

# **“The Flamingo Machine”**

**Koichiro Azuma (Artist)**

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**Jutaro Sekita (Structural Engineer)**



## Concept Overview

**-Project Statement: “The Flamingo Machine ” (Flamingo Playground Sculpture)**

**-Artist : Koichiro Azuma**

**-Structural Engineer : Jutaro Sekita**

**-Translation and Art Coordination : ArtTank [Toshio Kondo / Estuko Kodaira]**

I plan to create a large, playground-style sculpture shaped like a flamingo. To make it strong and safe, I will use metal as the main material. People will climb up stairs built into the flamingo’s “legs” and sit on a bicycle attached to the flamingo’s body. When they pedal the bicycle, the flamingo’s neck and head will move up and down, almost as if it has come to life. This design lets school-aged children and adults be the driving force of the artwork, reviving the playful spirit of a park that once had many real flamingos.

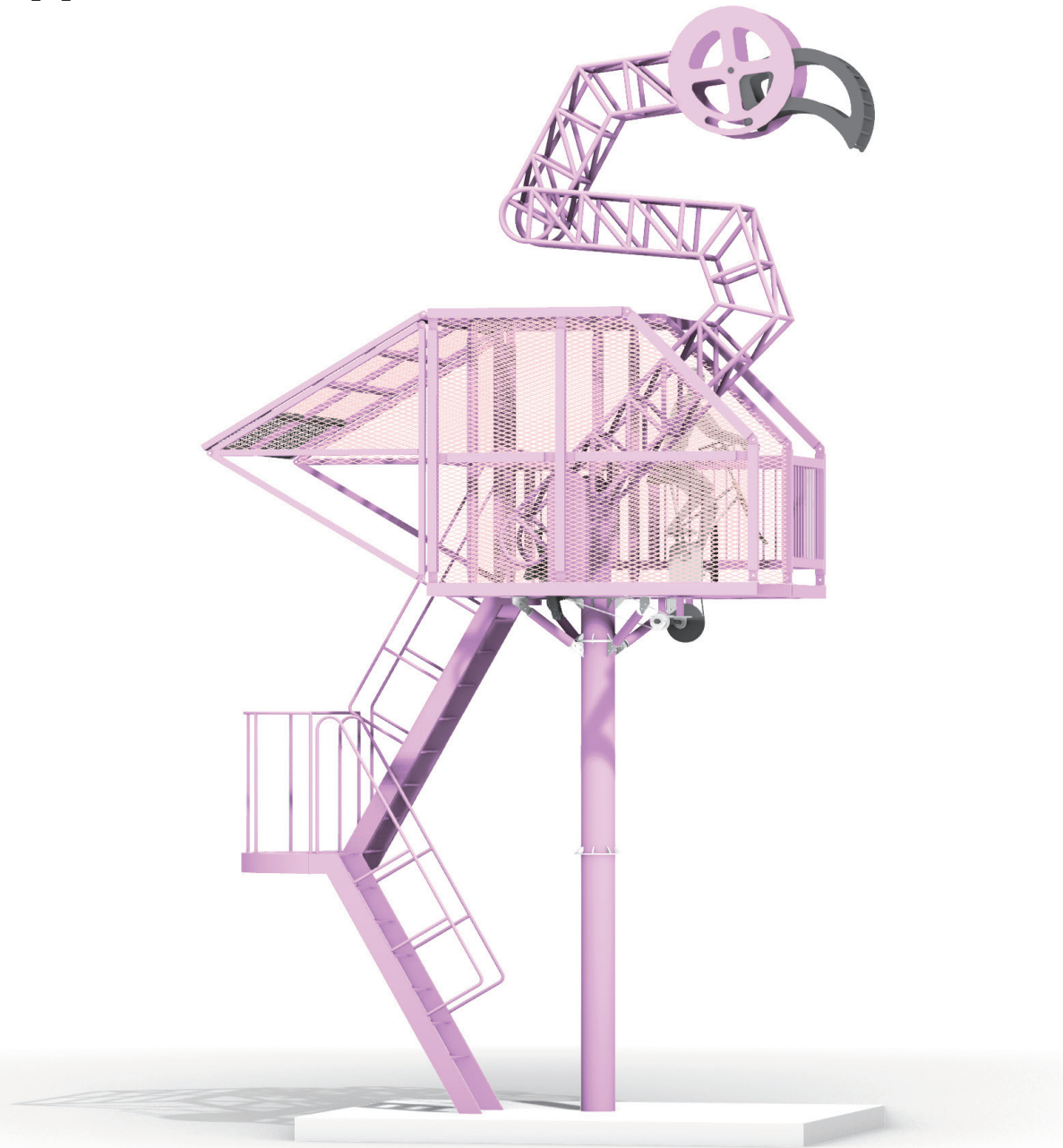
Because the sculpture runs on pedaling, it also complements nearby sports facilities, encouraging physical activity and shared fun. By uniting exercise with art, the project aims to energize the park and bring together visitors of different generations. I want people to discover new ways of enjoying public spaces through this interactive piece.

Flamingos have a special way of moving, much like crane trucks (named after the bird “crane”). While watching them at the zoo, I noticed how their necks bend and stretch when they drink water, similar to an excavator’s arm in motion. This observation inspired me to recreate that up-and-down movement with a sturdy metal structure. Visitors can climb inside the flamingo’s body, feeling as if they are operating heavy machinery.

Previously, I created a sculpture called “Tea Plantation and Cyclist,” inspired by frost protection fans in the tea fields of Shizuoka, Japan. These fans, often painted green to match the color of tea leaves, protect the plants from frost damage and also contribute to the beautiful scenery of Japanese tea fields. I used discarded bicycles from the area to build a five-meter-tall artwork. Because of this piece, many visitors from abroad and local residents rediscovered the charm of the region. In the same way, I hope this flamingo sculpture will capture people’s attention, invite them to enjoy moving the artwork, and bring a renewed sense of excitement to the park.



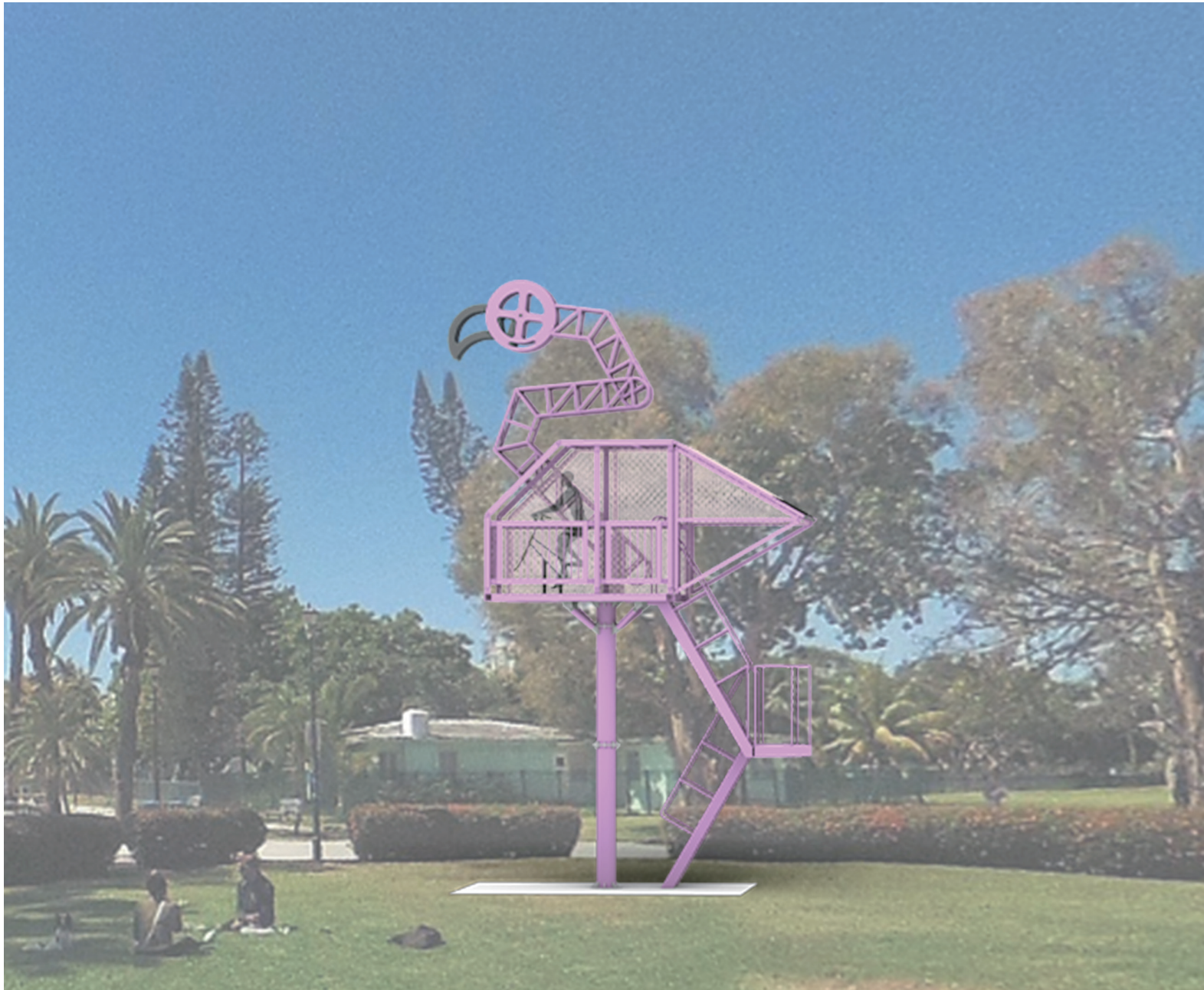
Artwork Concept Image [1]



