Student Aircraft Builders

Mission

- A Hands on Engineering Opportunity
  We believe every engineering student should have the opportunity to be a part of an undergraduate project.
- Undergraduate Research
  We have received interest in the use of our Zenith as a research platform for Faculty and other projects on campus.
- Green Aviation
  We believe large changes need to come to the field of aviation, primarily in efficiency and cost. Electric aviation poses to be the future, with great advancements being made by NASA and teams like Pipistrel.
- Educational Outreach
  Our mission is to not only personally advance the field of aviation, but to also inspire others to do the same.

Who are the Student Aircraft Builders?

We are an interdisciplinary team of University of Illinois students dedicated to constructing kit aircraft. Like most student engineering projects, we are building and designing to a deadline, with the intention to prove our merit. Unfortunately, as we are pioneers in this venture, no standardized collegiate competition exists. We have, however, found something comparable. We aim to take home the Oskosh AirVenture 2014 Homebuilt Lindy Award.

Every engineering student should have the opportunity to work on an undergraduate project. Members will learn teamwork, organizational skills, administrative techniques, communicating and supporting ideas, time management, and most importantly, hands on experience in an engineering project. Engineering students are uniquely suited to construction projects on this scale. A baseline understanding of structural and fluid dynamic processes is critical for all engineering disciplines, especially Aerospace and Mechanical.

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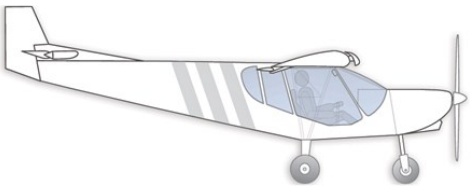
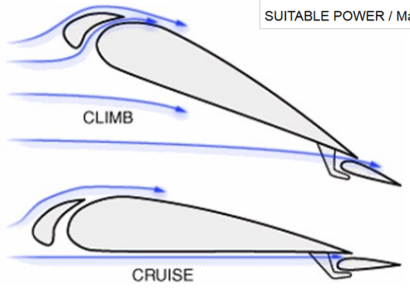
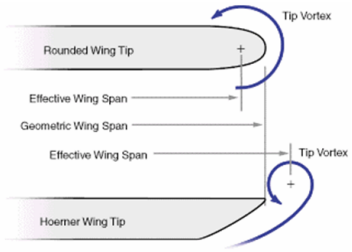
2013 – 2014 Project

Student Aircraft BUILDERS

SPECIFICATIONS	STOL CH 750	
(Based on factory prototype, equipped with 100-hp Continental O-200 powerplant)		
WING SPAN	29 FT. 10 In.	9.1 m.
HEIGHT (rudder tip)	8 Ft. 8 In.	2.6 m.
WING AREA	144 SQ.FT.	13.4 m.sq.
WING CHORD	4 Ft. 10 In.	1.5 m.
LENGTH	21 Ft. 10 In.	6.7 m.
HORIZONTAL TAIL SPAN	8 Ft. 5 In.	2.6 m.
HORIZONTAL TAIL AREA	22.2 Sq. Ft.	2.0 m.sq.
EMPTY WEIGHT	775 LBS.	350 kg.
DESIGN GROSS WEIGHT (Edition 2)	1,440 LBS.	652 kg.
GROSS WEIGHT (LSA Limit)	1,320 LBS.	600 kg.
USEFUL LOAD (LSA)	545 LBS.	250 kg.
WING LOADING (LSA)	9.15 LBS/FT²	44.8 m²
POWER LOADING (LSA)	13.2 LBS/BHP	6.0 kg/BHP
DESIGN LOAD FACTOR (ultimate)	+6 G / -3 G	
NEVER EXCEED SPEED (V_{NE})	125 MPH	200 km/h
CABIN WIDTH	42 INCHES	100 cm.
CABIN WIDTH (bubble doors)	50 INCHES	1.27 m.
FUEL CAPACITY (std., dual wing tanks)	24 US Gallons (2 x 12 gal.)	90 liters (2 x 45 liters)
SUITABLE POWER / Max Engine Weight	80 - 140 hp. / 300 lbs. installed	





