## Project Interim Progress Report (Rapport d’avancement de project intérimaire) July 1, 2016 - January 31, 2017 Please submit by January 16, 2017 (Attn: Joanne O’Connor [management@nserc-canrimt.org](mailto:management@nserc-canrimt.org))

## Instructions

*This progress report, updated milestones**and the Form 300 are required as a condition of research funding support from the sponsors of the NSERC CANRIMT.* ***Please report for activity in the current reporting period only.***

**SUMMARY**

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| **THEME IV: *Adaptive Tooling/Processes & Novel Manufacturing Processes/Applications*** | | | | | | **Leader/ Chef:**  *(Veldhuis, McMaster)* | | |
| **PROJECT** **IV.B.8: Development of Lubricating Multilayer PVD Coatings for Machining of Al-Si Alloys** | | | | | | **Leader/ Chef:**  *(Veldhuis, McMaster)* | | |
| **PROJECT DURATION/DURÉE DU PROJET : 4 years (Starting July 2017)** | | | | | | | | |
| **STATUS/STATUT:** *(****Milestones*** *to be updated by each Project Leader)* | | | | | | | | |
| **Ahead of Schedule** |  | **On Schedule** | **X** | **Delayed** |  | | **Cancelled** |  |

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| **PROJECT DESCRIPTION/ DESCRIPTION DU PROJECT**  (*Brief description in point form, including role of project in Theme.)* |
| * This research project will investigate the wear behaviour of various multilayer (hard/lubricating) coatings during the machining of Al-Si alloys where the Si content is 8-16 %, leading to high levels of abrasion. * Investigations on the surface integrity of the machined part will also be done. |

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| **PROJECT OBJECTIVES & METHODOLOGY/ OBJECTIFS DU PROJET & MÉTHODOLOGIE**  *(Include alignment with Network objectives.)* |
| * In this project the coating architecture will be developed to address two major wear mechanisms: built-up edge formation and intensive abrasion. * Special lubricating materials will be developed for deposition on the surface of tooling to reduce sticking of workpiece materials on tools. |

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| **1. RESEARCH TEAM/ ÉQUIPE DE RECHERCHE** *(Summary for the current reporting period)* |

**1a: Research Personnel (Supervisors, Co-Supervisors, Collaborators)/   
Personnel de recherche**

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| --- | --- | --- | --- | --- |
| *Name, given name/ Nom., prénom* | *Organization/ Organisation* | *Sup./Co-Sup./*  *Collaborator* | *E-mail/Courriel* | *Phone No./ Téléphone* |
| Stephen C. Veldhuis | McMaster | Sup. | [veldhu@mcmaster.ca](mailto:veldhu@mcmaster.ca) | 905 525 9140  Ext. 27044 |
| J. Endrino | Cranfield University | Collaborator | [j.l.endrino@cranfield.ac.uk](mailto:j.l.endrino@cranfield.ac.uk) | +44 (0)  1234 752931 |

**1b: Students, Postdoctoral Fellows, Research Assist./  
Assoc./Eng., Technical/Professional, Guests** *(from outside Ontario; from outside Canada)***/  
Étudiants, Boursier de recherches postdoctorales, assistants, techniciens et invites** *(invite hors Ontario; hors Canada)*

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| *Name, given name/ Nom., prénom* | *Position* | *Organization/ Organisation* | *Name/Nom. (S) or /ou (C)\** | *Start/ Début* | *End/ Fin* | *CANRIMT Salary/Mo incl ben.* | *Extern. funding amount* | *Extern funding source* |
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| Sushant Rawal | Postdoc | McMaster | Stephen C. Veldhuis (S) | July 2016 |  |  | 4200 | SONAMI  (FedDev) |
| German Fox-Rabinovich | Research  Associate | McMaster University | Stephen C. Veldhuis (S) | Mar  2003 |  | 5333 | 5310 | SONAMI  (FedDev) |

***\*(S) – Supervisor  
 (C) – Co-Supervisor***

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| **TOTAL #** | **BASc** | **MASc/**  **M.Eng.** | **Ph.D.** | **PDF** | **Res. Asst.** | **Res. Assoc.** | **Res. Eng.** | **Tech./ Prof.** | **Guests/ outside Ontario** | **Guests/ outside Canada** |
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**1c: Partners & Contributions/   
Partenaires et Contributions**

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| --- | --- | --- | --- | --- | --- | --- |
| *Organization / Organisation* | *Acronym/ Acronyme* | *Contact* | *Cash/ Espèce* | *In-Kind/ Nature* | *Overhead/ Frais généraux* | *Total* |
| Honda  McMaster-Veldhuis Projects |  | Mark Earle | 120,000 | 152,500 | 30,000 | 150,000 |

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| **2. RESEARCH PLAN FOR THE CURRENT PERIOD/PLAN DE RECHERCHE POUR  LA PÉRIOD ACTUELLE** *(Please list both the technical objectives, methodologies and milestones as stated in the previous report.)* |
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| **3. ALIGNMENT OF RESEARCH PROJECT WITH NETWORK OBJECTIVES/ ALIGNEMENT DU PROJET DE RECHERCHE AVEC LES OBJECTIFS DU RÉSEAU** *( Please comment on the alignment of the research project with the overall Network objectives.)* |
| * Research will draw heavily off of work done in IV.B.5. Studies will include comparative wear performance tests involving various coated tooling during the face milling operation of high Si content alloy. * Opportunities for incorporating lubricious layers on tooling will be explored in other projects as well. * The role of surface lubricity will be incorporated in the virtual environment as well to allow manufacturing engineers to identify opportunities to improve performance. |