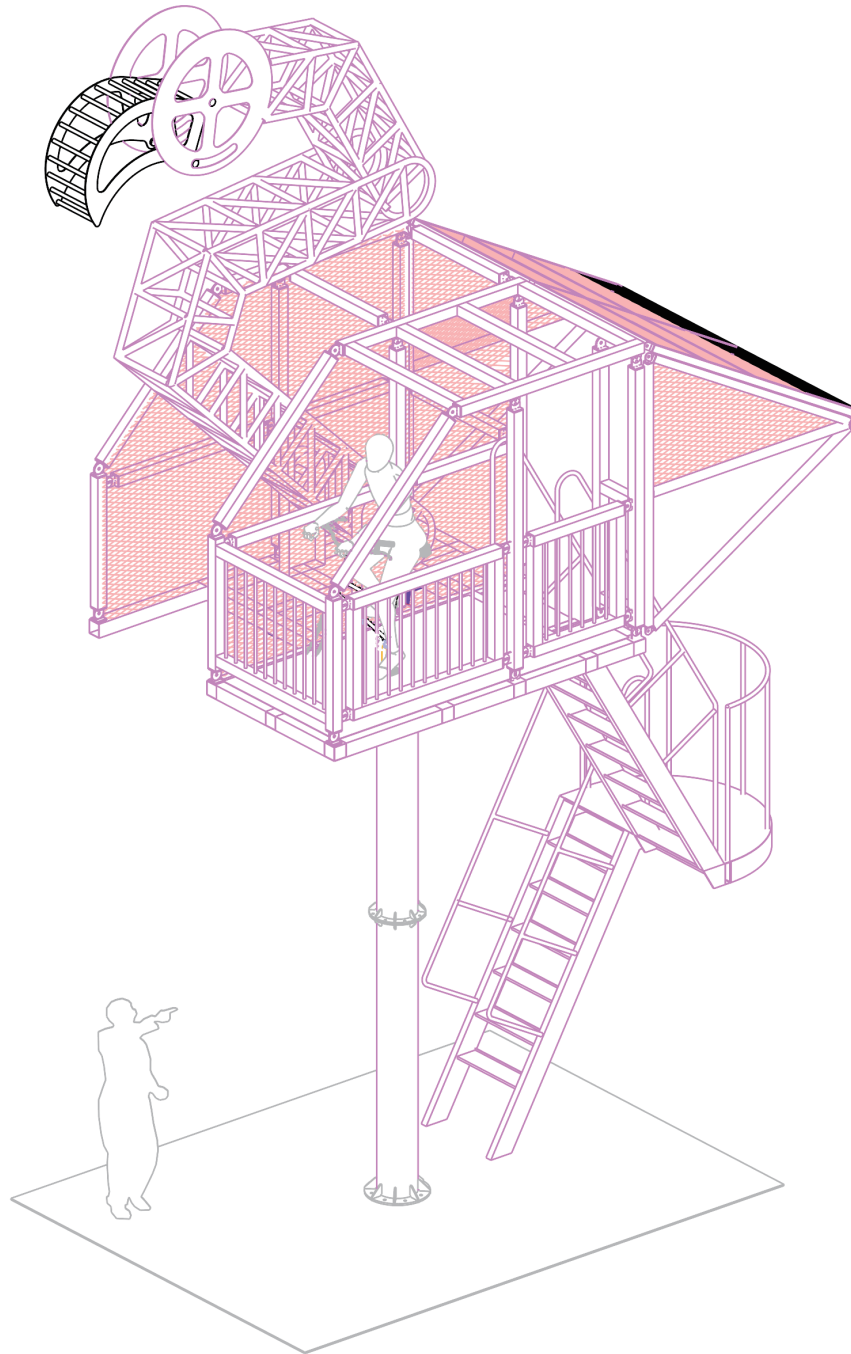
Artwork Concept Image [2]



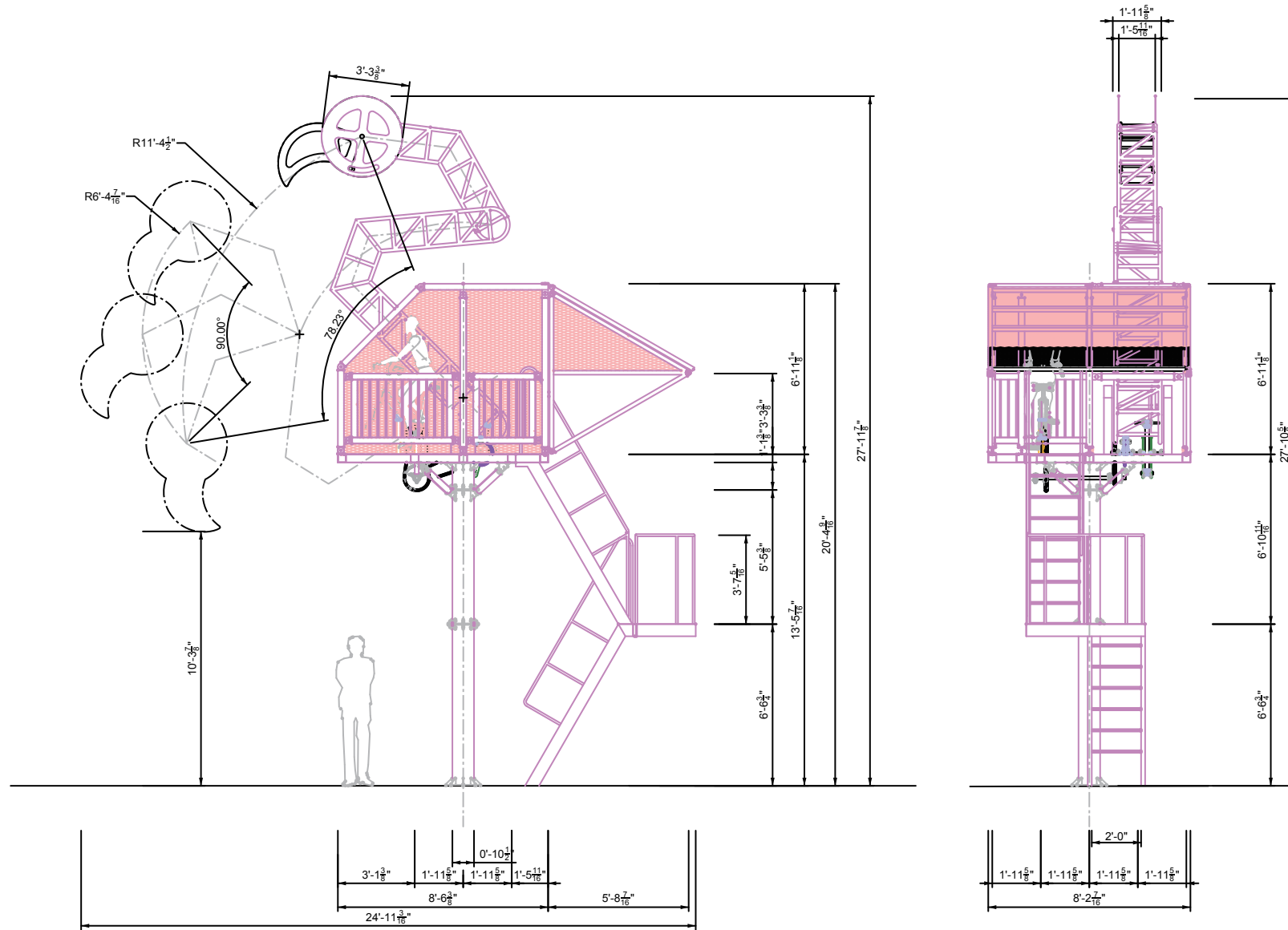
## Landscape View



# Concept Drawing (Parallel View)



# Structural Drawing of "The Flamingo Machine"

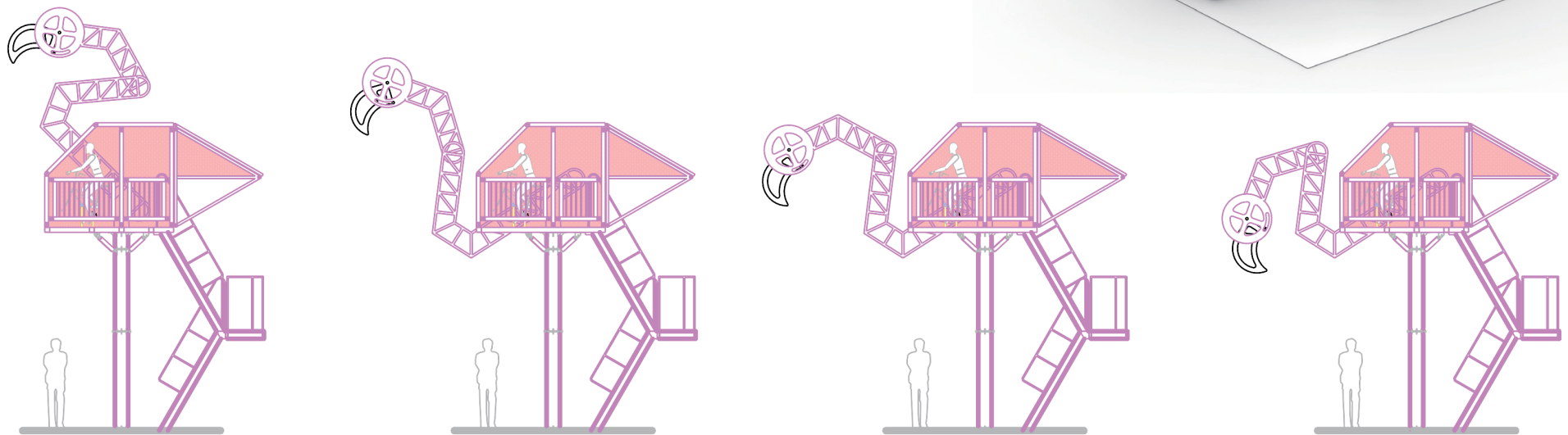
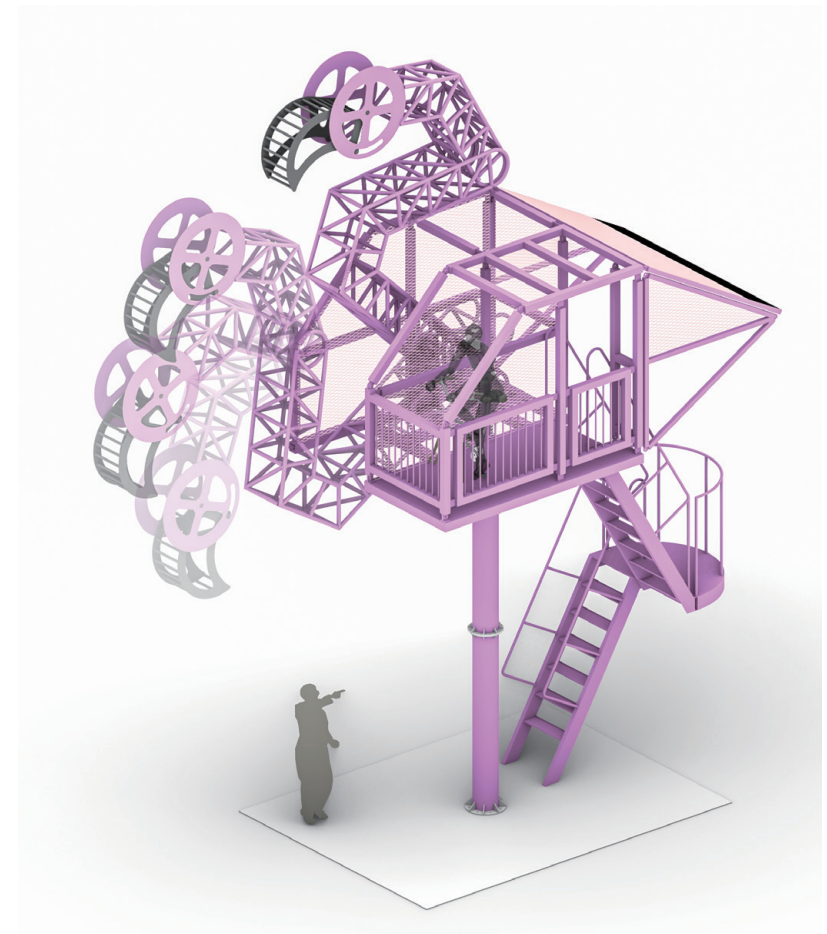


