JSC astronomers share stellar views with local students

Members of the Johnson Space Center Astronomical Society last month shared their enthusiasm for stargazing with the Clear Creek Independent School District Brookside Intermediate Science Club members.

After introductory explanations by Frank Cooper, former director of Burke Baker Planetarium, the students enthusiastically rushed out onto the darkened athletic field for a close-up view of the heavens. The students were particularly interested in getting a look at Jupiter and Saturn.

The eager observers lined up at the half-dozen telescopes Astronomical Society members had set up, but most chose to share their observations together by watching a live video feed using a standard 8mm video camera mounted on one of the instruments, an 8-inch Celestron telescope. The colorful bands on Jupiter's disc and several moons were easily seen. The most popular image was a closeup of Saturn and the band structure of its ring.

"For many of the students, this was their first experience viewing the skies through a telescope," said Kathy Johnson, science teacher and advisor to the Science Club. "Students, parents, and teachers were awestruck by the clarity of the views available to them in the magnificent telescopes."

NASA electrical engineer Tim Lawrence, a JSCAS member who participated in the event, remembers the impact of such telescopic views. "I remember, at the age of five, my first look through a telescope at the moon. That breathtaking experience launched my career with NASA. The JSCAS is composed of individuals with similar stories to tell, and we desire o give others the opportunity to have the same breathtaking experience."

This was the second opportunity in 1999 for the Brookside Science Club members to benefit from the knowledge and generosity of their NASA neighbors. At a recent meeting under the direction of Mike Laible, a NASA volunteer, 150 students constructed rubber band-powered airplanes made from balsa strips and tissue paper, culminating in a test flight for accuracy.

The Brookside Science Club meets monthly for 90 minutes after school. Those interested in sharing their expertise on science with the club may contact Johnson at 281-482-9710.

The JSCAS is an association of amateur astronomers dedicated to the study and enjoyment of astronomy. The club supports special interest groups, holds public star parties and hosts special events like the Brookside Intermediate star party. Besides Brookside, JSCAS has held special event star parties and made presentations to teacher conferences, elementary schools, and Boy Scout and Girl Scout troops. The club holds public star parties on a regular basis at Moody Gardens and Challenger Park.

The club usually meets at 7:30 p.m. on the second Friday of the month at the Lunar and Planetary Institute, 3600 Bay Area Boulevard. The club is open to anyone interested in astronomy. No dues are charged.

For more information and a complete calendar of events visit the JSCAS Web site at http://www.ghg.net/cbr/jscas/ ■

NASA JSC Photo S99-15580

Tim Lawrence, a member of the Johnson Space Center Astronomical Society, talks to Science Club members at the Brookside Intermediate star party. The sixth, seventh and eighth-grade students caught a glimpse of Jupiter and Saturn on a TV monitor with the use of Lawrence's telescope.

Benefits realized from new maintenance philosophy

It's a better, faster, and more economical approach to maintain everything from pumps to aircraft to spacecraft to submarines. The Navy uses it to evaluate the designs of all new ships. The electric utility industry has been using it since 1991 in both substations and line maintenance. NASA has long used it to analyze the space shuttle and shuttle support systems. And since the early 1990s, NASA has used it as a philosophy to maintain facilities and equipment.

It's called Reliability-Centered Maintenance or RCM. This unique method of maintaining equipment to ensure availability at the lowest possible cost was first documented in a book written by two airline industry executives and published in 1978. The authors proposed an approach to maintaining aircraft based on developing a maintenance program that assured the maximum safety and reliability of equipment at the lowest cost.

NASA facilities officials initiated RCM at JSC six years ago. Since April 1997, Brown and Root Services Pioneer has implemented this program under a fixed price contract. Under the terms of the contract, BRSP is responsible for maintaining all facilities as well as facility-based and some user equipment across JSC, including Ellington Field and the Sonny Carter Training Facility.

Under RCM, proactive maintenance costs may increase, but overall availability and reliability of equipment also increases. As a result, profit margins also increase.

Such has been the experience at JSC. Equipment availability and reliability across the center has increased. Since RCM was implemented under BRSP, monthly routine trouble calls on equipment have dropped by 50 percent.

A NASA Headquarters-sponsored consultant, William Steele of Enviro-Management & Research, Inc., recently visited JSC to assess the center's RCM program. Preliminary results were very favorable. In fact, at the time of the evaluation this past September, JSC scored the highest rating among all of the NASA centers included in the assessment.

NASA JSC Photo S99-15013 by James Blair

Brown and Root Services Pioneer employee Zane Patterson conducts a vibration test on a chiller in Bldg. 48.

"Reliability-Centered Maintenance at JSC has been extremely successful due in part to the expertise, dedication and priority Brown and Root Services Pioneer, in conjunction with NASA-JSC, has placed on the program's implementation," said Beth Humphries, NASA division chief, Facilities Engineering Division. "This is an example of partnering efforts between government and contractor which result in programs that are technically sound, cost-effective and mutually beneficial."

Steele evaluated JSC in eight areas including maintenance philosophy, performance measurements, program organization, preventive maintenance, and training and development. His evaluation states that RCM is the "cornerstone" of JSC's maintenance and repair program.

RCM requires a shift in mindset for personnel that maintain facilities and equipment, from focusing on reparative maintenance – maintaining equipment according to a predetermined schedule and repairing or replacing items when they fail – to a more proactive maintenance approach using high-tech monitoring processes including vibration analysis and infrared thermography to monitor the state of equipment to predict failures and schedule corrective maintenance before failures occur.

"In the past, maintenance was performed on time-based intervals," said Doug Conover, NASA facility engineer and RCM lead for JSC. "It is apparent that varying usage of the same types of equipment results in different life spans and requires different applications of maintenance techniques."

Also, the mission criticality of equipment plays an important role in the degree of maintenance needed. One piece of equipment that is not used as much as another could require less maintenance. "Effective maintenance practices using the RCM philosophy result in cost-effective maintenance that places the focus on critical equipment run times instead of a strict time-based preventive maintenance program," said Conover.

A key element of RCM is condition monitoring – continuous or periodic monitoring and diagnosis of systems to forecast equipment failures. Also called predictive maintenance, condition monitoring can be useful in averting costly unplanned equipment failures and the resulting downtime.

"For years, we made heroes out of those mechanics who could get equipment back on line the quickest," said Wayne Powell, BRSP RCM manager at JSC. "Most of the time they did not look to see what caused the equipment to fail. So down the road the equipment would fail again. Under RCM, the hero is the one who can stop the failure mode from happening.

"With RCM, we are watching trends and monitoring degradation points. And when repairs are needed, they can be planned and performed during off-hours so that we don't impact use of the equipment."

Since contract inception more than two years ago, BRSP has invested $1 million to train its people in RCM processes and procedures and to purchase the hardware and software necessary to conduct RCM for the center. BRSP operations and maintenance personnel had to go through RCM training, which taught them the importance of predictive testing and inspection techniques to prevent unplanned failure. ■