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| **4. PROBLEMS and RESOLUTIONS/ PROBLEMES ET SOLUTIONS PROPOSÉES** *( Please summarize any problems arising during the current reporting period and their resolution or plans for resolution.)* |
| *Problem/ Problème:*  *Resolution / Résolution:* |

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| **5. RESEARCH PROGRESS and RESULTS/ PROGRÈS DE LA RECHERCHE et RESULTATS:** *(Summarize progress and results below.)* |

**5a: MILESTONES/ÉTAPES**  
*Summarize progress on milestones – including % completed – as outlined in the Research Plan for the current reporting period and any modifications since the last reporting period.* *(Milestones document also to be updated for each project.)*

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| **MILESTONE/ ÉTAPE:** **Literature review assessment of current coatings used for machining Al alloys and abrasive materials** | |
| **Progress:**  **Modifications:** | |
| **% Completed/ Rempli** | **0%** |

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| **MILESTONE/ ÉTAPE:** **Production and characterization of coatings using bench top testing for lubricity, hardness and fatigue resistance.** | |
| **Progress:**  **Modifications:** | |
| **% Completed/ Rempli** | **0%** |

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| **MILESTONE/ ÉTAPE:** **Production and lab-scale machining testing and validation of coating performance** | |
| **Progress:**  **Modifications:** | |
| **% Completed/ Rempli** | **0%** |

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| **MILESTONE/ ÉTAPE: Implementation at industry partner site and publication of results** | |
| **Progress:**  **Modifications:** | |
| **% Completed/ Rempli** | **0%** |

**5b: PUBLICATIONS and PRESENTATIONS / PUBLICATIONS ET PRESENTATIONS**

*Please list all publications directly arising from Network-funded research during the current period. Do not include abstracts.*

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| ***A: REFEREED CONTRIBUTIONS - ARTICLES***  *Include articles in refereed publications – please specify whether the article has been submitted (S), accepted (A) or published (P).* | | | |
| Last Name, Initial | *Year* | *Title, Journal, Volume* | *Status* |
|  |  |  |  |
| ***B: REFEREED CONTRIBUTIONS - OTHER***  *Include papers in refereed conference proceedings, letters, notes, communications, review articles, monographs, books, book chapters and government publications.* | | | |
| Last Name, Initial | *Year* | *Description* | *Status* |
|  |  | Conference Title, Location and Date (Status: Invited, Not invited) |  |
|  |  | Journal/Book/Publication Title (Status: S-submitted; A-accepted; P-published) |  |
| ***C: NON-REFEREED CONTRIBUTIONS***  *Include papers in non-refereed conference proceedings, papers, letters and review articles.* | | | |
| Last Name, Initial | *Year* | *Description* | |
|  |  | Conference Title, Location and Date | |
|  |  | Journal/Book/Publication Title | |
| ***D: SPECIALIZED PUBLICATIONS - PRESENTATIONS***  *Include theses, presentations, industrial/technical reports, internal reports, discussions of abstracts and symposium records.* | | | |
| Last Name, Initial | *Year* | *Description* | |
|  |  | Thesis or Conference Title, Location and Date | |
|  |  | Journal/Book/Publication Title | |
| ***E: PUBLICATIONS –  Not originally funded by NSERC CANRIMT but continuing or completed with Network funding*** | | | |
| Last Name, Initial | *Year* | *Description/Title* ***(include start date of NSERC CANRIMT funding)*** | |
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| ***F: PUBLICATIONS – Not funded by NSERC CANRIMT but related to the Network research focus*** | | | |
| Last Name, Initial | *Year* | *Description/Title* | |
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**5c: PATENTS and LICENSES/ BREVETS ET LICENSES**

*Non-disclosure agreements signed, patent applications filed, patents issued, copyrights, licenses under negotiation, licenses granted, etc.*

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| *Category* | *Owner* | *Description* |
|  |  |  |

**5d: OTHER COMMUNICATIONS, AWARDS/ AUTRES COMMUNICATIONS, PRIX**

*Provide information on additional communications related to your work, such as awards and distinctions, news stories, interviews, public forums, press releases, etc. for the current reporting period (please provide copies or links.)*

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| *Name, given name/ Nom, prénom* | *Details* | *Date* | *Link or copy attached* |
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| **6. TRAINING/ FORMATION** *(Describe the extent of cross-network and partner involvement in training for the current reporting period.)* |
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| **7. RESEARCH PLAN FOR NEXT 6 MONTHS/ PLAN DE RECHERCHE POUR LES 6 PROCHAINS MOIS***(Describe Planned Research Activities for the next 6 month period and include any modifications made during the current reporting period.); also please list both the technical objectives and milestones.)* |
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**8. OPTIONAL – Comments, Questions and/or Feedback/  
OPTION – Commentaires, questions et/ou des commentaires**

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| *Include any supplemental comments or questions pertaining to the Network here.* |
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**9. NETWORK EVENTS ATTENDED or SUGGESTIONS /  
ÉVÉNEMENTS RÉSEAU ONT ASSISTÉ ou SUGGESTIONS**

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| *Please list any Network-related events attended and include comments and suggestions for events which may be helpful and informative for Network members to attend in future.* | |
| *Event* | *Comments/Suggestions* |
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