening the spatial experience, environmental values, and long-term relevance of sports facilities in the development of urban structures.

DESIGN THEME

The design of the VortexBlaze Basketball Arena emphasizes the dynamics of movement, the energy of competition, and the visual intensity of basketball, embodied through a neo-futuristic architectural language. This theme positions the arena not simply as a venue for competition but as an experiential space that embodies the spirit of fighting and collective interaction. The vortex concept serves as the organizing framework for the building's space and mass, creating a central flow that directs users' attention to the arena's core. At the same time, the blaze element reinforces the visual expression of the athletes' energy and determination. The integration of these two elements forms a warfare narrative, creating the impression of a symbolic battlefield expressed through dynamic forms, clear spatial orientation, and progressive visual composition.

The implementation of the theme in the site and architecture is designed to emphasize the connection between public spaces, the main arena, and the green landscape. The existing urban forest serves as a balancing and transitional element, creating a comfortable spatial experience before and after users enter the arena. The pedestrian network is intuitively and fluidly designed, directing movement to the core zone while strengthening visual interaction with the green elements and building facades. This pattern emphasizes the continuity of movement and enlivens the user experience within the design narrative.

Furthermore, the design theme reinforces Surabaya's identity as a dynamic and progressive city through expressive, aerodynamic, and futuristic forms and masses. Architectural elements such as facades, roof planes, and mass openings are arranged to reinforce the impression of energy, rhythm, and intensity. In this way, VortexBlaze is not only a sports arena but also an iconic, adaptive architectural landmark that offers a powerful spatial experience while emphasizing the character of basketball and the competitive spirit of the metropolitan city.

IMPLEMENTATION OF CONCEPT IN DESIGN

The implementation of the VortexBlaze concept on the building facade is achieved through a composition of curved planes that form a dynamic, progressive expression. The facade is designed as a primary architectural element that represents the rotational motion (vortex) and competitive energy (blaze) in basketball. Formally, the elliptical mass of the arena is wrapped in a play of solid planes and dynamic patterned openings that follow the direction of the rotational flow towards the center of the arena.



Figure 9. VortexBlaze Basketball Arena Facade

This composition creates an aerodynamic impression and reinforces the building's centripetal orientation, so that it is read as a unified volume that moves rather than remains static. The

sloping, asymmetrical transformation of the form further emphasizes the visionary, expressive, neo-futuristic character (Fig.9).

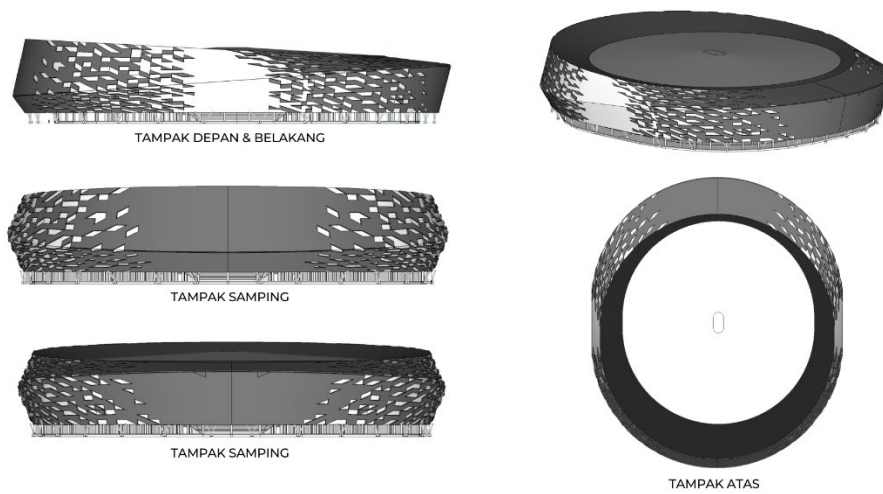


Figure 10. Elevation Building

The blaze element is expressed through the layering of the facade, composed of perforated panels that form a dynamic pattern resembling sparks or flames spreading along the building's mass rotation. This layering creates visual depth on the facade and reinforces the impression of energy and competitive intensity. The play of solids and voids on the facade planes creates a contrasting visual rhythm, making the building appear more vibrant and attractive from various perspectives (Fig. 10).