## The Moving Neck

The main feature of The Flamingo Machine is its moving neck and head. When someone pedals the bicycle inside the flamingo's body, the neck starts to move up and down—just like a real flamingo drinking water.

This movement was inspired by how flamingos bend their necks, and by the way machines like excavators or cranes move. A strong metal structure with simple mechanics makes this possible.

The sculpture does not move by itself—it comes to life only when people pedal. Your movement becomes the flamingo's movement. This is a sculpture where motion is the art.



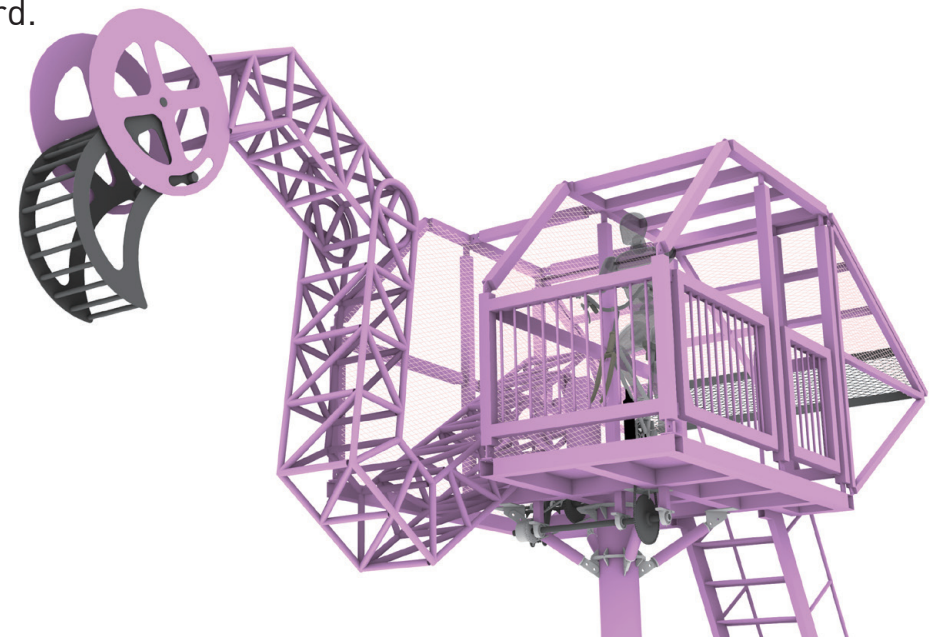
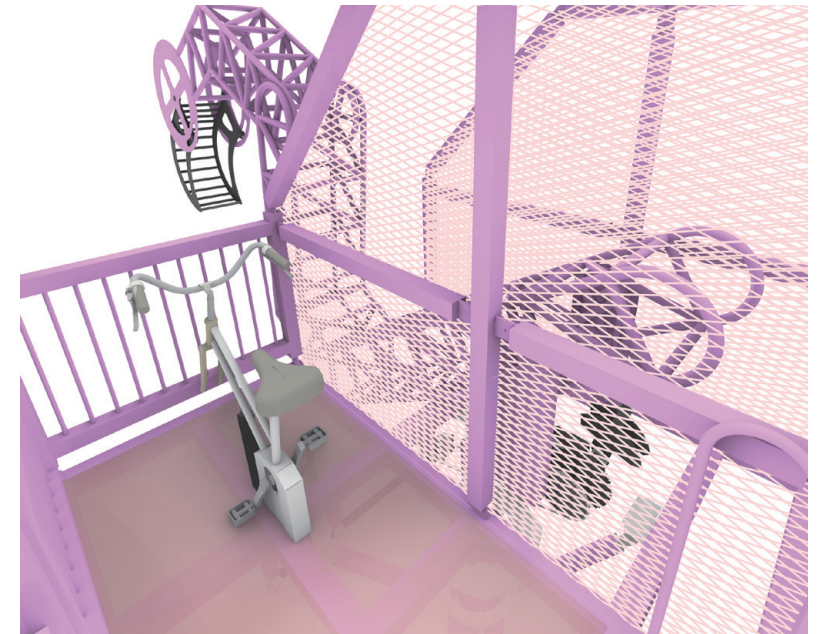
## “The Flamingo Machine” as an Imaginary Machine Sculpture

This sculpture invites visitors to pedal a bicycle built inside the flamingo’s body. When you pedal, the flamingo’s long neck and head move up and down—just like operating a real excavator.

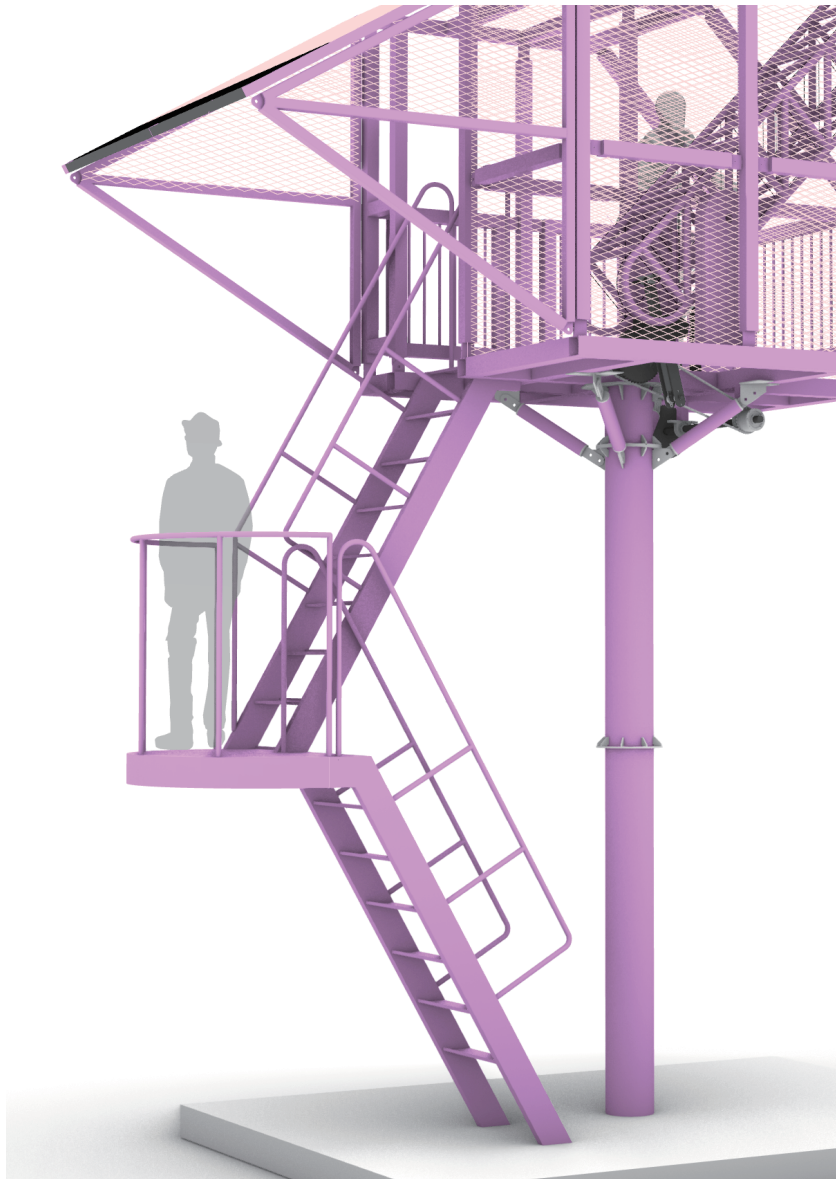
The seat and handlebars are designed to feel like the cockpit of a construction machine, giving visitors the feeling of being a machine operator. From this seat, they become both the rider and the operator, powering the sculpture with their own energy.

This idea was inspired by machines like the crane, which is named after a bird. In the same way, this artwork imagines a new kind of machine: a “flamingo machine”—part animal, part vehicle, and part sculpture.

By combining movement, imagination, and play, the sculpture becomes a playful, hands-on experience—something even children can enjoy, as they “drive” a gentle, giant bird.



