FALL 2007 / ADVANCED DESIGN STUDIO / NEIL DENARI

AIR TIGHT

Shrinkwrapping Vague Things

CONTROL
Since the early 1990's, and the rise of a global digital culture, architecture has sought to both exploit and codify the possibilities of design and manufacturing processes controlled by computerization. First exposed as a set of new formal genres, somewhat removed from materialization, these processes and techniques are now converging toward an innovative landscape of scalefree environments, where industrial design, automotive production, and architecture are linked by shared formalisms, industrial prefabrication, and material usages. Indeed, while carbon fibre is too expensive to use on an architectural scale, and steel is too heavy for a hand-held device, the geometries that link these scales, (ie controlled curvatures, radial formal transitions, extrusions, part-to-whole assemblies,) are based on functional and aesthetic intent and the logic of material production. From injection molded plastic, to superformed aluminum, the product world is now a source of reflection for architecture and its more historically limited set of construction techniques.

SURFACE SMOOTHNESS: THE SEMI MONOCOQUE
This studio will focus on the architectural scale project and will largely focus on a limited range of formal and constructional systems. As a near one – to – one expression of its external surface, the semi/monocoque construction system will be the studio's main point of departure. Most widely used in the aerospace industry, this method produces highly efficient strength to weight ratios and is naturally geared toward resolving the complex surface geometry demanded by aerodynamic forces. Egg crates, diagrids, and Lamella surfaces are all related to the stringer – former system of linear elements, that along with a stressed skin, make up the elements of the Semi/Monocoque system.

THE INEVITABILITY OF SOLIDITY / form types
The studio will focus on two genres of formal production. We will research examples of work in all scales and will become highly familiar with the materials, histories, geometries, functions, and terminologies of each.

Global generic no 1
For at least the last fifteen years, the culture of architecture has embraced (exploited may be a more accurate term) the phenomenon of fluidity. As a real functional mandate or as a cultural paradigm (e.g. the world is fluxual and never fixed), fluidity has singlehandedly legitimized both formal and conceptual discourses developed within contemporary architecture. Indeed, fluidity has developed into a generic global technique whose various modes of representation speak to a wide array of intentions (difference, vagueness, incompleteness, fluxuality, continuity,etc). This studio will reinforce this broad expressionistic tendency, but will do so with an elevated set of logics and programmatic demands. As a material medium, architecture takes the state of solidity, thereby rendering the concept of fluidity as a rhetorical device that narrates a local functional demand or a much larger cultural ambition as stated above. As such, architecture's investigations into fluid shapemaking is always based on the inevitable discourse of weight and describable mass, recasting the fluid within the fixed. This, of course, is partly a brand of architecture that desires to be highly speculative, asking the occupant to behave like a wave or a particle, guided by lines and surfaces that hope to be simultaneously highly functional and graphically discursive.

Global generic no 2
While the concept of flow has sponsored a near holy grail search for highly descriptive and hopefully performative forms for contemporary life, industrial design has, in many ways, pursued an altogether different formal discourse, preferring to focus on a tighter set of dimensional and material imperitaves. Indeed brands like Apple and the Japanese company Plusminuszero have maintained a smooth modernism emanating from the work of Dieter Rams and Braun, for instance. With luminous materials and eased, radial corners, these products represent digital life stripped of the intent to express historical difference, certainly architecture's preferred method of overcompensating for its relative primitiveness.

Fluid phenomena

Liquids (water)
Do not keep their shape; they take the shape of the container they are in
They flow
Cannot be compressed (keep the same volume)

Gases (air)
Do not keep their shape; they completely fill the container that they are in
They flow; they spread out quickly or diffuse
Can be compressed (squashed into a much smaller volume)

PROJECT

Air Tight: The AIRBUS A380 / INTAKE EXPERIENCE

Reuters / August 17, 2007: **Singapore**: Singapore Airlines will take delivery of the first Airbus superjumbo A380, the world's biggest passenger plane, on Oct. 15, the airline said Thursday, ending a frustrating two-year wait that cost Airbus's parent, EADS, billions of dollars. The airline said it would pick up the superjumbo from EADS in Toulouse, France, and take it to Singapore to allow staff to familiarize themselves with the plane before the first flight on Oct. 25.