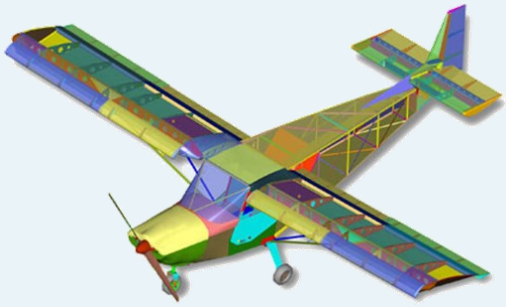


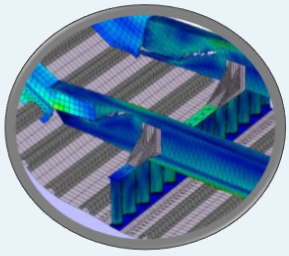
Construction Teams

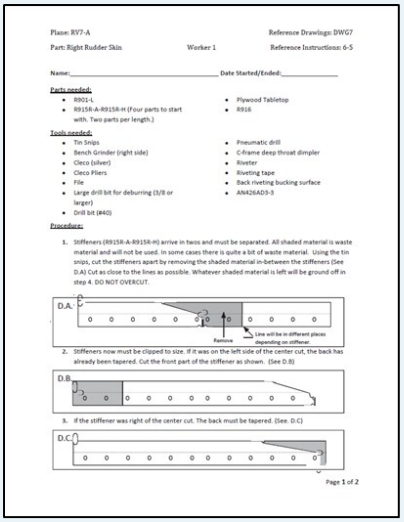
Computer Aided Design

Project Management

Build Team






Plane: RV7-A — Reference Drawings: DWG7
Part: Right Rudder Skin — Worker 1 — Reference Instructions: 6-5
Name:_____ Date Started/Ended:_____
Parts needed:
- R901-L
- R915R-A-R915R-H (Four parts to start with. Two parts per length.)
- Plywood Tabletop
- R916

Tools needed:
- Tin Snips
- Bench Grinder (right side)
- Cleco (silver)
- Cleco Pliers
- File
- Large drill bit for deburring (3/8 or larger)
- Drill bit (#40)
- Pneumatic drill
- C-frame deep throat dimpler
- Riveter
- Riveting tape
- Back riveting bucking surface
- AN426AD3-3

Procedure:
1. Stiffeners (R915R-A-R915R-H) arrive in twos and must be separated. All shaded material is waste material and will not be used. In some cases there is quite a bit of waste material. Using the tin snips, cut the stiffeners apart by removing the shaded material in-between the stiffeners (See D.A) Cut as close to the lines as possible. Whatever shaded material is left will be ground off in step 4. DO NOT OVERCUT.

D.A
Remove
Line will be in different places depending on stiffener.

2. Stiffeners now must be clipped to size. If it was on the left side of the center cut, the back has already been tapered. Cut the front part of the stiffener as shown. (See D.B)

D.B

3. If the stiffener was right of the center cut. The back must be tapered. (See. D.C)

D.C

Page 1 of 2

Build Process

Student Aircraft BUILDERS

NEW SUBSECTION!

CAD Team models prefabricated materials and theoretical assembled subsection

Project Manager and deputies create subsection instructions

Project Management Meeting

Presentation of assembly procedures to Build Management

Build Management Meeting

Build managers and foremen go over assembly in detail. Technical Project Manager present.

On-Campus Builder Briefing

Technical Project Manager and foremen brief builders using slideshow presentation hosted at lecture halls on campus.