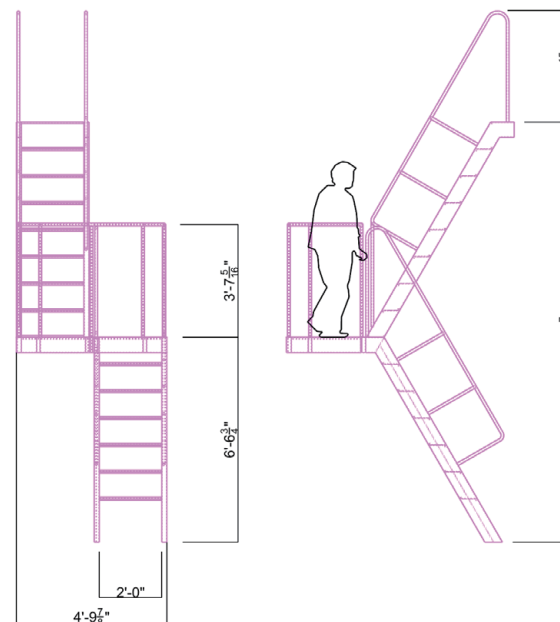
## Flamingo Leg Staircase



This bent staircase is designed to look like a flamingo's leg. The landing in the middle represents the sharp angle where a flamingo's leg bends when it stands. Flamingos often rest on one leg, with a distinct "kink" in the joint—and this stair shape brings that image into the structure.

As visitors climb the stairs, they are not just going upward—they are stepping into the body of the flamingo. The motion of climbing becomes part of the experience, like walking along the leg of a giant, living bird.

This staircase is not just a way to go up—it is an essential part of the flamingo sculpture.



# “The Flamingo Machine” Foundation Design Report by Jutaro Sekita

\*These calculations are for preliminary evaluation of overturning moment. A formal structural design by a licensed Professional Engineer in Florida is required for actual construction.

## 1. Project Overview:

- Structure Height: 8.5m (27ft 11in)
- Overall Dimensions: Width 2.5m (8ft 2in), Depth 5.2m (17ft 1in)
- Main Structural Pipe: 300mm (11.8in) diameter, 6mm thickness (0.24in)
- Total Weight: Approximately 3160kg (6967 lbs)
- Center of Gravity: Estimated at 4.1m (13ft 5in) above ground
- Installation Type: Permanent

## 2. Foundation Design:

**Proposed Foundation Size: 3.0m x 4.0m x 1.0m (9ft 10in x 13ft 1in x 3ft 3in)**  
**Estimated Foundation Weight: 27,000kg (59,525 lbs)**

## 3. Structural Considerations:

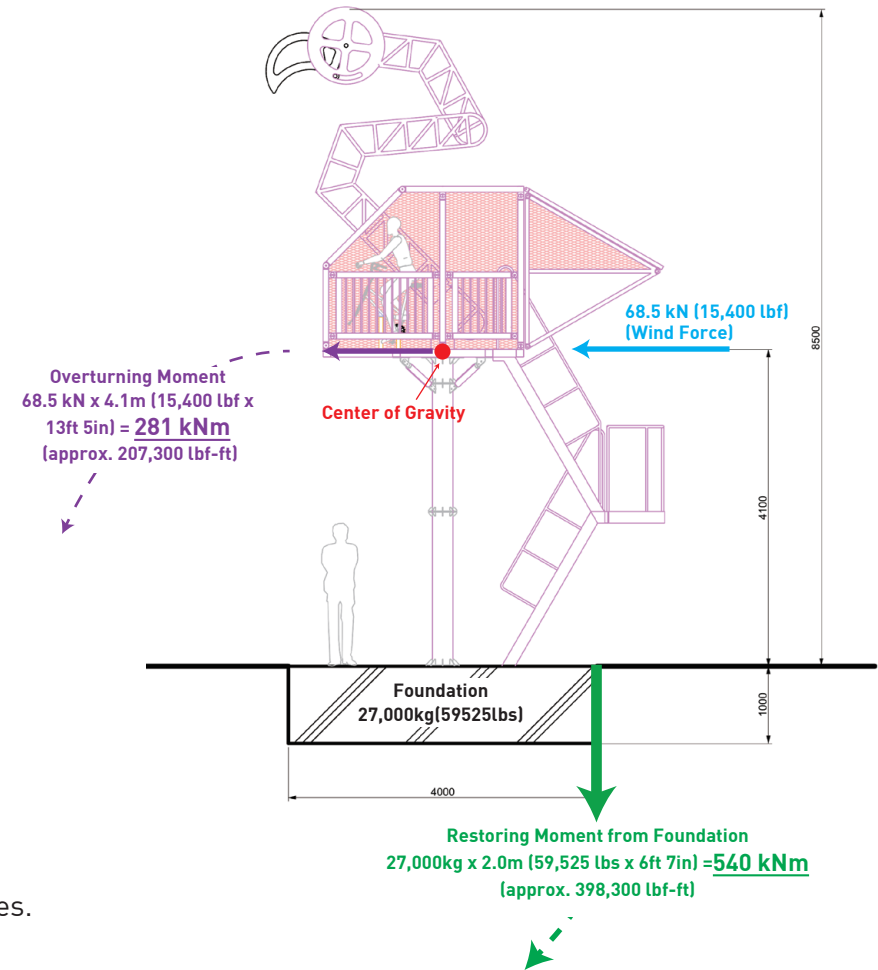
- Wind Load: Based on 175 mph (約78.2 m/s) design wind speed and 21.25 m<sup>2</sup> (229 ft<sup>2</sup>)(\*1) surface area
- Wind Force: Approx. 68.5 kN (15,400 lbf)
- Overturning Moment: 68.5 kN x 4.1m (13ft 5in) = 281 kNm (207,300 lbf-ft)
- Restoring Moment from Foundation: 27t x 2.0m (6ft 7in) = 540 kNm (398,300 lbf-ft)

## 4. Safety:

- Required safety margin for overturning: **1.5**
- Required Moment: 281 kNm x 1.5 = 422 kNm (approx. 310,950 lbf-ft)
- Provided Moment: 540 kNm (approx. 398,300 lbf-ft) **(passes)**
- Ground pressure: **6.1 t/m<sup>2</sup> (approx. 1,250 psf) against assumed capacity of 15 t/m<sup>2</sup> (approx. 3,000 psf)**
- Sliding resistance will also be calculated to ensure stability against horizontal wind forces.

## 5. Construction Notes:

- Concrete should be reinforced (RC foundation) with top/bottom and vertical rebar
- Anchor bolts and base plate to be embedded and aligned precisely during pour
- Surface finish and waterproofing (if needed) should be confirmed on site
- This design assumes average soil bearing capacity and no significant seismic activity.
- This design assumes average soil bearing capacity. A formal geotechnical survey will be conducted prior to final foundation design to account for local soil conditions in Miami.
- (\*1) Wind load was calculated using a projected surface area of 21.25 m<sup>2</sup> (229 ft<sup>2</sup>), derived from the full frontal dimensions of the structure: 8.5m (27ft 11in) in height x 2.5m (8ft 2in) in width.



**Design Wind Speed: 175 mph (approx. 78.2 m/s).** This is the required speed under the Florida Building Code for a Risk Category II structure located in Miami-Dade County's High-Velocity Hurricane Zone (HVHZ).  
**Wind Force: Approx. 68.5 kN.** This force is calculated based on the 175 mph wind speed per ASCE 7-22 standards. This is approximately four times the 17 kN force stated in the original proposal.

## Finishing System

We propose a finishing system for the "Flamingo Machine" artwork, designed for maximum durability and long-term beauty in an outdoor setting.

### **1. Base Treatment & Painting System**

The steel framework will receive a full hot-dip galvanizing, protecting both the exterior and the interior of all hollow sections. Provided no mechanical damage occurs, this zinc layer can suppress red-rust formation for around 20 years, even in Miami's high-humidity, high-UV environment. Over the galvanizing we will apply:

- **Primer** – INSL-X Stix® Water-borne Bonding Primer for maximum adhesion to zinc-rich surfaces.
- **Top-coat** – Aura® Exterior (Benjamin Moore) in 'Pink Ladies 1347' and 'Black 2132-10'. We will apply multiple coats to achieve the specified film thickness.

Durability expectations and maintenance cadence

- Conduct a visual inspection and spot touch-up every year.
- Repaint high-wear zones (stairs, handrails, contact points) on a 5 – 7 year cycle.
- Plan a full-surface repaint roughly every 10 years, or sooner if annual inspections reveal chalking, loss of gloss, or coating damage.

### **2. Justification: Playground-Level Durability**

This entire specification—complete internal and external galvanizing plus a robust, multi-coat paint system—is trusted for its high safety and durability, meeting standards similar to those required for public playground equipment. It is the best choice to ensure the artwork withstands public exposure and the elements, preserving its value and beauty for years to come.

## Galvanizing

Galvanizing is a rust prevention method that dramatically improves the corrosion resistance of steel by forming a protective zinc coating on its surface. Its effectiveness is proven in a wide range of applications, including bridges, road signs, power transmission towers, structural steel for buildings, and fences. After application, it provides excellent rust prevention over the long term, while being



## Primer: INSL-X Stix

INSL-X Stix is a high-adhesion primer that creates a powerful bond on difficult, hard-to-coat surfaces. It offers a superior grip on galvanized metal, as well as other slick materials like glossy tile and PVC, with minimal surface prep. This provides a durable and reliable foundation for any type of paint topcoat.



## Topcoat: Aura® Exterior

Color Code : Pink Ladies 1347 / Black 2132-10  
Aura® Exterior is an ideal choice for playground equipment due to its outstanding durability and color retention. Thanks to its proprietary Color Lock® technology, vibrant colors are protected from fading under harsh UV exposure. The resilient finish also resists scuffing and wear, ensuring a safe and beautiful coating that endures constant use.



## Commitment to Safety: Adherence to U.S. Public Playground

### **Built to Playground Safety Standards**

Our commitment to safety is paramount. We consistently design and fabricate our artworks to meet or exceed the stringent safety standards found in public playground equipment. This dedication stems from our long-standing collaborations with leading playground manufacturers. By applying their proven safety-by-design principles, we ensure the "Flamingo Machine" is not only engaging but also inherently safe for all visitors.

### **1. Drivetrain and Mechanical Safety**

**Complete Enclosure of Bicycle Components:** The bicycle mechanism features a robust **chain guard** that fully encloses the chain and sprockets. This prevents any accidental contact with moving parts, eliminating risks of entanglement or injury to clothing or limbs. The gear ratio is specifically calibrated to allow for easy pedaling by children, ensuring the neck moves at a slow and safe pace.

**Integrated Anti-Reverse Mechanism:** The bicycle unit is equipped with a **one-way cam clutch**. This critical safety feature ensures that the pedals can only rotate forward, preventing any backward motion that could potentially trap or injure a user's feet or legs.