EADS's $16 billion program to produce a new class of mammoth plane encountered a variety of technical problems, most recently in fitting each jet's 500 kilometers of wiring. The difficulties plunged the Franco-German aerospace group into a financial crisis, promoting a management shakeup and 10,000 job cuts to save costs.

After a near-death business experience, Airbus has now been reborn through the long expected delivery of the A380. With its main competitor Boeing prospering over the last 10 years (delivering the 777 and the newish 737-900), Airbus had been in a kind of panic – mode, losing brand identity and customers at an unprecedented rate.

In order to more fully extend sales of the new A380, it has been determined that the brand identity of Airbus should be experienced in a highly controlled environment, that like the plane itself, is configured around the forces of fluidity and human movement. To accomplish this, the company has ordered the design of an immersive physical and mediated environment to be directly connected to a sales model version (full scale, fully operative) of the A380. Like a jetway connecting the departure lounge to the opening in the plane's fuselage, the IE (Intake experience) is a building that operates between architecture and industrial design. As this project will be situated in direct proximity to the plane (both of which are sitting inside a longspan industrial building located in Toulouse, France) the design will explore the concept of smooth- surface formmaking in relation to a highly engineered object whose form is based on forces (aerodynamics) much different than that of architecture (**teradynamics**…a word coined for this studio). Nonetheless, like air movement along a wing profile, the IE should conform itself to the site (the A380) and to the special dynamics of a specifically articulated program oriented toward experiential depth.

The IE will be approximately 7,000 sf of interior space. It's program will be based on "experience economy" principles where visitors (student groups, industrial designers, potential customers like commercial airlines, corporations, sheiks, etc.) are immersed in the "ideas and concepts" of Airbus design as a precursive experience before boarding the model jet. The program will focus on the movement and repose of the dynamic body and will include the design of a 2D graphic landscape painted onto the concrete floor of the hangar. Between this flat space and the robust but elegant forms of the aircraft, the IE will become fluid and solid all at once.

Airbus has asked that the project reflect in its material reality the precision of its industrial production. Therefore, the main structure and skin of the project must be metal (stainless steel, aluminum, titanium). All materials will be recycled from the waste generated during aircraft production. Other materials such as carbon graphite, composite ceramics, plastics, recycled rubber, silicone, and low iron glass will be required to complete the full material fit out of the project. The IE must be a refined object that takes advantage of the fact that it is a building that, somewhat ironically, doesn't have to deal with the elements (the exterior).

INTENT
There are two main intentions to this experiment. One, to work directly with material/structures from the inception of design. Indeed, a high degree of precision will be developed with regard to structural systems and patterns since fluid typologies of form inherently stresses controlled curvature and clear relationships between seams, joints, arcs, and radii on all edges and surfaces. Two, to work directly with a set of programs that are limited, somewhat malleable, yet are in need of precise resolution.

PRODUCTION
Each project will be completely resolved with full 2D and 3D printed material. Extensive use of laser cutters will be required with an appropriately scaled 3D print for the mide term and final reviews. Some powerpoint will be used for presenting. The studio will work with Rhino, Maya, Autocad, and Illustrator. Please be proficient with these applications. Some tutoring/seminar work will be available during the quarter.

PROJECT 1 INITIAL RESEARCH

a) AIRBUS Brand Research
The IE program will be based around the delivery of experiences for the visitor that explain informationally and environmentally how Airbus aircraft are designed and how they perform.
http://events.airbus.com/A380/Default1.aspx
http://www.airbus.com/en/
http://portal.aircraft-info.net/article8.html

b) Digital Site Model Production
Aircraft model should be purchased as a group (each student chips in) at:
http://www.turbosquid.com/Search/Index.cfm?FuseAction=ProcessSearch&intStartRow=1&intMediaType=2&istSearchKey=A380

Hangar size to be 300' x 300'. Walls, main trusses, and lights should be modeled. Clear span: truss depth should be 12.5'.

c) Material, Graphic And Construction Research
Images should include all aspects of various types of commercial aircraft (or as much of the A380 as you can find), from structure, to skin, to interior elements and graphics.

Material research

Aluminum
Robotics
Low Iron Glass
Acrylics / Polycarbonates

Airbus research

History
Toulouse
Current business climate
Brand image graphics

Construction research

Outsourcing of components
Assembly techniques
Airframe structures