RESEARCH OVERVIEW

CURRENT WBC-FUNDED RESEARCH

CURRENT PROJECTS ORGANIZED PER SITE IN ALPHABETICAL ORDER.

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
AUBURN UNIVERSITY					
O-07-PE: *Understanding the Fundamental Influence of Wood Extractives on Wood*					
AUBURN UNIVERSITY: S. Peresin S. Gururaja **OREGON STATE:** J. Nairn J. Simonsen **VIRGINA TECH:** C. Frazier **STUDENT:** Diego Cuartas	**IAB TC LEADS:** Bob Breyer, Bakelite Bill Leggate, DAF • Arclin • Bakelite • DAF • FPL • Hexion • ~~Oxiquim~~ • WVCO	10/27/2022	1/1/2023	Expected 12/31/2024	**Year 1 / 2:** $53,206 **Year 2 / 2:** $55,000 **Total-to-date: $108,206** Expected Request: $0
O-02-VI: *Monitoring Phenol Formaldehyde and Wax Content with Vis/Nir Smartphone Technology* ***(new)***					
AUBURN UNIVERSITY: B. Via **STUDENT:** Seth Adusei	**IAB TC LEADS:** Chris Wren, Hexion • Arclin • Bakelite • DAF • Freres • Hexion • ~~Oxiquim~~ • WVCO	10/27/2022	1/1/2023	Expected 12/31/2023	**Year 1 / 1:** $10,500 **Total-to-date: $10,500** Expected Request: $0
OREGON STATE UNIVERSITY					
P-02-MU: *Modeling of Edge Bending for Mass Timber Products*					
OREGON STATE: Lech Muszynski John Nairn **STUDENT:** TBD	**IAB TC LEAD:** Danny Way, Boise • Boise • Hexion • Roseburg • Freres • Bakelite	4/27/23	10/1/2023	Expected 12/31/25	**Year 1 / 2:** $60,565 **Total-to-date: $60,565** Expected Request: **Year 2 / 2: $70,000 (Spring 2024)**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
P-03-PR: *Identifying maximum tolerance and mechanisms of interaction for two common resins systems and two fire retardant treatments*					
OREGON STATE: Gerald Presley John Simonsen John Nairn **STUDENT:** Shane Johnson, MS	**IAB TC LEAD:** Tim Zattau, Roseburg • Arclin • Bakelite • Hexion • Roseburg • WVCO	4/27/23	10/1/2023	Expected 12/31/24	**Year 1 / 1:** $37,127 **Total-to-date: $37,127** Expected Request: $0
BOISE-22: *Using Notch Delamination to Study Moisture-Adhesive Interactions*					
OREGON STATE: A. Sinha J. Nairn **STUDENT:** Samuel Ayeni, MS. Elizabeth Israel, MS.	**IAB TC LEAD:** Danny Way, Boise • Boise • Freres	10/27/2022	11/1/2022	Expected 2024	**Year 1 / 2:** $56,000 **Year 2/2:** $51,000 **Total-to-date: $107,000** Expected Request: $0
O-09-SC: *Near-Infrared Hyperspectral Imaging and Chemometric Techniques for Estimation of Percent Wood Failure (PWF) in Adhesive Bonds* ***(new)***					
OREGON STATE: L. Schimleck L. Muszynski **STUDENT:** Ighoyivwi Onakpoma, MS	**IAB TC LEAD:** Darren Riedlinger, Arclin • Arclin • Bakelite • Boise • FPL • Freres • DAF • Hexion • ~~Oxiquim~~	10/27/2022	11/1/2022	Expected 2023	**Year 1 / 1:** $7,108 **Total-to-date: $7,108** Expected Request: $0
N-02-MU: *Long-Term Response of Wood-Based Composites in Variable Climate Conditions*					
OREGON STATE: L. Muszynski J. Nairn M. Riggio **STUDENT:** Oluwafunbi Adeleye, MS	**IAB TC LEAD:** Danny Way, Boise • LP • Freres • WVCO • Bakelite • Oxiquim	10/14/2021	11/1/2021	Expected 10/31/2023	**Year 1 / 2:** $55,000 **Year 2/2:** $55,000 **Total-to-date: $110,000** Expected Request $0

