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14. ABSTRACT The T55 jet engine used in the CH-47 Chinook helicopter contains either the T712 (Figure #1) or the T714 (Figure #2) compressor rotor. After so long, these compressor rotors need rebuilt to original equipment manufacturers (OEM) specifications. Corpus Christi Army Depot's (CCAD) current process requires numerous set-ups resulting in a turn around time of 15 to 16 hours to completely refurbish the compressor rotor. Due to a change in compressor rotors from the T712 (Figure #1) to the T714 (Figure #2), CCAD is in need of a grinding center to reduce the cycle time and to accommodate the addition of a 17.5" shroud which is not present on the T712 (Figure #1). The National Center for Defense Manufacturing and Machining (NCDMM) was requested to evaluate the current process and provide a total grinding solution for the process. This solution is to eliminate the multiple set-ups and reduce the current cycle time to allow 4 to 5 assemblies be ground per day.					
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T55 Compressor Rotor Turn Time Reduction – Phase I

NCDMM Project No. 06-0107-08

PROBLEM / OBJECTIVE

The T55 jet engine used in the CH-47 Chinook helicopter contains either the T712 (Figure #1) or the T714 (Figure #2) compressor rotor. After so long, these compressor rotors need rebuilt to original equipment manufacturers (OEM) specifications. Corpus Christi Army Depot's (CCAD) current process requires numerous set-ups resulting in a turn around time of 15 to 16 hours to completely refurbish the compressor rotor. Due to a change in compressor rotors from the T712 (Figure #1) to the T714 (Figure #2), CCAD is in need of a grinding center to reduce the cycle time and to accommodate the addition of a 17.5" shroud which is not present on the T712 (Figure #1).

The National Center for Defense Manufacturing and Machining (NCDMM) was requested to evaluate the current process and provide a total grinding solution for the process. This solution is to eliminate the multiple set-ups and reduce the current cycle time to allow 4 to 5 assemblies be ground per day.

ACCOMPLISHMENTS / PAYOFF



Figure #1
T712 Compressor
Rotor Assembly



Figure #2
T714 Compressor
Rotor Assembly

Process Improvement

Due to the uniqueness of the operation along with the size of the compressor rotor assembly, very few state-of-the-art machine choices exist. Danobat Machine Tool Company manufactures a complete line of machines specifically for blade tip grinding. The Dantip R1 400/600 CNC High Speed Grinding, Deburring and Measuring Machine (Figure #3) is one option chosen for this operation. The second option is a Hardinge supplied Kellenberger Kel-Varia grinding machine/Marpos gauging system combination (Figure #4). Both options offer quality and reliability in the field of grinding.



Figure #3
Danobat



Figure #4
Kellenberger

Implementation and Technology Transfer

The Danobat solution requires only one set-up resulting in a cycle time of approximately 3 hours per assembly. The Kellenberger/Marpos combination requires at least two set-ups due to the off-line gauging system resulting in a cycle time of 7 to 8 hours per assembly.

By implementing one of the above solutions, CCAD will have the ability to increase their production of the T712 and T714 compressor rotors to meet the needs of today's warfighters.

Expected Benefits

Expected Cost/Time Savings:

The Danobat solution, with a cost of nearly \$1.2M, generates annual savings of \$162,500 machining 100 units/year. This results in a 7.3-year payback.

The Kellenberger/Marpos solution, with a cost of nearly \$850K, generates annual savings of \$112,500 machining 100 units/year. This results in a 7.5-year payback.

TIME LINE / MILESTONE

Start Date.....November 06
End Date.....April 07

PROJECT FUNDING

NCDMM Funding.....\$40K

PARTICIPANTS

Danobat Machine Tool Company
Hardinge Inc.
NCDMM

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