Registration facilitated by the Project Coordinator

Construction ensues under supervision of foremen

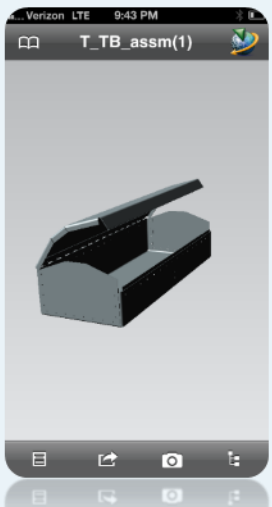
CAD Team

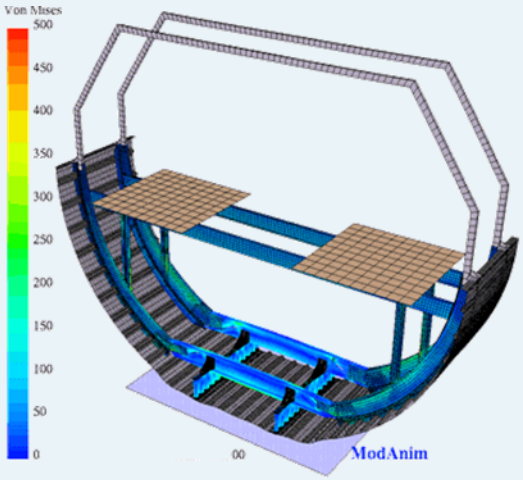
Project Management

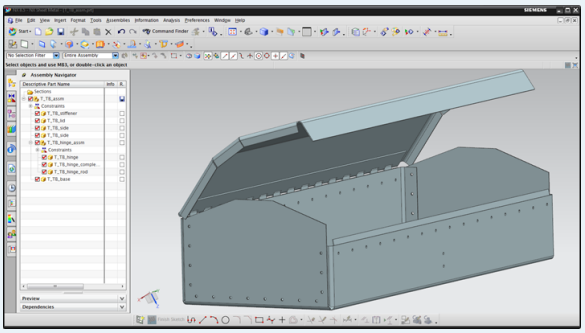
Build Management

CAD Team

The CAD team will act as a visual reference for both the project management and build team. The CAD team's objective are to teach students Pro Engineering / Creo Elements and NX (Unigraphics) and to provide additional assents to be explored by other projects such as augmented reality and mobile device based programs.