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
VIRGINIA TECH					
M-04-FR: *Wax Migration*					
VIRGINIA TECH: C. Frazier STUDENT: JC Stant	**IAB TC LEAD:** Jesse Paris, WVCO • Bakelite • LP • WVCO	8/27/20	TBD	2 years after start	**Year 1 /2:** $51,372* **Year 2/ 2:** $48,372 **Total-to-date: $102,744** Expected Request: $0
I-29-FR: *Fundamentals in Resole Formulation**					
VIRGINIA TECH: C. Frazier **STUDENT:** Ryan Gray, PhD **Project suspended until further notice*	**IAB TC LEAD:** Todd Miller, Hexion • Arclin • Bakelite • Hexion • ~~Oxiquim~~ • WVCO	5/17/17	1/5/18	Expected 1/4/22	**Year 1:** $45,558 **Year 2:** $45,558 **Year 3:** $45,558 **Year 4:** $52,965 **Total-to-date: $189,639** Expected Request: $0
I-28-FR: *Wood Thermochemistry**					
VIRGINIA TECH: C. Frazier **STUDENT:** ~~Sara Yazdi, PhD~~ TBD **Project suspended until further notice*	**IAB TC LEAD:** Darren Riedlinger, Arclin • Arclin • Bakelite • WVCO	10/24/17	1/15/19	Expected 12/2022	**Year 1 / 4:** $46,558 **Year 2 / 4:** $46,558 **Year 3 / 4:** $53,965 **Year 4 / 4:** $53,966 **Total-to-date: $201,047** Expected Request: $0
I-10-FR: *Carbon Isotope Ratios: Novel View of CH_2O Emissions*					
VIRGINIA TECH: C. Frazier STUDENT: ~~Niloofar Shivyari, MS~~ Mark Cashman, PhD	**IAB TC LEAD:** Todd Miller, Hexion • Arclin • Freres • Bakelite • Hexion • ~~Oxiquim~~ • WVCO	10/13/16	1/10/17	Expected 5/14/22	**Part A (Shivyari):** **Year 1:** $45,180 **Year 2:** $45,180 **Year 3:** $45,180 **Year 4:** $45,180 **Part B (Cashman):** **Year 5:** $0 **Year 6:** $33,145 **Total-to-date: $213,865** Expected Request: $0

COMPLETED RESEARCH

PROJECTS HAVE PRESENTED FINAL REPORT. ORGANIZED PER SITE IN ALPHABETICAL ORDER

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
AUBURN UNIVERSITY					
K-03-PE: *EFFECT OF NANOFIBRILLATED CELLULOSE (CNF) AT THE WOOD-BASED MATRIX/RESIN INTERFACE*					
Auburn: M. Soledad Peresin Brian Via STUDENT: M. Celeste Iglesias, PhD Philip McMichael, BS	**IAB TC LEAD:** Bob Breyer, G-P Chemicals • Arauco • Arclin • G-P Chemicals • Hexion • LP • Roseburg • WVCO	9/27/18	2/10/19	Expected 12/31/20	Year 1: $33,219 **Total-to-date: $33,219** Expected Future Request: $0
MICHIGAN STATE UNIVERSITY					
O-05-NE: *A Fundamental Study of Lignin Reaction with Formaldehyde*					
MICHIGAN STATE: M. Nejad & T. Wang **STUDENT:** Debnath Debkumar	**IAB TC LEADS:** Sudip Chowdhury, WVCO • Arclin • Hexion • ~~Oxiquim~~ WVCO	10/27/2022	11/1/2022	Expected 12/31/2023	**Year 1 / 1:** $30,000 **Total-to-date: $30,000** Expected Request: $0
SWEETWATER-21: *Investigating Lignin Consistency from Batch-to-Batch*					
MICHIGAN STATE: M. Nejad **STUDENT:** Mohsen Siahkamari	**IAB TC LEAD:** Scott Tudman, Sweetwater* • Sweetwater* • Hexion • WVCO **Former member*	10/14/2021	11/1/2021	Expected 10/31/2022	**Year 1 / 1:** $35,000 **Total-to-date: $35,000** Expected Request: $0

