Integration of FBTol into CADKEY

Federal Manufacturing & Technologies

C. W. Brown

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Final Report/Project Accomplishments Summary

CRADA Number 97KCP1051

Approved for public release; distribution is unlimited.

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Honeywell

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Date: 4/14/2000

Revision: 1

A. Parties

The project is a relationship between

Honeywell FM&T

CADKEY (formally Baystate Tech.)

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B. Background

A well-known but unsolved issue among CAD (Computer-Aided Design) modelers is

their inability to advance the representation of non-shape information beyond the confines of decorative annotations. Experts recognized that this issue is the missing piece toward achieving both true product modeling and toward satisfying advanced solid-based applications' requirement for an enhanced representation of meaningful non-shape attributes -- particularly product tolerances. Feature-Based Tolerancing (FBTol) is an enabling component technology that augments solid-based systems with a complete and unambiguous representation of tolerances. No commercial CAD system on the market contains the capabilities that FM&T's (Federal Manufacturing & Technologies) FBTol technology provides.

This project was needed to infuse additional quality into the design of manufacturable products. Ensuring the quality of tolerance designs before delivery of designs will avoid significant costs encountered if errors were to be found later in the product life cycle. The union of CADKEY and FBTol will aid in product design defect detection and provide downstream applications with explicit non-shape information.

CADKEY Corporation President, Bob Bean, contacted Honeywell FM&T when CADKEY was planning to enhance their Draft-Pak package and subsequently their CAD product with solid modeling capability. He recognized FBTol as a unique component technology. Based upon shared visits, it was realized that the technologies would complement each other and the results of a joint project would be mutually beneficial to both companies.

CADKEY provided their strengths in mid-range CAD development while gaining key functionality in the areas of tolerancing and design features from FM&T's component technologies. The Nuclear Weapons Complex (NWC) and FM&T will gain a robust value-cost commercial CAD system to generate FBTol-enabled solid models in support of both design and downstream agile manufacturing applications such as FM&T's FBMach (Feature-Based Machining) and Rapid Product Validation efforts. Furthermore, American industry will gain, within the recognized value-leader CAD package, a means to generate FBTol-enabled solid models for the next generation of product-model applications.

C. Description

The purpose of this CRADA is to implement FM&T's unique FBTol component technology into CADKEY Corporation's commercial CAD product. The role of FM&T and CADKEY were as joint developers. CADKEY enhanced their CAD product with FM&T's GeMS++ (Generic Memory Structures ++) technology to more readily accept FM&T's FBTol. FM&T developed a FBTol add-on to CADKEY. The CRADA consisted of four phases; due to DOE funding cuts significant portions of three phases were completed. As mentioned previously, significant results include an enhanced version of CADKEY using FM&T's GeMS++ technology, a CADKEY parametric design feature tree, and an FBTol CADKEY add-on. Note: FBTol's foundation is also GeMS++.

D. Expected Economic Impact

CADKEY was directly benefited with FM&T technology. The future release of CADKEY

20 will be based on FM&T's GeMS++ technology. Through the CRADA, CADKEY received emphasize to develop their parametric design feature capability and CADKEY will be able to soon claim the first CAD system with intelligent tolerancing via FBTol technology. Revenue impact to CADKEY is initiating. Expected benefits to the consumer come from a value-based complete and unambiguous product modeler with intelligent tolerancing resulting in cost avoidance during manufacturing, inspection, and assembly.

E. Benefits to DOE

Processes to ensure the quality of model-based designs were improved. The assurance helped FM&T become a leader within the NWC in model-based design and manufacturing. The partnership with CADKEY has significantly improved the FBTol and GeMS++ technology to be "production" worthy. Improvements to FBTol technology have allowed FM&T and the NWC to develop model-based designs better, resulting in cheaper and faster production cycles. FM&T would still have been involved in this type of technology; however, the partnership has progressed the technology into a deployable state. It is encouraged to share the capabilities of both FBTol and GeMS++ to the public as licensable products.

F. Industry Area

Results from this project could directly benefit all mechanical design and manufacturing.

G. Project Status

The project was terminated early due to DOE funding issues. The final phase, Phase IV, was not completed.

H. Point of Contact for Project Information

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I. Company Size and Point of Contact

CADKEY Corporation is a privately held, Boston-area company founded in 1989. The company is a leading developer of PC-based, professional mechanical Computer-Aided Design (CAD) software used by designers and manufacturers worldwide since 1985. CADKEY has 50 to 70 employees. Annual sales are unknown.

CADKEY contact:

John Ryan

CADKEY Product Line Manager

Tel: 508 229-2020 x182

Fax: 508 229-2121

J. Project Examples

K. Technology Commercialization

L. Release of Information

I have reviewed the attached Project Accomplishment Summary prepared by Honeywell FM&T and agree that the information about our CRADA may be released for external distribution.

Original signed by May 3, 2000

Name: John Ryan Date

Organization: CADKEY Corporation

Title: CADKEY Product Line Manager