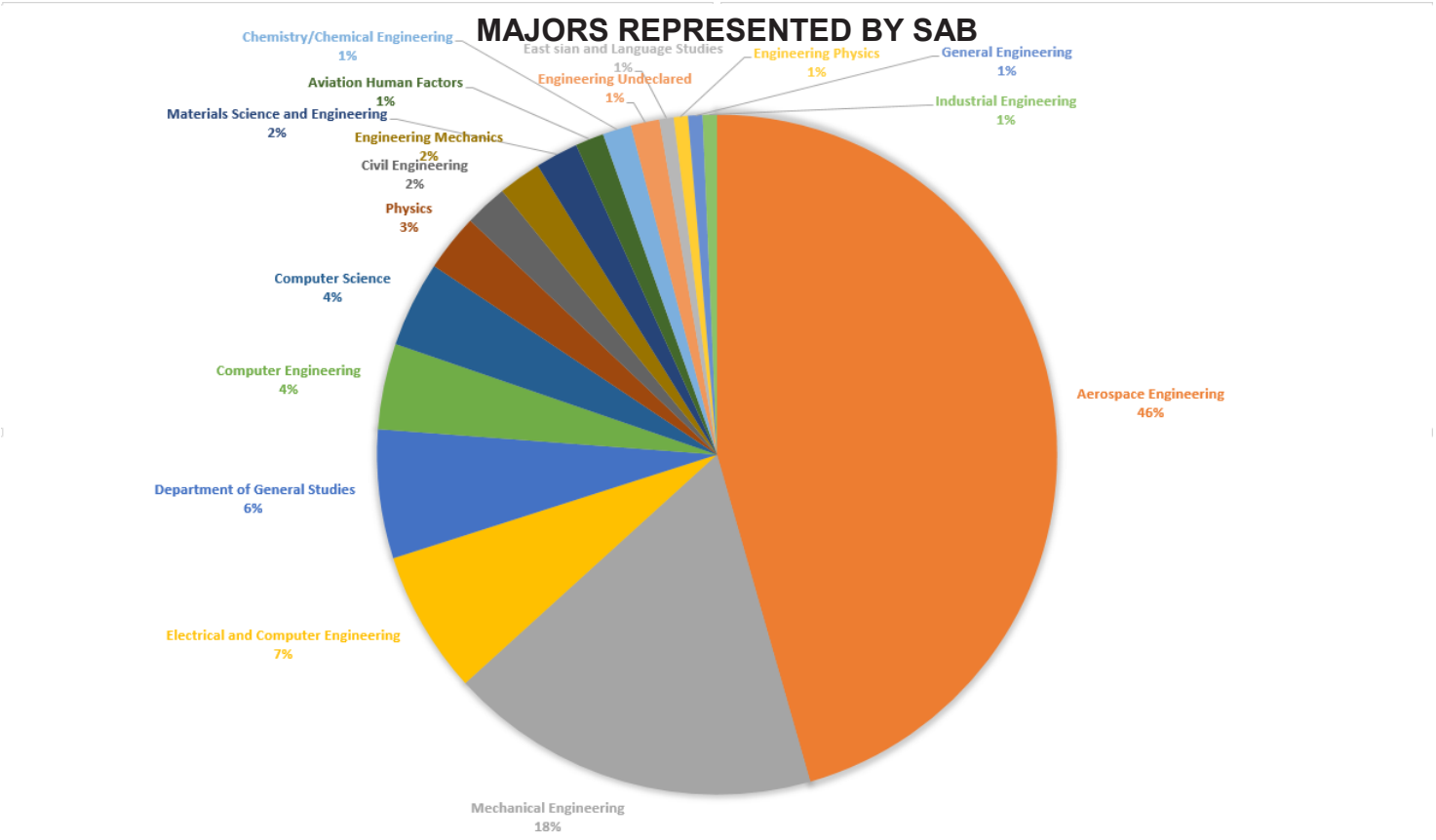
Project Management

The Project Management Team was created to tackle SAB's biggest struggle: with over 150 interested students, who do you make sure everyone has something to do? To solve this problem the project management team learns and implements techniques and programs used in industry to optimize a project or program. Members gain traditional project management experience and learn to break down a process into the absolute basics to best relay it to others. They develop public speaking and presentation skills as well as experience in industrial design and process improvement.

Build Team

The Build Team consists of ~80 students divided into three positions. Builders will be either a Build Manager, Foreman, or Builder. Build managers (~5 total) will implement new programs and respond to higher level issues. They are also responsible for procuring needed tools and equipment and will also operate as Foremen. Foremen (~15 total) supervise build sessions to ensure safety and provide assistance. Builders (~60 total) will have completed the training kit shown below. No entry level skills needed. The will receive detailed instructions on the relevant subsections courtesy of the project management team.

Builder Training Toolbox



Student Aircraft BUILDERS

Sponsorship Tier	Participating Sponsor	Bronze Sponsor	Silver Sponsor	Gold Sponsor	Orange & Blue Sponsor
Donation Amount	$250 to $999	$1,000 - $4,999	$5,000 - $9,999	$10,000 - $ 19,999	$20,000 +
Receive quarterly newsletter	●	●	●	●	●
Hyperlinked name on SAB's "Sponsor" webpage	●	●	●	●	●
Corporate logo on SAB's "Sponsor" webpage	●	●	●	●	●
Name and logo on booth at airshows		●	●	●	●
Name and logo on booth at Enginering Open House		●	●	●	●
Name on all student and member promotional material		●	●	●	●
Corporate logo on student and member promotional material			●	●	●
Corporate logo on SAB's homepage			●	●	●
Invitation to speak at one of two informational meetings held throughout the year. (Meeting will allow sponsor to speak on behalf of their organization for purposes of public image and recuitment)			●	●	●
Corporate recruiting material distributed at team events				●	●
Optional flight offered at University of Illinois Campus with finished aircraft				●	●
Professional Photo-shoot with airplane and team					●
Optional flight offered at place of choosing within Continental United States with finished aircraft					●
Logo Placement on Aircraft		Tier 0	Tier 1	Tier 2	Two Tier 2 Locations

As our project is entirely funded by Corporate, University, and Alumni donations WE NEED YOUR HELP!

We offer excellent sponsor exposure at all events and competitions as well as access to our talented engineers.

Sponsors will receive specific benefits as described on our Sponsorship Package above.

We are operating under the UIUC department of Aerospace Engineering, and as such we possess active 501(c) 3 status. Therefore all monetary donations, and many time and service or in-kind donations, are tax deductible. If you or your company are interested in becoming a sponsor, or have any inquiries about our project, please contact us at sab@ae.illinois.edu or go sab.ae.illinois.edu for more information.

Estimated Project Cost

Student Aircraft BUILDERS

Item	Cost
Zenith CH-750 kit and finishing kit	$ 15,000
Corvair	$ 6,500
Fixed pitch metal propeller (Sensenich)	$ 985
Firewall forward accessories	$ 5,000
Nav and landing lights/strobes	$ 745
VFR cross country avionics	$ 12,980
Basic electrical system	$ 700
Cushions/harnesses	$ 900
Professional paint	$ 3,000
Basic airframe tools and hangar equipment	$ 2,500
Concurrent construction tools	$ 500
To build a Zenith CH-650 (subtotal)	$ 46,110
Trip to AirVenture upon completion	$ 3,250
Meetings	$ 750
Estimated cost of project	$ 50,110

Current Liquid Funding $10,000

Zenith 2013 Timeline