



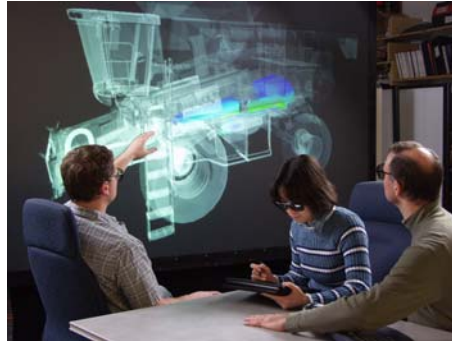
# Biomass Program

## Multi-Component Harvesting of Wheat Straw

Using wheat straw as a feedstock for producing materials, fuels, and chemicals has been limited due to obstacles that include capital costs, energy consumption, waste streams, production logistics, and the quality of the biomass feedstock. The objective of this project is to develop commercially-viable technologies that will potentially overcome these barriers and enable the use of wheat residues as an inexpensive feedstock resource.

Researchers will focus on the development of single-pass harvesting equipment that selectively harvests multiple crop components, and on plant science and engineering to optimize sugar production.

The wheat straw and grain will be more effectively harvested with the single-pass, multi-component harvester. The combination of an advanced sensor and control system with a modified harvester will enable the in-field separation of desired plant components (e.g., grain and select straw fractions) from the undesired components. The undesired components will be returned to the field where they will add to the soil nutrient content.



**Design team discusses multi-component harvester virtual model.**

### R&D Pathway

Expand the engineering understanding of today's grain harvesters through high-speed imagery/visualization, computational modeling, and virtual engineering techniques; and apply this new understanding to the engineering and development of a single-pass, multi-component harvester controlled by an autonomous intelligent control system. Research in plant science (e.g., gene regulation) will be undertaken to optimize the processing of wheat components into low-cost sugars that can then be more easily converted into useful chemicals and fuels.

## Feedstock R&D

### Benefits

- Enable wheat straw that would normally go to waste to be used for energy, fuels and biomaterials production

### Applications

The development of virtual reality-based modeling and design tools will support the engineering design of a single-pass, multi-component harvester.

### Project Participants

Iowa State University  
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### Project Period

FY 2003 – FY 2006

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