24X7@PHL: Codify

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1. Introduction

"24X7ATPHL: Codify" is an investigation into the novel usage of time-based animation software and procedural modeling as a method for visualizing time-based quantitative data via the construction of a qualitative, two-dimensional rendering. Treated as an experiment in the extrusion and aggregation of time-based qualitative instances, "24X7ATPHL: Codify" slows down and composites the accumulated information of seven days traffic (customer pickup and drop off) at an international airport; visualizing information in such a way as to not only notate the generations and changes in patterns, but also to show the beauty that can be found in data while unlocking the emergent potential for design. "Codify" makes use of the accumulation of NURBS geometries as a methodology for understanding the specific conditions of movement created by the interaction of existing architecture and user, the results of which are currently being used to develop everything from the design of several furniture pieces to that of a new cladding system for the Philadelphia International Airport.

2. Data Articulation and Animation

The investigation began with the collection of basic user data from the Philadelphia International Airport, specifically the amounts of users being dropped off and picked up from the airport at sequential periods through a seven day cycle. Taken into account were issues of congestion, construction, bottlenecks, and other typical traffic-based disruptions.

The collected data operated as the set of parameters for both the generation and manipulation of a **POP Network** in Houdini 9. The birth rate of the particle system was regulated by the basic user data with the birth rate adjusted according to time of day and number of users, key framing sampled periods of time at sequential intervals on the timeline.

A NURBS sphere was constrained to the **POP Network** to give the particles a basic shape and volume, aiding both in their visualization (for tracking of movement) as well as for identifying shape deviations based on forces applied.

Dynamics in the form of **force POPs**, **attractor POPs**, **drag POPs**, and **spring SOPs** were applied to the construction as methods of notating conditions of congestion and bottlenecking, construction, and other anomalies that effected the flow of traffic both in and out of the airport.

Sequential frames of the completed simulation were then exported in IGES format using a **geometry ROP** for the purposes of rendering and post-processing using a combination of Bunkspeed Hypershot and Adobe Photoshop.

3. Qualitative Reconstruction: Accumulation

The sequential IGES files were imported into Rhinoceros and composited into one master file using a common reference point as a datum for the placement of each file, remembering that each IGES file notated one moment of time within the seven day sequence. The process of compositing accomplished the task of merging all of the different time segments into one time stream, a 2-D, time-lapse construction of the seven day cycle. In this vein we are no longer looking at individual frames but an aggregate, composited in such a way as to display a change of state over the seven day cycle. It is within this respect that the division of movement comes into play as the seemingly "random" determination of the number of sequences to be composited becomes more logical when the output is examined.

The resultant information was then examined by importing the master file into Bunkspeed Hypershot and rendering the result out as a composite animation, an aggregate render that combines each sequential IGES file into one construction.

4. Emergent Patterning

Several pattern "types" result from the analysis of the composite, each of which has countless potential towards varying types of architectural solutions from programmatic to formal gestures. In looking at the composite as a whole, we are clearly able to witness how the organization of elements within the whole shifts from start (at left) to finish (at right.) As all traffic moves from left to right within the analysis (and airport) we are able to determine where the moments of organized congestion, disorganized congestion, and freedom of movement occur. Potential new entrance and exit points can therefore be reprogrammed back into the animation in an attempt to balance or tune the model in such a way as to bring more regularity to the movement of users within the airport.

If we choose to look at the composite for its formal architectural merits (or potentials), we are able to witness several potential formal design logics. An example of this can be seen in the nature of the warping of the individual particles based on the forces present. At the left portion of the composite, we see several of the particles organizing into an overlapping pattern that could be translated into a cladding system of glass or metal whereby repetitive panels overlap one another in such a way as to (conceptually) reflect the dynamics of movement found in the composite while (physically) protecting users from the elements. These same geometries can also be plugged back into a new procedural model and used (along with other ergonomic parameters) towards the design of furniture that relfects the same geometric qualities.

5. Conclusion

"24X7ATPHL: Codify" is meant as an experiment into the visualization of qualitative data into quantitative output, using procedural modeling and time-based software to visualize complex data in ways not possible through other means. The potential outcomes of such visualization have massive ramifications on design potentials, from the logic of analysis and planning to the purely plutonic and graphic.

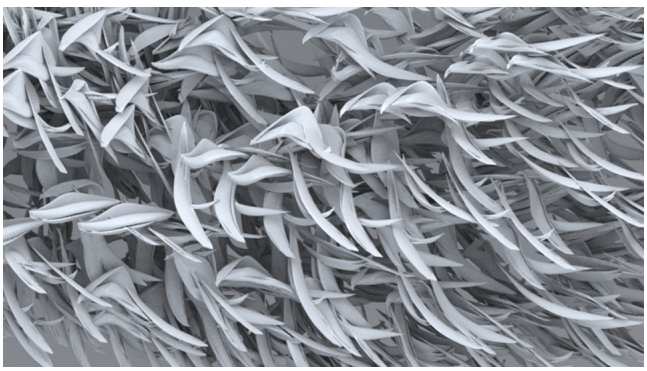

Figure 01 Rendered detail from "24X7@PHL: Codify."

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