**Protected Flamingo Neck Movement:** The articulating components of the flamingo's neck are engineered to be **structurally inaccessible to the public**. This design prevents any direct contact with the moving parts, safeguarding against pinching or trapping hazards.

**Elevated Flamingo Neck Position:** The lowest point of the flamingo's neck is intentionally positioned at a significant height above the ground, making it **difficult for even adults to reach**. This strategic elevation minimizes the potential for unintended or disruptive physical interaction with the artwork's primary moving element, preventing accidents arising from unforeseen interference.

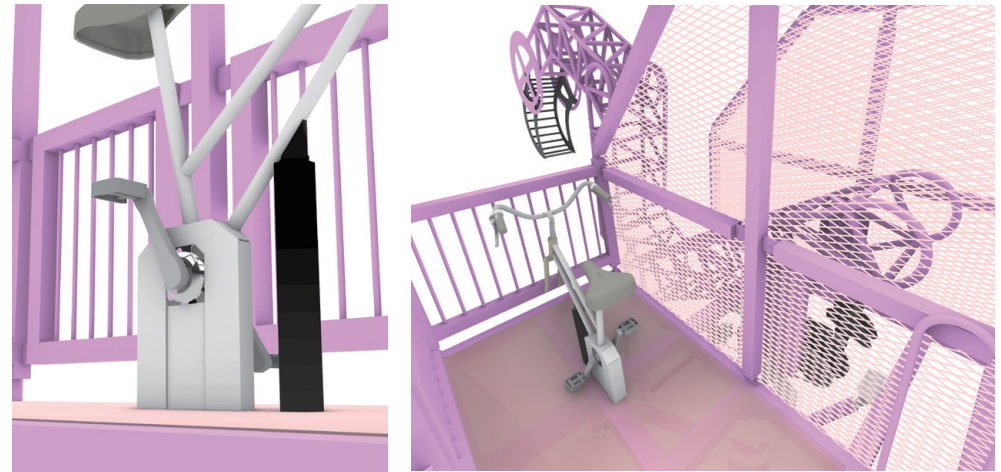
### **2. Access and Structural Safety**

**Safety Railings: Compliant Standards:** The safety railings will be designed based on the requirements of **ASTM F1487-21** and any applicable local regulations. The design will fully comply with all applicable local Miami codes and ASTM F1487 playground safety standards. All guardrails will be a minimum of 1.1 m (43.3 inches) high, or higher if required by local code for the given platform height. Crucially, all openings within the guardrail system will be sized to prevent the passage of a 3.5-inch (9 cm) diameter sphere to eliminate any head entrapment hazard.

**Scenario A Stairway: Controlled Access:** The stairway in Scenario A is intentionally designed with a **narrow width**. This physical constraint discourages individuals from attempting to ascend while carrying large objects or holding young children, thereby promoting safer, more controlled single-file movement.

**Scenario B: A Two-Layered Safety Approach:** For Scenario B, safety is holistically addressed by focusing on fundamental design principles that protect users at both ground level and on the platform.

- **Ground-Level Access Control:** To prevent unauthorized access, the ladder is engineered with a deliberately high first step, **positioned approximately 70 cm (27.5 inches) above the ground**. This strategic feature is specifically designed to prevent very young children from climbing the structure independently, thereby enhancing overall safety.
- **Platform Fall Prevention:** The platform is fully enclosed by robust safety railings designed to meet established playground safety regulations. **These railings are built to a height of 1.1 meters (43 inches) to reliably prevent falls**, ensuring a secure experience for all visitors.



## Maintenance Plan

This document outlines the maintenance plan to ensure the long-term beauty, safety, and functionality of the "Flamingo Machine" artwork.

### 1. Painting and Frame Maintenance

The frame is protected by **hot-dip galvanizing** and a multi-coat system of specified high-performance paint (Aura® Exterior), providing exceptional durability. The paint's proprietary Color Lock® technology ensures long-term protection and color retention.

**Annual Inspection:** Review the entire surface each year for chalking, scratches, or coating damage and carry out immediate spot repairs.

**Partial Repaint (5–7 years):** Recoat high-traffic components such as stair treads and handrails to keep protection continuous.

**Full Repaint (~10 years):** Schedule a full repaint of all exposed steel around the ten-year mark, adjusting if inspections show it's necessary.

**Galvanizing Repairs:** The hot-dip galvanizing offers robust, 20-year rust protection, even inside pipes. If the zinc layer is breached by welding or impact, the area must be abraded, treated with a zinc-rich primer (like cold galvanizing spray), and restored with the specified paint system.

### 2. Drivetrain and Moving Parts

While the moving parts are typically the most delicate, this system has been engineered for minimal maintenance.

**Lubrication and Inspection:** This is a maintenance-free system regarding lubrication; we use self-lubricating bearings and a stainless steel chain, so no regular oiling or greasing is required. However, we recommend a simple visual and operational check of these components once a year to ensure optimal long-term performance.

### 3. Overall Strategy and Maintenance Kit

Our strategy is to provide a robust, high-quality artwork that is easy to maintain over the long term.

**Parts Philosophy:** While the initial components are high-quality Japanese products, they have been carefully selected for their high compatibility with American-made parts. This solves the biggest challenge of long-term maintenance.

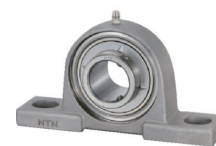
**"Maintenance Starter Kit":** A kit will be provided upon delivery and installation, containing: A full set of spare bearings (Made in Japan by NTN), a spare drive chain (Made in Japan by TSUBAKI), a touch-up paint kit (American-made Aura® Exterior, custom-tinted pink), and a detailed maintenance manual and parts list.

**Finding a Local Contractor:** We recommend establishing a service agreement with a certified industrial machinery maintenance provider or a specialized kinetic art conservator to ensure the artwork's long-term integrity. We are committed to working with City of Miami Beach staff to help identify an appropriate local contractor for maintenance, as well as to identify suitable locally-sourced alternatives for replacement parts.

**Replacement Parts (Bearings & Chain):** The artwork is built with high-quality NTN bearings and TSUBAKI chains from Japan, chosen for their superior quality. These components meet international standards (ISO for bearings, ANSI for chains), ensuring they are interchangeable with parts from major U.S. and global suppliers like Timken, SKF, and Diamond Chain. Replacements are readily available through local industrial suppliers, including U.S. Tsubaki for the chain components.

Following this plan will ensure the "Flamingo Machine" remains a beloved and functional work of art for many years to come.

### "Maintenance Starter Kit"



### **Fabrication in Japan, Shipping, and On-site Installation**

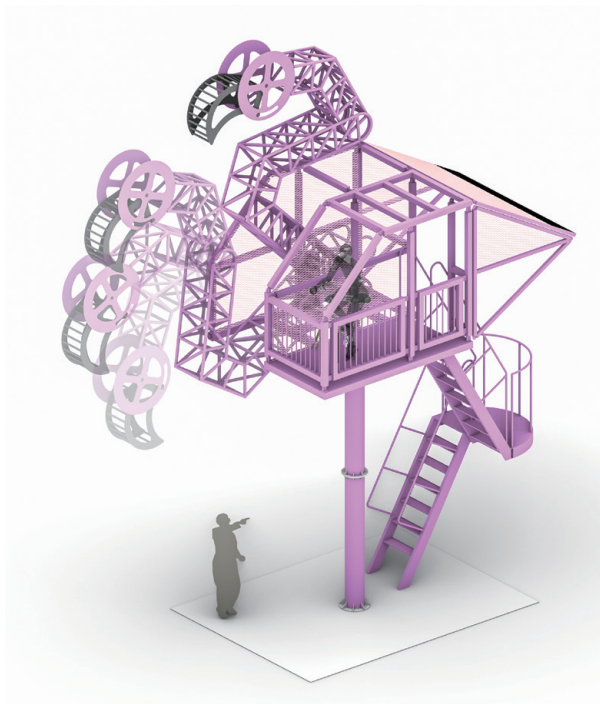
Under this plan, we can create the monumental 8-meter sculpture as envisioned. The artist, Koichiro Azuma, is also the owner of a steel fabrication workshop. Producing the artwork in his own facility ensures that the artistic vision can be realized with precision and reliability. This allows for easy quality control and eliminates the risk of production failures.

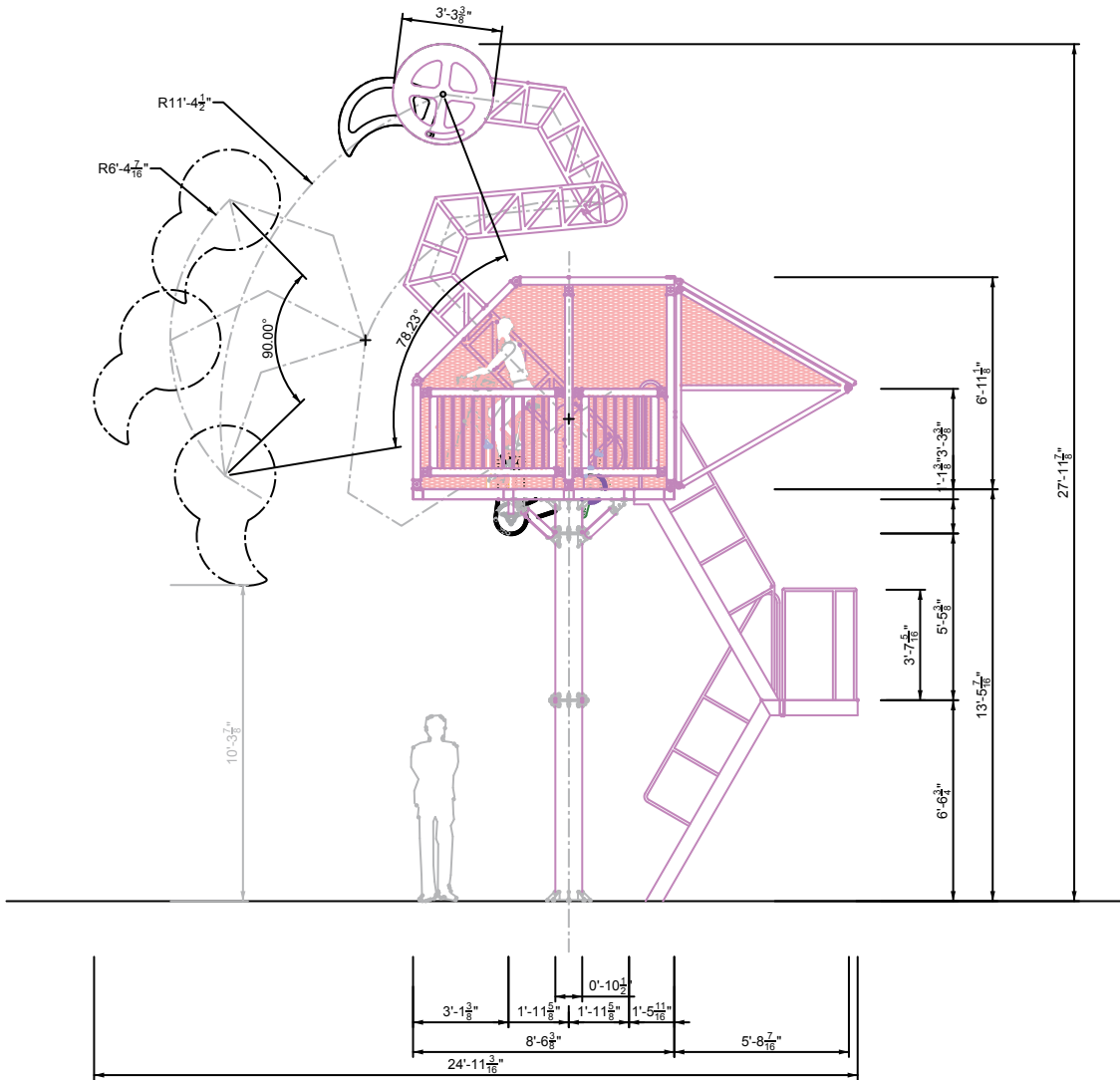
On the other hand, this scenario anticipates significant expenses related to shipping. Furthermore, time delays associated with shipping are likely to occur. On-site installation and foundation work will be required. There is also a possibility that customs duties will be incurred during transportation.