In terms of materiality, the facade utilizes Aluminum Composite Panel (ACP) as the primary material to create the building's curved planes and dynamic surfaces. The use of ACP supports the expression of precise, lightweight forms and provides a modern and futuristic appearance that aligns with the neo-futuristic architectural approach. Metallic or monochromatic finishes reinforce the high-tech and progressive feel while emphasizing the arena's identity as a contemporary landmark in Surabaya.

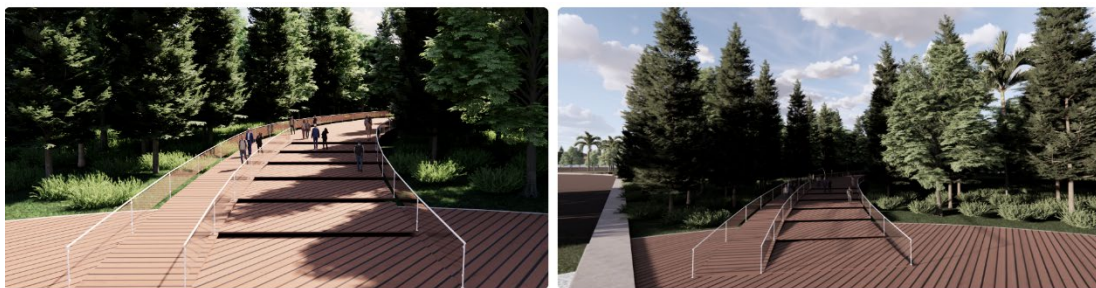


Figure 11. Forest Trail

The concept's implementation in the area is realized not only through the arena building but also through landscape design integrated with the urban forest. One of the main elements of the site design is the Forest Trail (Fig. 11). This pedestrian corridor traverses the urban forest without damaging the existing ecological structure. The forest trail was developed according to the principle of minimal intervention, following the density of existing vegetation to eliminate the need for large-scale tree felling. Rather than altering the forest structure, the design adapts the

path's geometry to the natural vegetation pattern. This approach maintains the character of the urban forest as a key ecological element while also integrating it into the user's spatial experience.

Spatially, the forest trail serves as a transitional element between the central arena zone and the green open space area. This path connects various activity points, including the training area, green open space, parking, and plaza, creating a more intimate, natural walking experience. Thus, circulation is not only functional but also recreational and reflective, providing a contrasting atmosphere to the dynamics of the competition arena.



Figure 12. Interior Design

The VortexBlaze concept is implemented in the interior through a dynamic space, using contrasting colors and flowing lines that reflect the energy and movement of basketball. The interior continues the exterior's neo-futuristic approach, dominated by sporty colors such as electric blue, bright orange, black, and white (Fig. 12). Blue conveys a sense of focus and professionalism, while orange represents the spirit and intensity of competition. This color contrast reinforces the warfare theme, symbolizing strategic combat and performance within the arena.

The neo-futuristic character is reinforced by curved ceiling lines, integrated linear lighting, and a rhythmic, repetitive spatial composition. Warm lighting elements create an energetic atmosphere evocative of a blaze, while the orderly layout reflects team discipline and solidarity. Overall, the

arena interior delivers an expressive, modern, and immersive spatial experience, aligning with VortexBlaze's identity as a progressive and energetic international sports facility.

