

BLAINE AIRPORT PROMOTION GROUP

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8891 Airport Road C-2, Blaine MN. 55449
FIFTH YEAR OF PUBLICATION



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Optics in physics involves the properties of light usually describing the behavior of visible, ultraviolet and infrared light. Optical science is studied in many related disciplines that include astronomy, engineering, photography and medicine; ophthalmology and optometry.

An Arab by the name of Alhzen (Ibn al-Haytham) is said to be the father of optics when he wrote his *Book of Optic* in the early 11th century. Alhzen contribution included optics, astronomy, mathematics, meteorology, visual perception and scientific methods. The study has continued through the centuries to advance the understanding of optics bringing with it new technology in optical systems. Optics is a part of everyday life. Visual systems in biology play a central role in the science of what we know as our five senses and optical communication in the use of internet, cameras and modern telephone.

Invisible Adversaries

As new technologies were introduced and improved so did the need to adapt to changes brought about by developments in industry as well as the advent of aviation. During WWII long duration flights of up to 12 hours caused pilots and crew to experience vision problems. This un-explainable medical problem was solved when the connection was made to the extended exposure to radioluminescent paint invented in 1908. This new technology was used to paint aircraft instruments on flight decks to improve night vision while concealing the aircraft from detection.

High-Gs Deny Vital Oxygen to Eyes and Brain

Pilots reported mild experiences with acceleration forces as early as WW I. Pilots complained of blurred vision when pulling out of a dive or executing severe combat maneuvers. These G forces were not understood at the time.

Sustained acceleration, or high-Gs is a measurement of gravitational forces on the human body. High-G forces basically affects the cardiovascular system by increasing the distance blood flow travels from the heart to the eyes and brain due to stretching and elasticity of the veins and arteries of the pilots neck during high-G flight operations. The brain has only three to five seconds worth of stored oxygen; when depleted, anoxia occurs causing subtle change

during an actual shutting down of body function. By WW II greater measures had to be taken to protect the pilot and crew during momentary pull out of a dive or high-G turns. An anti-G suit was designed to prevent blood flow from leaving the bodies core providing a counter-pressure on the blood in the legs and abdomen. During high acceleration tests at Edwards and Holloman Air Force Base, test pilots would experience High-G tests proving that the human body could endure no more than 18 times the force of gravity.

Gravity Receptors

Acceleration will stimulate the otolith membranes located in the inner ear and send neural signals via the vestibulocochlear nerve to the brain. The eyes provide visual information about the position of the body while the otolith organs, along with nerves and muscles that control coordination and movement, maintain the body's balance. The otolith membranes are gravity receptors sensitive to gravitational changes during horizontal and vertical acceleration. When the body or head is tilted, that movement sends neural impulses to the brain to convey the new change of speed or direction of gravitational pull. When these membranes move subject to accelerated forces the movement can momentarily lead to disorientation. The forward acceleration of a take off at low-Gs can confuse the otolithic membranes that communicate information about the body's position in space. During takeoff a pilot can perceive a nose-high attitude when the airplane is actually near level or at moderate angle of attack. The brain is given a horizontal neural signal from the otolith of a change in linear movement toward the back of the head and will provide appropriate information for that position. Even though the airplane is at a slight angle of attack, the otolith membrane position will signal to the brain and identify it as an attack angle of 45° so the pilot must develop instrument discipline with frequent monitoring and trust of the information received from them.

Microgravity Research

Fifteen space stations have been in use for research starting in 1971. The International Space Station with over 36 long duration crews has been the most successful. Astronauts must exercise regularly to compensate for the 0-Gs weightless environment to keep muscle and bone density within normal ranges. Astronauts have already suffered vision problems after long tours in space. Early tests have not solved the problem of eye care and protection for long term exposure in microgravity environments.

Minneapolis, Minnesota Ophthalmologist, Dr. Richard Lindstrom, has been named to a NASA team of eye doctors to solve the questions about future space exploration and to solve why astronauts suffer severe vision problems. Dr. Lindstrom stated that "If we can not solve the vision problems associated with long term space travel in a microgravity environment, the Mission to Mars will not happen." The Mars mission is being planned for 2030, *STAR TRIBUNE • SCIENCE-HEALTH • FEBRUARY 1, 2015*

Discover Aviation Days May 30 & 31, 2015

Volunteer support is vital to the success of the key areas that will make this event grow and be a showcase of a functioning airport. The event is about educating the general public on values of aviation to the community and "Connecting Blaine with the World".

It takes an enormous amount of dedication and energy to put this event together and host it for the visitors. The many areas that require support will include Mail, Car-Parking, Kids Activities, Traffic Control, Event Set-Up, Aircraft Rides, Parade and many more.

This is a "Fly-In" event. Visitors come to see the airplanes. This is a great opportunity to show the range of aircraft that use the Blaine Airport. The two day event will allow the time and space to showcase your plane adding a special feature of aviation for public viewing.

The DAD organization will be asking for donations as a registered 501 c (3) non-profit organization. Also sponsorship packages are being made available for prospective sponsors. If you wish to sponsor or if you know of a business or organization that may be interested **please contact D.A.D.**

D.A.D. holds monthly meetings on the third
Thursday at 7:00 P.M.

www.discoveraviationdays.org

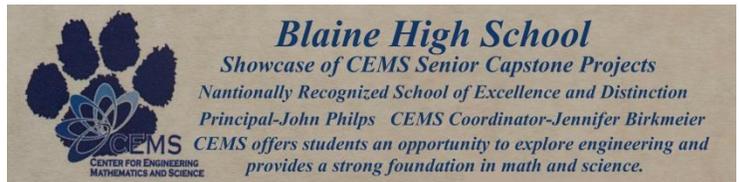
Location: Key Air



ALUMINUM OVERCAST EAA Chapter 237 June 16-18, 2015



Hosted by Chapter 237 at the Anoka County-Blaine Airport (KANE), the *Aluminum Overcast* proudly carries the colors of the 398th Bomb Group of World War II and commemorates B-17G #42-102516 which was shot down on its 34th mission over Le Manior, France, on August 13, 1944, and has been beautifully restored with financing from the veterans of the 398th Bomb Group. [EAA's](#) Chris Henry will present his "renowned" B-17 presentation on Wednesday evening, June 17th. Contact: Kirk Fjetland fjetfamily@msn.com



Capstone Project 2015

On February 26, 2015, senior students from Blaine High School's Center for Engineering, Mathematics, and Science presented their senior projects. Students in the CEMS research class worked in groups to create a new and innovative product. They worked with community and industry mentors to complete their projects. *JB*

Twenty-two teams each made three minute presentations in front of several hundred parents, teachers and special guests in the school's auditorium. During the presentations the students described their project, how their product was developed, its practical use and evaluation of the success and how the outcome of the project motivated them.

Following the auditorium presentation the students provided displays of their projects during a reception held in the school's cafeteria.

Photos provided by Jennifer Birkmeier-CEMS Coordinator



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ACHIEVMENTS IN ENGINEERING MATHEMATICS AND SCIENCE