## Fabrication in Japan, Shipping, and On-site Installation

- ✓ **Maximum Impact & Scale:** Achieves the full 8.5 meter (27ft 11in) vision as intended.
- ✓ **Guaranteed Quality & Feasibility:** Fabrication in the artist's own workshop ensures high precision and reliability.
- ✗ **Higher Cost:** Significant expenses for international shipping.
- ✗ **Logistical Hurdles:** Potential for customs duties and shipping delays.



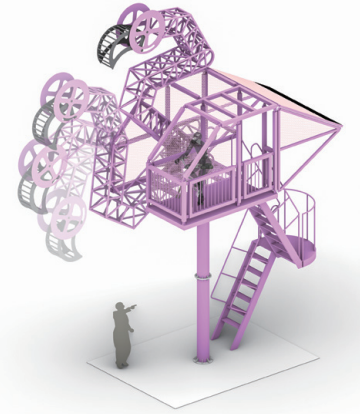


## Budget Narrative for “The Flamingo Machine” by Koichiro Azuma x Jutaro Sekita

### Production in Japan and International Shipping

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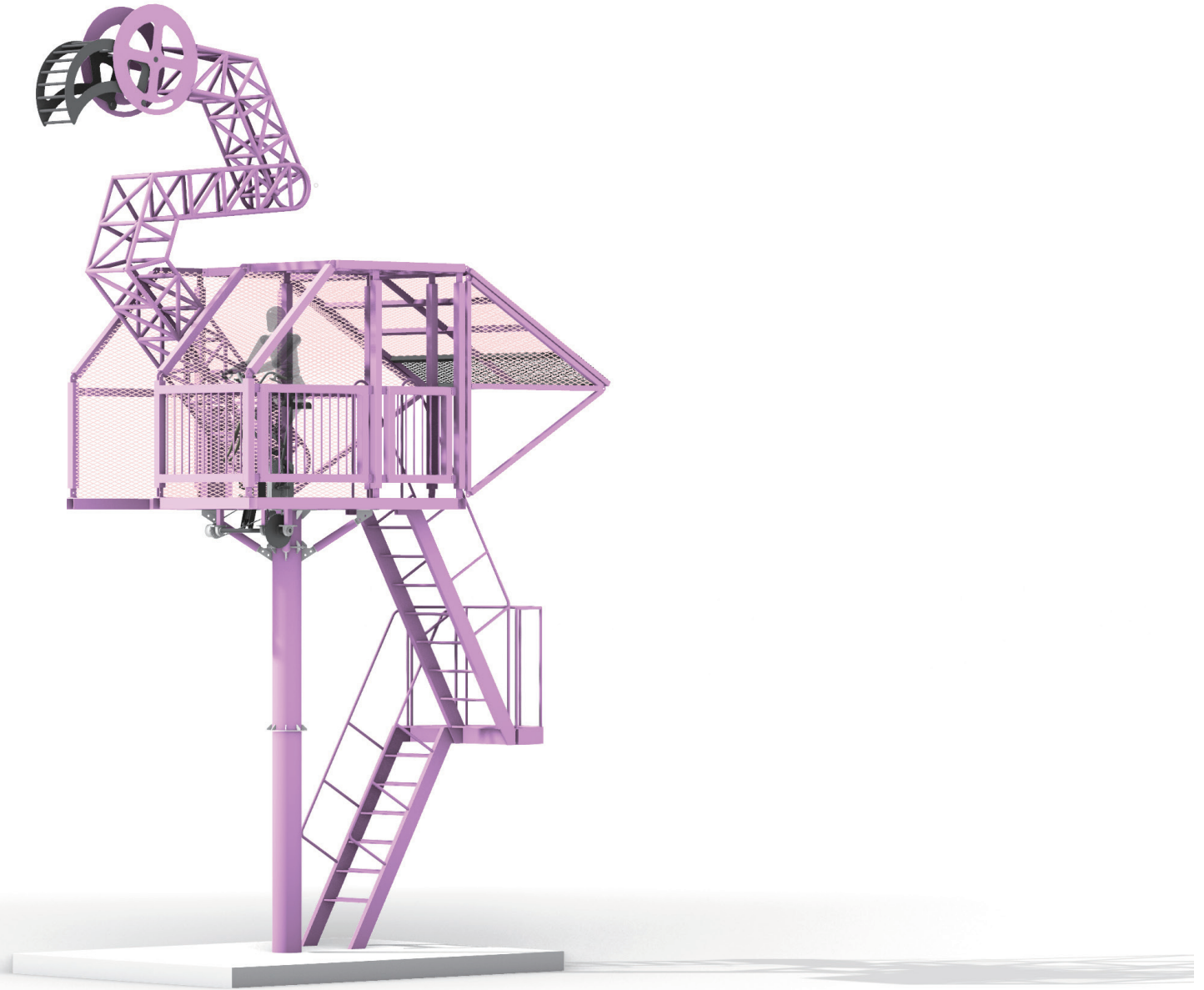
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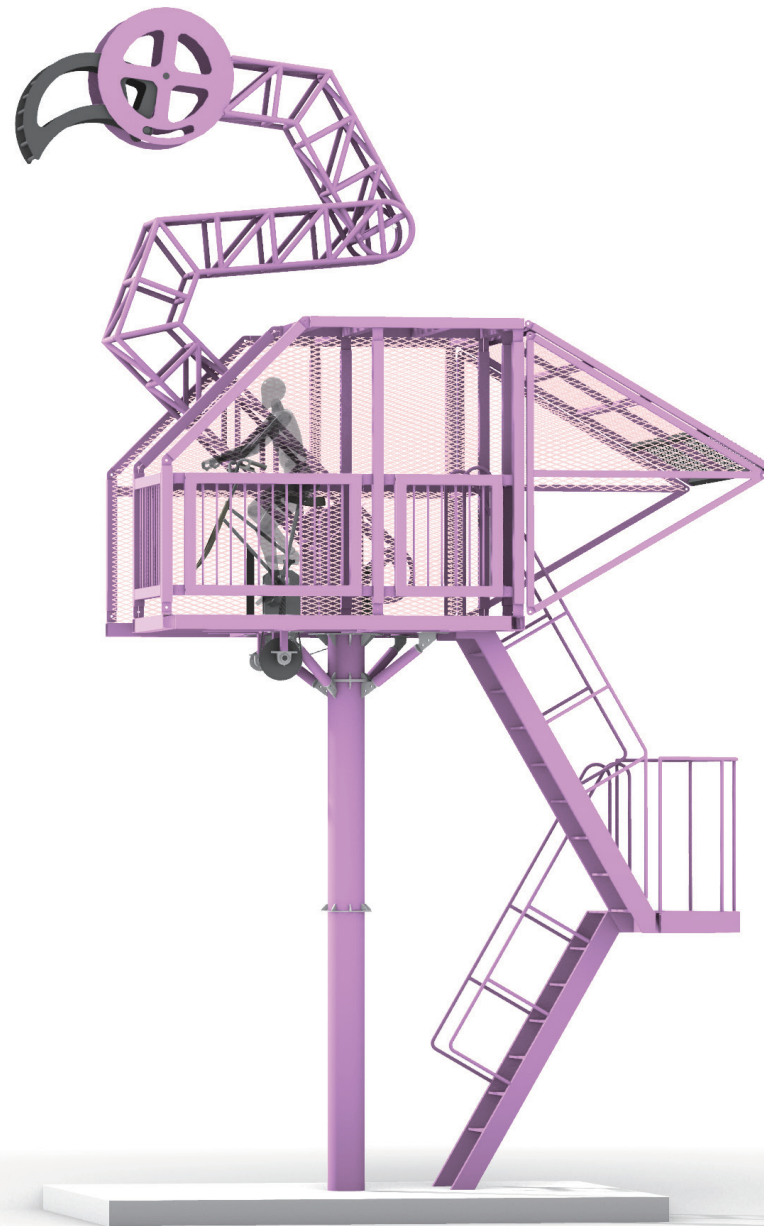
Category	Description	Amount (USD)
Artist Fee (13.3%)	Art direction, design, and overall supervision (13.3%)	\$20,000
Production, Materials, and Finishing [Azumakobo]	Estimates by Azumakobo Co., Ltd	\$41,333
International Shipping (Yokohama → Miami)	Estimates by Shinwa Shipping (Includes container collection costs)	\$26,667
Installation Costs	Estimates by local companies (Crane and General Contractors)	\$12,000
Foundation	Estimates by local companies (General Contractors)	\$30,000
Insurance	Insurance for construction and public installation	\$4,000
Warranty Contingency (1 year)	Reserve for repairs and defects during 1-year warranty period	\$5,000
Travel & Accommodation	Flights, lodging, and local transportation for artist and technicians	\$8,000
Contingency	Reserve for inflation, material shortage, or unexpected costs	\$3,000
<b>We obtain multiple quotes from local companies and make calculations.</b>		<b>Total</b>
		\$150,000