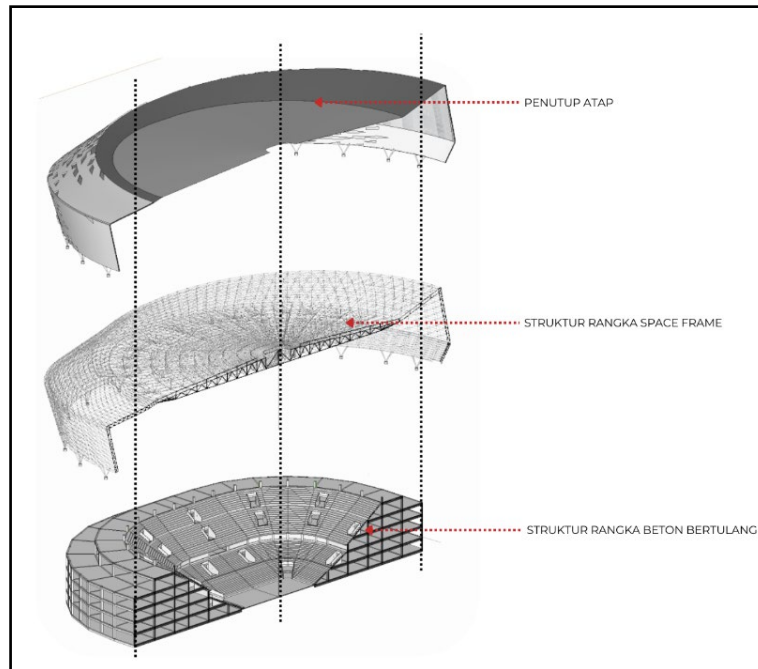


Figure 13. Stadium Structure Diagram

The arena's structural system is designed in layers to meet the needs of wide spans, stability, and dynamic architectural expression (Fig.13). The lowest level uses a reinforced concrete frame structure as the primary element supporting the building's vertical loads. This structure supports the stands, the arena floor, and the live loads generated by spectator activity and matches. Reinforced concrete was chosen for its high compressive strength, good stability, and ability to create a tiered grandstand configuration with a regular and efficient grid system.

Above, a space frame structure is used as a wide-span system to support the roof without numerous columns in the central area. This system provides a spacious, visually unobstructed interior, thereby optimally supporting the arena's function. The space frame distributes the load evenly through a network of three-dimensional rod elements, resulting in a lightweight yet strong and rigid structure.

The top layer is a roof covering that follows the building's dynamic shape. This covering serves as a weatherproof element while enhancing the flowing, progressive architectural expression. Overall, the combination of the reinforced concrete structure and the space frame creates a synergy of strength, span efficiency, and a neo-futuristic character that aligns with the VortexBlaze design concept.

CONCLUSION AND SUGGESTIONS

The design of the VortexBlaze Basketball International Arena demonstrates that a neo-futuristic architectural approach can be an effective strategy for addressing the need for an international-scale sports facility that is not only functional but also possesses a strong, representative identity. The vortex concept, a symbol of dynamic movement, combined with blaze, a representation of energy and competitive spirit, is translated through the transformation of the massing, the expressive facade composition, and the contrasting, sporty interior design. The integration of blue

and orange, the play of flowing lines, and dramatic lighting create an immersive spatial experience that aligns with basketball's fast-paced, competitive, and energetic nature.

From a building system perspective, the application of a reinforced concrete frame structure to the stands and podium areas, combined with a space frame system for the roof span, demonstrates that the requirement for column-free space can be achieved without sacrificing structural stability and efficiency. The synergy between the structural system and architectural expression reinforces the arena's character as a regional icon and a public space adaptable to a range of sporting and entertainment activities at various scales.

Further development requires a more in-depth technical study of the space frame system's optimization, particularly regarding connection details, construction methods, and material efficiency in a tropical climate. Building performance studies, such as analysis of natural lighting, ventilation, and thermal control, are also crucial to ensure optimal space comfort at maximum capacity. Furthermore, simulations of spectator circulation and evacuation systems for various international event scenarios need to be developed to provide comprehensive safety, accessibility, and user comfort. With these technical enhancements, the VortexBlaze concept has the potential to become a model for the design of expressive, adaptive, and sustainable sports arenas.

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