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Quarterly Report 9/30/03

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October 2, 2003

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Development of a Rolling Process Design Tool for Use in Improving Hot Roll Slab Recovery

Lawrence Livermore National Laboratory

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Quarterly Report: Q4 FY03

LLNL Input

In this quarter, LLNL personnel traveled to the Alcoa Technical Center to discuss the current status of simulations and experiments. The previously noted deficiencies of the fracture model were discussed in detail as were ways to improve its functional form to ensure reasonable behavior over a wide range of pressures and strain rates. Additional experiments to calibrate the model at low strain rates and high triaxiality were reviewed. We expect that ATC will provide the refined fracture model to LLNL shortly. Once available, appropriate modifications will be made in the FEM subroutines, and the validation process for the fracture model will continue.

A simulation is being performed to validate the FEM model for a production facility mill configuration. The current focus is on the evolution of the deformed slab shape with increasing number of reduction passes. A detailed comparison of the slab side profile with experimental results is currently being carried out to identify key parameters controlling the simulated shape. Preliminary results show that the friction model plays a dominant role in the intermediate and final profile shapes. Using details of the deformed shape as a validation metric, additional simulations will be performed to optimize parameter values.

AlcoaInput

ProtectedCRADAInformation

QuarterlyReport –AlcoaContract74518,DevelopmentofArollingProcessDesign Tool

FromJuly1,2003toSeptember30,2003

- Completedadditionaltorsionfracturedataandlowerstrainratetensilefracturedata ofAlcoa's5xxxalloy.ThesetwosetsofdatawillenableAlcoapersonneltodevelop anadvancedfracturelimitdiagramsin4Q,2003forLLNLmodelinguse.
- LLNLteamvisitedAlcoaCenteronAugust25and26,andhadsuccessfully implementedaversionofALE3DtoAlcoaparallelcomputingsystem.Thevisitalso generatedadditionalinterestofusingsuchtoolstodescribetheevolutionofedge profilesofrolledslabs.

Note:

1. AlcoaproprietarydatameansthedatawasdevelopedbyAlcoabeforethis CRADAactivitystarted
2. ProtectedCRADAinformationmeansAlcoadatawasproducedinperformance ofthisCRADAproject.Thisdatacannotbereleasedfor5years
3. AlldatageneratedbyLLNLunderthisCRADAprojectisrestrictedunderthe rulesgovernedby“ProtectedCRADADData”

DOEF4600.6
(09-94)
Replaces EIA -459F
All Other Editions Are Obsolete

OMB Control No.
1910-0400
U.S. DEPARTMENT OF ENERGY
FEDERAL ASSISTANCE PROGRAM/PROJECT STATUS REPORT

OMB Burden Disclosure Statement

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1. Program/Project Identification No.	2. Program/Project Title Development of a Rolling Process Design Tool for Use in Improving Hot Roll Slab Recovery	3. Reporting Period 6/01/03 through
4. Name and Address PI: Richard Couch; Lawrence Livermore National Laboratory; Livermore, CA 94550		5. Program/Project Start Date 06/01/01
		6. Completion Date 05/31/04
7. Approach Changes <input checked="" type="checkbox"/> None		
8. Performance Variances, Accomplishments, or Problems <input checked="" type="checkbox"/> None		
9. Open Items <input checked="" type="checkbox"/> None		
10. Status Assessment and Forecast <input checked="" type="checkbox"/> No Deviation from Plan is Expected		
11. Description of Attachments		

☒ None

12. Signature of Recipient and Date

13. Signature of U.S. Department of Energy (DOE) Reviewing Representative and

U.S.DepartmentofEnergy
MilestoneLog

**DevelopmentofaRollingProcessDesignToolforUseinImprovingHotRollSlab
Recovery**

IdentificationNumber	Description	PlannedCompletion Date	ActualCompletionDate
1.	Constitutivemodeldefined: PQ3	3/02	3/02
2.	Fracturemodeldefined:PQ5	9/02	9/02
3.	Frictionmodeldefined:PQ3	3/02	3/02
4.	Finiteelementmodel constructed:PQ4	6/02	6/02
5.	Rollingdataproduced:PQ6	12/02	12/02
6.	Initialcodevalidationstudies completed:PQ8	6/03	6/03
7.	Validatemodelsina productionconfiguration: PQ10	12/03	
8.	Completeparameterstudy: PQ12	6/04	