

# ***SPINOFFS***

Spinoffs are relatively short learning modules inspired by the LTAs. They can be easily implemented to support student learning in courses ranging from prealgebra through calculus. The Spinoffs typically give students an opportunity to use mathematics in a real world context.

LTA - SPINOFF 10A                      Exploring how NASA's Automated Window Inspection Device (AWID) Uses the Rectangular Coordinate System to Track Defects

LTA - SPINOFF 10B      Analyzing the Cost Effectiveness of NASA's Automated Window Inspection Device (AWID)

**Lynnell Mathews** - AMATYC Writing Team Member  
Howard Community College, Columbia, **Maryland**.  
(Currently at Bowie State University in Bowie, Maryland)

**Cyrus McCarter** - AMATYC Writing Team Member  
Wake Technical Community College, Raleigh, **North Carolina**

**Ric Adams** - NASA Scientist/Engineer  
Kennedy Space Center, **Florida**



## Project Grant Team

**John S. Pazdar**  
Project Director  
Capital Comm-Tech College  
Hartford, Connecticut

**Peter A. Wursthorn**  
Principal Investigator  
Capital Comm-Tech College  
Hartford, Connecticut

This project was supported, in part, by the  
**National Science Foundation**  
Opinions expressed are those of the authors  
and not necessarily those of the Foundation

**Patricia L. Hirschy**  
Principal Investigator  
Asnuntuck Comm-Tech College  
Enfield, Connecticut

## **SPINOFF 10B**

### **Analyzing the Cost Effectiveness of NASA's Automated Window Inspection Device (AWID)**

#### **Introduction**

The Automated Window Inspection Device (AWID) was designed primarily to provide a better way for scanning the Orbiter's windows after each mission. Previously, the technicians had to spend hours cleaning surface grime from the windows before they could even start looking for defects in them. Checking for defects was done with a jeweler's loop and many difficult hours of careful examination. Even with a great deal of diligence, defects were missed. The process begged for automation and better technology. The AWID provided the solution. While doing so, it also saved a great deal of time and labor.

Using some rough approximations, you will calculate some of the savings in time and labor from using the AWID.

#### **Assignment**

Reread the AWID Background handout. Assume a technician cleaning or inspecting an Orbiter window works 8 hours each day and, with benefits, makes approximately \$23.35 per hour.

- 1) How many windows are on the Orbiter ?
- 2) How many technician-hours does it take to clean and polish the windows?
- 3) How many technician-hours does it take to inspect all the windows?
- 4) With the assumptions above, how much does it cost to manually inspect the Orbiter windows?
- 5) How many total hours would it take two technicians to clean, polish and inspect the windows?  
How many days is this for the two technicians?

Suppose it takes two technicians about 1 hour to install and 1 hour to remove the AWID from each window.

- 6) How many technician-hours does it take for the AWID to be installed and removed from all the Orbiter windows?
- 7) How much does it cost to pay the technicians to install and remove the AWID from all the Orbiter windows?
- 8) How many days would it take two technicians using the AWID to install the AWID and inspect the windows?
- 9) If NASA continues to launch Shuttles at the present rate, what will be the differences in total time and total labor cost between manual and AWID inspection of the windows each year?