

## Dynamic Design: The Clean Room

## Putting It All Together

### TEACHER GUIDE

### BACKGROUND INFORMATION

In this assessment, students revisit many of the concepts addressed in this module. The ultimate goal is for the student teams to complete the assembly of the array frame that you began in the “Working Together” activity. They will begin by using a spread sheet to plan the procedures for obtaining the hardware that they need, washing the various pieces and assembling the array. A sample scoring rubric is provided for you to score the three main performance tasks and the one product. This should be provided to students before they start planning during procedure one of the student activity.



Johnson Space Center

### NATIONAL SCIENCE STANDARDS ADDRESSED

#### Grades 5-8

##### [Science As Inquiry](#)

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

##### [Science and Technology](#)

- Abilities of technological design
- Understandings about science and technology

##### [Science in Personal and Social Perspectives](#)

- Science technology and society

#### Grades 9-12

##### [Science As Inquiry](#)

- Abilities Necessary to do scientific inquiry
- Understandings about scientific inquiry

##### [Science and Technology](#)

- Abilities of technological design
- Understandings about science and technology

### ASSESSMENT STANDARDS

Standard B: [Achievement and opportunity to learn science must be assessed](#)

Standard C: [The Technical quality of the data collected is well matched to the decisions and actions taken on the basis of their interpretation](#)

Assessment tasks are authentic

Standard D: [Assessment practices must be fair](#)

(View a full text of the [National Science Education Standards](#).)

### MATERIALS

For each student:

- Latex gloves

For each group of three students:

Procedure 1:

- Spreadsheet or paper for planning the activity
- Student Activity, "[Putting It All Together](#)"
- Student Text, "[Maintaining Clean](#)"
- Scoring Rubric

Procedure 2:

- Plastic tub for washing components
- Plastic bowl to simulate cascade tank
- Paper cut-outs of wafers see [Teacher Tools](#), various colors available for groups
- Scissors
- Color coding labels (19 mm diameter)
- Color coding labels (6.25 mm diameter)
- Forceps
- Paper towels
- Tissue paper (optional)

Procedure 3:

- Completed Student Recording Sheets "Collector Layout" from "Mapping it Out"
- Array chart paper from "Working Together"

## PROCEDURE

1. Explain to students that this activity is the assessment for the module and that throughout the activity each group will be scored based on a rubric. Distribute the student activity sheet and the grading rubric. Ask students to read these sheets and as a group, write down any questions they may have.
2. After groups have had time to generate questions have one person in the group ask the questions to the whole class. Provide answers to these questions if no one else in the class can answer them. Have them consider what they would do differently in order to be more effective array assemblers.
3. Provide the spreadsheet or paper for the data table and instruct students to begin with procedure one. Groups should have their plan approved by you before moving on to procedure two. Circulate around the room, facilitate by asking questions based on the progress of each group. Once a group has its plans ready. Read and approve or make suggestions. Use the scoring rubric to score each plan. Once approved, distribute gloves to the group and allow them to proceed to procedure two. Make other materials available that will be needed for the second procedure.
4. Again as time permits, circulate around the room and observe the progress of the student groups. Students should call you to their area when they are ready to demonstrate the washing procedure. For the knowledge section of the washing details, call on students at random and ask questions to assess this area. Once you have scored the washing ask the group to proceed to procedure three.

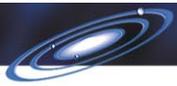
### Alternate Strategy Tip

Two weeks before the Genesis payload team was to start installing the real flight collector wafers, they found that a few of the wafers were more fragile than expected. Specifically, the wafers coated with aluminum and with gold had such thin layers of coating that the wafer tweezers would immediately scrape off the coating as soon as they tried to pick up the wafers that might be used.

Simulate this occurrence by asking students to think about how they would have to modify the vertical installation if, at the last minute they were given a fragile wafer (tissue paper which tears easily)—and how this would change their procedure. Some students might consider a horizontal installation. Ask how they might place the fragile wafer onto the frame without tearing it.

Once students have completed this change in procedure, ask questions similar to the following:

1. As a result of the last minute change in procedures:
  - a. Identify steps that were made easier as a result of the change.
  - b. Identify steps that were made more difficult as a result of the change.
2. Describe circumstances from your everyday life where plans have been changed and adaptations have been made. What were the results?



5. Finally observe the simulated assembly of the collector arrays scoring each group using the rubric.
6. Once groups have been scored on all three procedures, have them roll up the array and map, place their names on it and present to you for the final grading category.
7. Ask students for suggestions for more efficient completion of any other tasks that they “practiced” in previous activities.