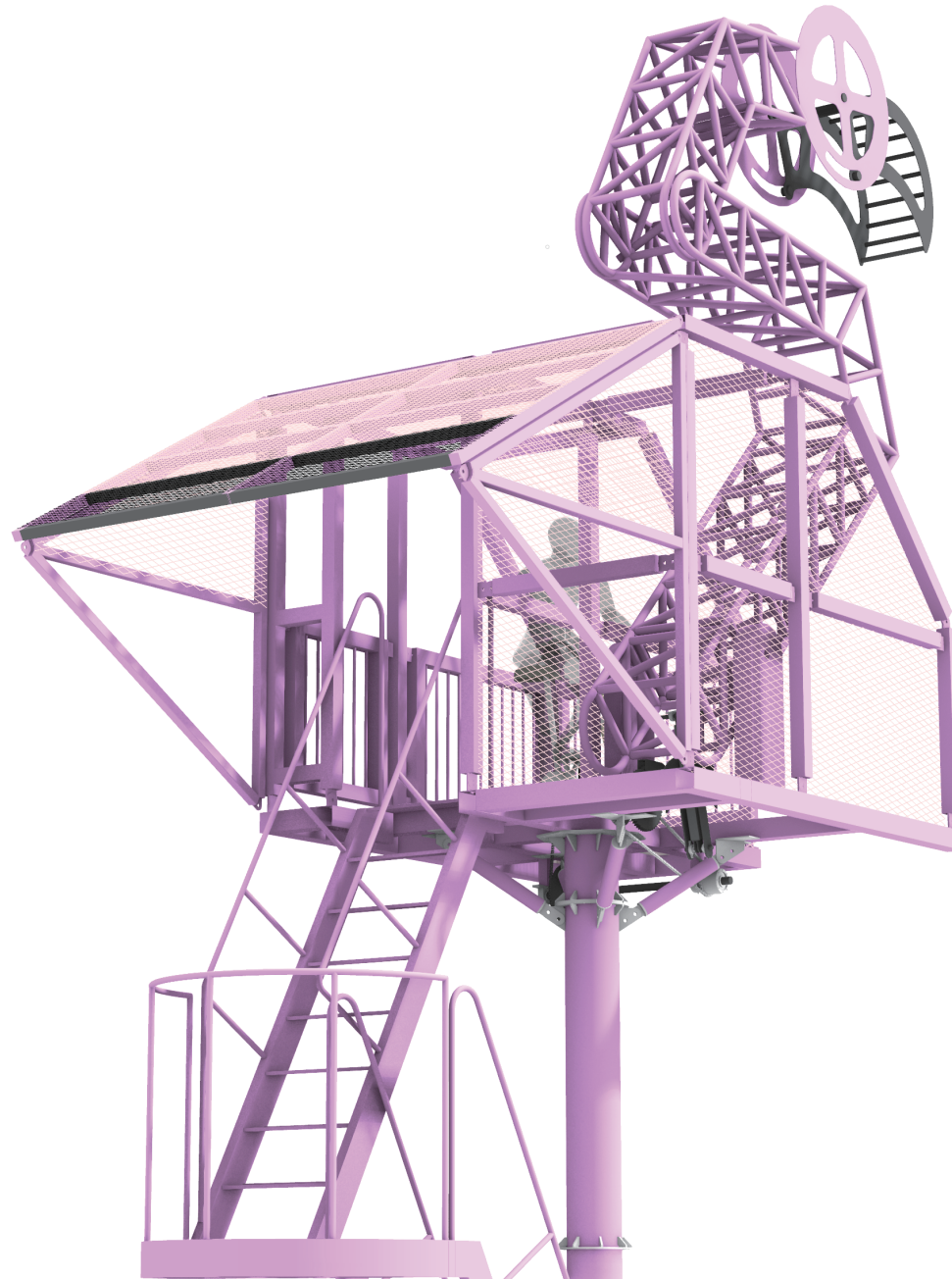
## Artwork Concept Image



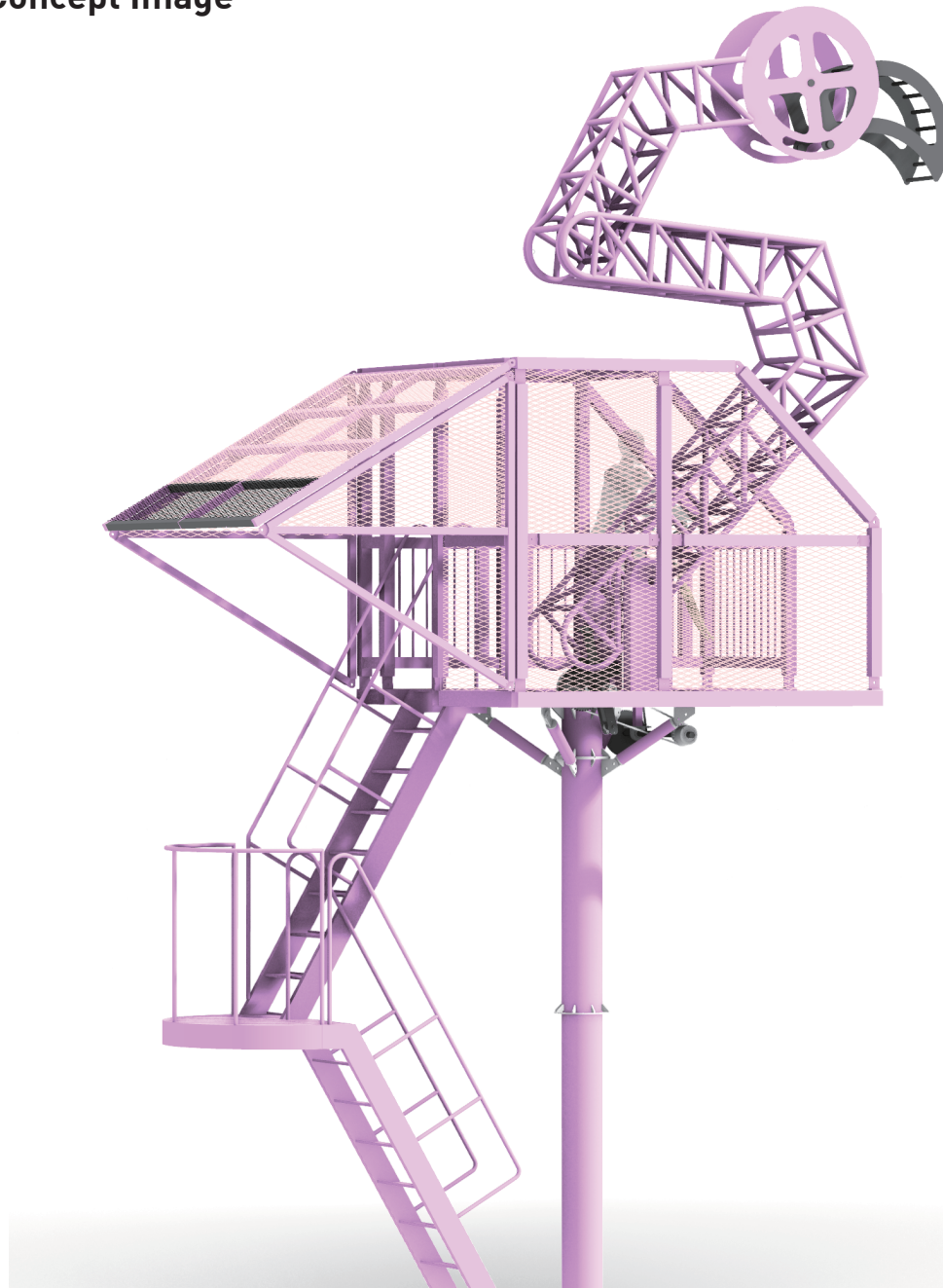
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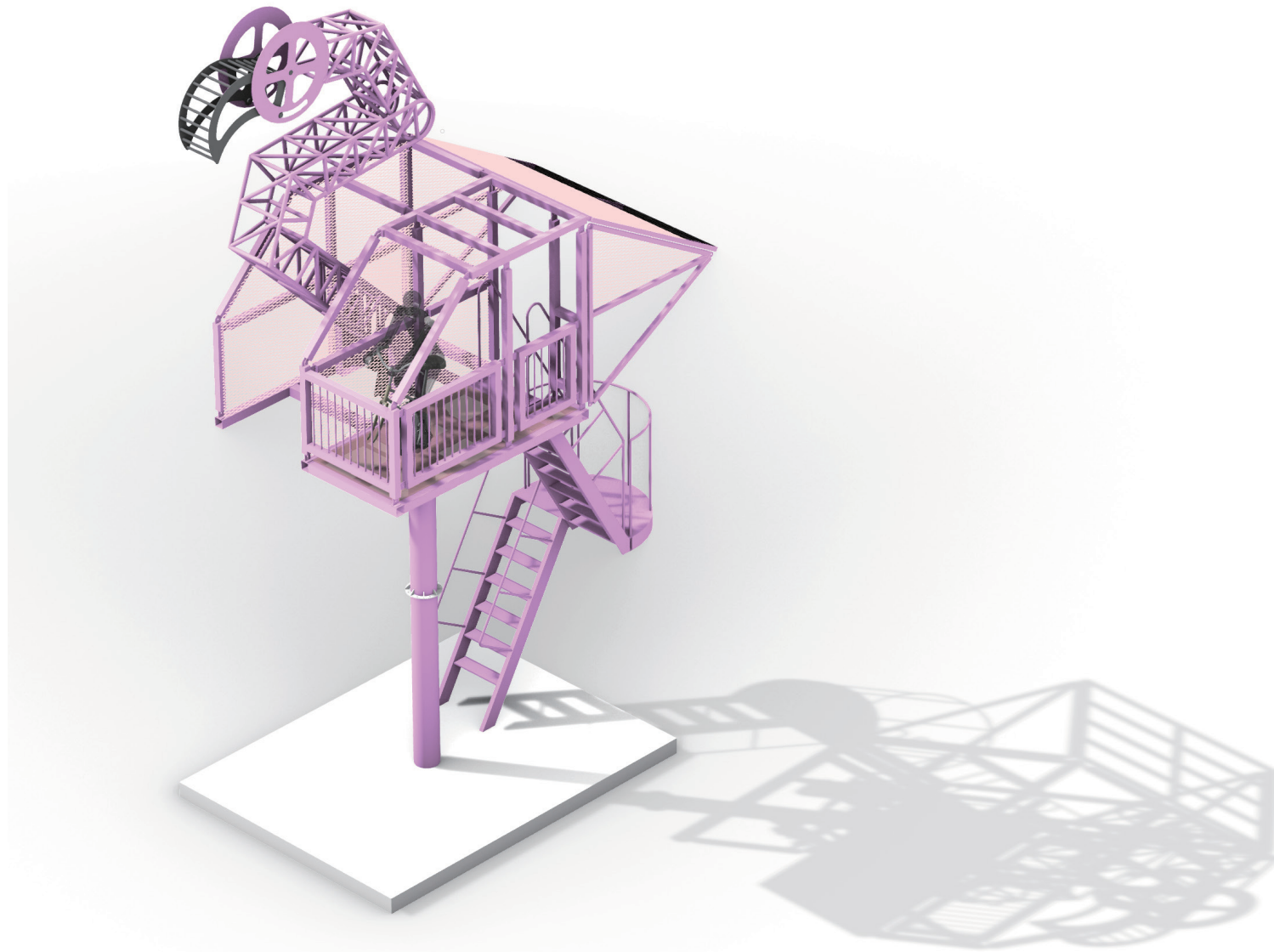
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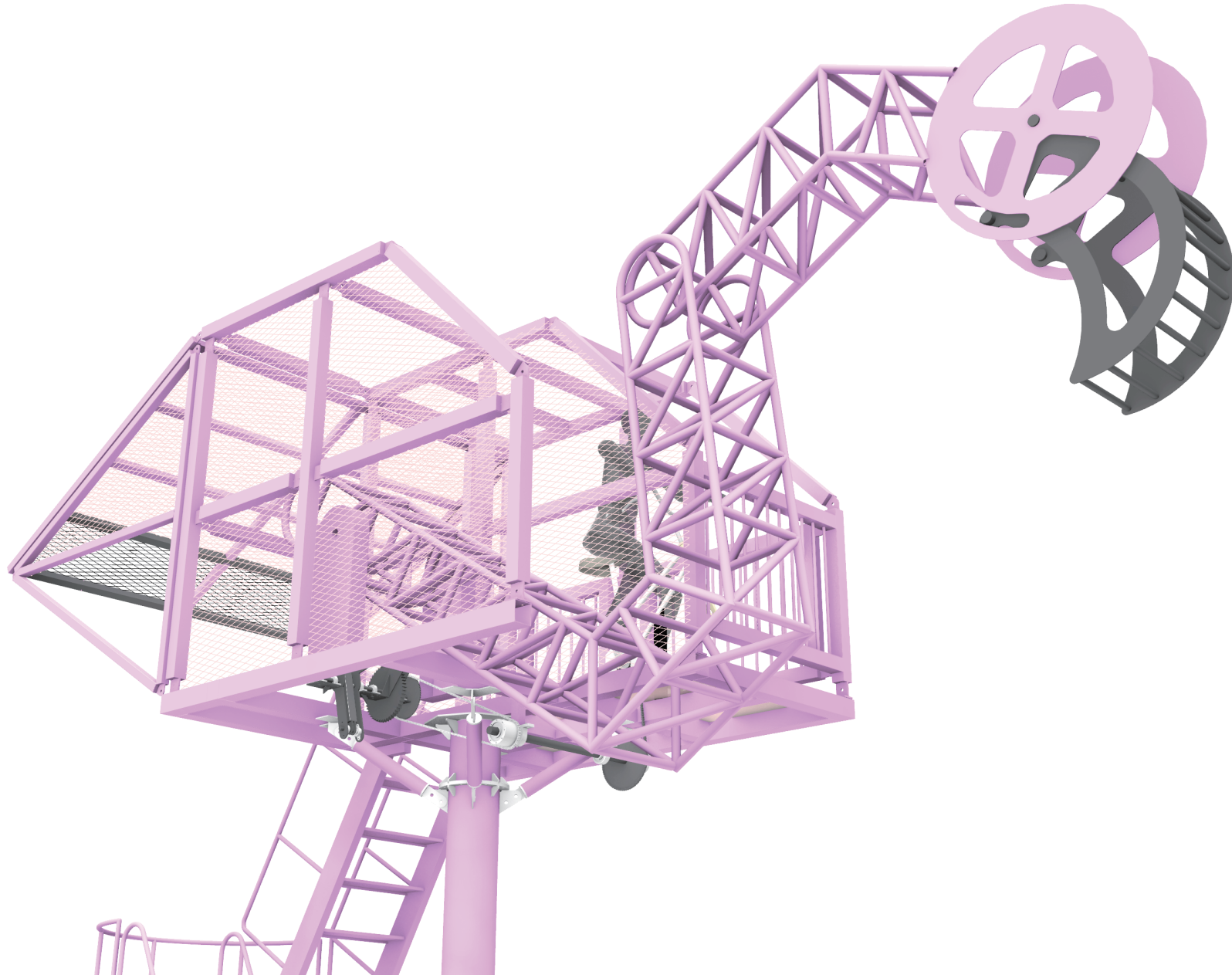
