Machine Tool User Cylindrical Die Rolling

Performance Support System

Federal Manufacturing & Technologies

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Final Report/Project Accomplishments Summary

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P. O. Box 419159

Kansas City, Missouri

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Revision: 0

A. Parties

The project is a relationship between:

AlliedSignal FM&T

Kinefac Corporation

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PO Box 419159

Worcester, Massachusetts

Kansas City, MO 64141-6159

01603-1260

B. Background

Kinefac Corporation is the pioneer in the machine tool cylindrical die rolling process. This is an older technology process that provides major productivity and material savings benefits and is widely accepted in the fastener industry. It has, however, achieved only limited application in other industrial areas. As technological advancements occur in the machine tool industry, informing potential user industries of new capabilities remains paramount for machine tool manufacturers. Kinefac Corporation needed a method for matching tool development needs with machine capabilities in a quick, accurate, and efficient manner.

AlliedSignal Federal Manufacturing & Technology's (ASFM&T)'s technical skills in designing and developing interactive multimedia products provided a solid basis for developing a computer-based performance support system to meet Kinefac's need. The program focuses on providing information about the cylindrical die rolling process to design and manufacturing engineers, in potential user industries. It provides background information about the die rolling process design requirements and identifies, using part parameters, the Kinefac machines capable of producing specific tools using the cylindrical die rolling process.

Kinefac Corporation provided expertise in part specification parameters required for assessing production capabilities and machine availability. Teamed with AlliedSignal Federal Manufacturing & Technologies' (ASFM&T's) designing skills, the partnership produced a highly effective performance support system.

C. Description

This project was initiated to provide the machine tool industry and the DOE a method for evaluating educating potential users about various aspects of the cylindrical die rolling process including:

- characteristics of the cylindrical die rolling processes,
- major productivity and material savings benefits,
- advantages for use in the fastener industry,
- production capabilities based on part parameters,
- production capabilities based on machine specifications.

ASFM&T utilized data provided by Kinefac Corporation to develop an interactive performance support system. AlliedSignal developed one complete branch of the program and Kinefac will develop the remaining two branches. Macromedia Authorware version 3.5 and Microsoft Access version 7.0 were selected for development tools. These

software tools maximize continued program development ease and program management with future machine technology advancements. Using this authoring tool and the external database resulted in development of a product that has many potential uses within the manufacturing industry. Source code for the product can be used as a template for other applications.is reusable and can provide potential solutions to non-manufacturing needs. The final product will be released on CD-ROM.

D. Expected Economic Impact

The final performance support system, released on CD-ROM, makes wide distribution of the program possible. This will significantly increase Kinefac Corporation's capabilities for expanding their potential user base and providing information of technological advancements in the die rolling machine tool industry. The design of the program also allows Kinefac to modify the program in foreign languages to meet industrial needs abroad.

As environmental issues have become a key focal point in industries, Kinefac Corporation has answered these concerns through the die rolling process. Because this process compresses metals rather than cutting them, there is less material waste due to metal shavings. There is also less need for recycling of these production materials. Therefore, issues of excessive water consumption and material disposal have been alleviated. The performance support system educates users of these benefits. The process has also been refined to maximize tool development by minimizing production time. This system will provide users with specifications on production times as defined by the part, process, and machine. This will increase productivity while reducing design time.

E. Benefits to DOE

This project resulted in the development of a versatile and easily modifiable performance support tool that can be adapted for and applied to other machine tool processes within the DOE. Similar tools could be developed based on this prototype which could provide electro-mechanical engineers and product designers with a means for determining the best machine tools and machine tool processes to use for any machining application.

While it is unknown whether DOE currently takes advantage of Kinefac's cylindrical die rolling process, a potential benefit of this project exists in the area of ES&H. Because the cylindrical die rolling process creates far less waste than most machining operations and because it can eliminate the need to saw or sand metal, this process may be the best choice for manufacturing certain nuclear and nonnuclear parts, resulting in reduced health

risks. This performance support tool can be used by DOE design engineers to determine the feasibility of using the die rolling process for manufacturing parts made of potentially toxic or hazardous materials. For example, an electromechanical engineer at Los Alamos can use this tool to determine if she/he can use the die rolling process can be used for manufacturing a part made out of beryllium. Since beryllium is most dangerous in its airborne form and the die rolling process reduces airborne particle emissions in the machining process, selection of the die rolling process a Kinefac machine for some products may reduce a health risk while also meeting the engineer's design specifications for the part.

This product will enhance the DOE's ability to respond to design changes and requirements for the weapons industry by helping design engineers identify the most efficient machine tool for producing certain machined parts.

Additionally, benefits to DOE include enabling U.S. Government purchasers of machine tools to increase productivity and environmental benefits based on the effective application of cylindrical die rolling processes in place of older and more traditional practices of shaping metal by cutting and grinding.

F. Industry Area

Manufacturing (including Automotive, Aerospace, Machine Tool). The machine tool industry would be expected to benefit from this project by using the PSS product to determine the best machine tool to use for manufacturing certain parts. This PSS can also be used as a model for future "expert" systems which, in turn, can be used by machinists and engineers in the industry for determining the best machine tool for the specified part among all the possible machine tools available. Since the source code is re-usable, the program technology can be easily modified for use by other machine tool companies as well as other manufacturing industries.

G. Project Status

The AlliedSignal completed the Helical/Thread path has been completed on schedule. Other paths will be completed by Kinefac. The program and accompanying documents will be delivered on CD ROM to Kinefac Corporation on schedule.

H. Point of Contact for Project Information

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I. Company Size and Point of Contact

Kinefac Corporation

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Worcester, Massachusetts 01603-1260

Number of Employees: 150

Howard Greis, President

Phone: (508) 754-6891 ext. 668

Fax: (508) 756-5342

Charles Garniewicz, Program Point-of-Contact

Phone: (508) 754-6891 ext. 642

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J. Project Examples

The program is available on CD-ROM.

K. Technology Commercialization

No commercialization of this product is expected.