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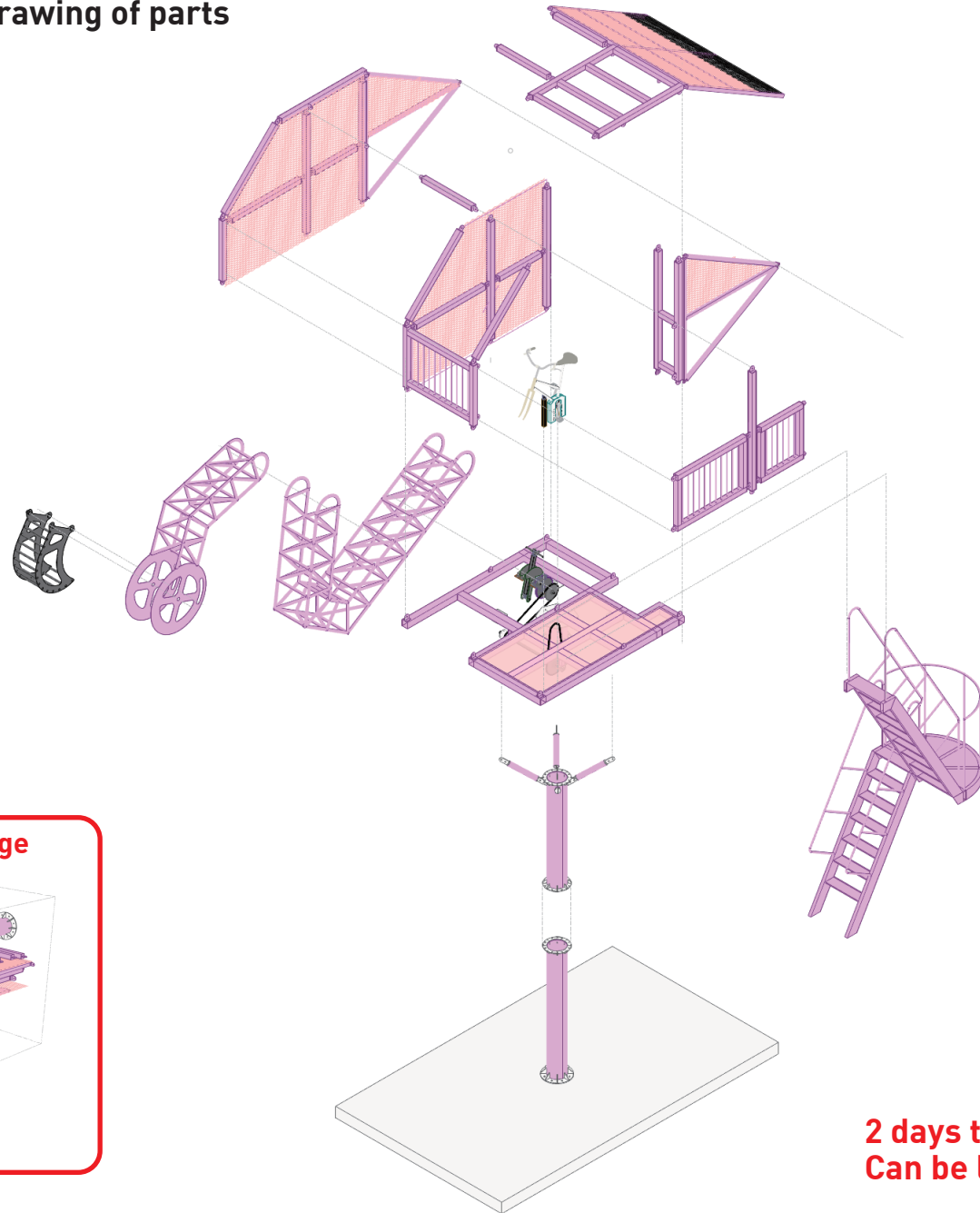
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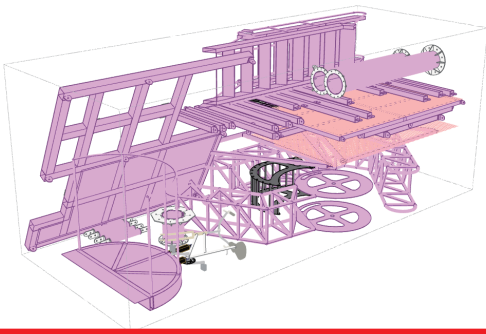
Artwork Concept Image



# Exploded drawing of parts



**20ft Container loading image**



**2 days to assemble.  
Can be loaded into a 20ft container.**