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
M-05-NE: *Improving Durability of Wood Products by Reducing Lignin Degradation*					
MICHIGAN STATE: M. Nejad **STUDENT:** ~~Saeid Nikafshar, PhD~~ ~~Dyllan Nelson, B.S.~~ Mariia Bespalova, Ph.D.	**IAB TC LEAD:** Sudip Chowdhury, WVCO • LP • Oxiquim • WVCO	8/27/20	11/1/20	Expected 11/30/22	**Year 1 / 2:** $20,000 **Year 2 / 2:** $20,000 **Total-to-date: $40,000** Expected Request: $0
SWEETWATER-20: *Evaluating Suitability of Steam-Explosion Lignin for Different Polymeric Resin Applications*					
MICHIGAN STATE: M. Nejad **STUDENTS:** Saeid Nikafshar, PhD Mohsen Siahkamari, PhD Mona Alinejad, PhD	**IAB TC LEAD:** Scott Tudman, Sweetwater • SWEETWATER • HEXION WVCO	11/1/2020	11/1/20	10/31/21	**Year 1 / 1:** $35,000 **Total-to-date: $0** Expected Request: $0
I-19-NE: ***Suitability of different lignins as polyol replacement in PU adhesive formulation***					
Michigan State: M. Nejad (Mona Alinejad, PhD) (**IAB TC LEAD:** Robert Breyer, G-P Chem)	• G-P Chemicals • Hexion • Oxiquim • Roseburg WVCO	10/24/17	1/1/18	12/31/19	Year 1: $21,652 Year 2: $21,848 **Total WBC Funding: $43,500**
H-16-NE: ***Comparative analysis of different lignins as phenol substitutes***					
Michigan State: Mojgan Nejad (Isal Kalami, PhD, Christian Henry, PhD)	• Arclin • GP Chemicals • Henkel • Hexion • Oxiquim • WVCO	4/6/16	6/1/16	5/31/17	Year 1 : $14,00 **Total WBC Funding: $14,000**
NORTH CAROLINA STATE UNIVERSITY					
I-02-VE: ***Understanding the machinability of MDF and HDF***					
N. Carolina State: G. Velarde D. Saloni **OREGON STATE:** F. Kamke (Carlos Leca, MS)	(**IAB TC LEAD:** Darren Riedlinger, Arclin) • Arauco • Arclin • Hexion Roseburg	10/13/16	3/8/18	4/7/19 (Final report delivered Oct 2020)	Year 1: $46,000 **Total WBC Funding: $46,000**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
J-05-SA: ***Investigating the use of biopolymers for additive manufacturing***					
NC State: D. Saloni G. Velarde Auburn: M.S. Peresin (Christina Verdi, BS)	(**IAB TC LEAD:** Bob Breyer, GP Chemicals) • Arauco • G-P Chemicals • Hexion • INVISTA • Oxiquim	10/24/17	1/15/18	5/31/19	Year 1: $16,000 **Total WBC Funding: $16,000**
I-13-SA: ***Novel adhesives from soybean proteins and biopolymer blends***					
N. Carolina State: D. Saloni G. Velarde (no student)	• Arclin • CFP • Evertree • GP Chemicals • Hexion • WVCO	10/13/16	3/1/17	4/30/18	Year 1: $14,250 **Total WBC Funding: $14,250**
H-07-VE: ***Determination of tool life during CNC machining operations for four panel products***					
N. Carolina State: Guillermo Velarde Rick Lemaster (Conrad Michael, BS)	• Arauco • Columbia FP	10/15/15	1/1/16	12/15/16	Year 1 : $19,136 **Total WBC Funding: $19,136**
H-04-LEM: ***The use of acoustic emission to classify wood chips/particles***					
N. Carolina State: Rick Lemaster Guillermo Velarde (Lyndsey Campbell, BS, Kamila Edwards, BS)	• Arauco • LP • Oxiquim	10/15/15	1/1/16	12/15/16	Year 1 : $14,676 **Total WBC Funding: $14,676**
OREGON STATE UNIVERSITY					
M-03-PR: *PRELIMINARY INVESTIGATION OF DMDHEU-TREATED STRAND BOARD*					
OREGON STATE: F. Kamke G. Presley STUDENT: ~~Hanna Girod, BS~~ Shane Johnson, BS	**IAB TC LEAD:** Jesse Paris, WVCO • LP WVCO	8/27/2020	08/01/2021 ~~11/1/2020~~ ~~**PAUSED**~~	Expected 06/31/2022 ~~7/31/2021~~	**Year 1 / 1:** $12,468 **Total-to-date: $12,468** Expected Request: $0

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
M-02-PR: *IN-DEPTH CHARACTERIZATION OF BONDLINES IN CLT MADE WITH PRESERVATIVE-TREATED LUMBER*					
OREGON STATE: G. Presley J. Cappellazzi STUDENT: Cody Wainscott	**IAB TC LEAD:** Bob Breyer, Bakelite • Freres • Bakelite WVCO	8/27/20	~~11/1/20~~ 3/1/2021	Expected 9/30/2022	**Year 1 / 1:** $20,000 **Total-to-date: $20,000** Expected Request: $0
M-01-KA: *REPEATABLE MEASUREMENT METHOD FOR PERCENT WOOD FAILURE*					
OREGON STATE: F. Kamke L. Muszynski STUDENT: Talbot Rueppel, MS	**IAB TC LEAD:** Sarath Vega, LP • ARCLIN • FRERES LUMBER • G-P CHEMICALS • LP • OXIQUIM • WVCO	8/27/20	10/1/20	Expected 9/30/22	Year 1 / 2: $54,053 Year 2 / 2: $6,709* **Total-to-date: $60,762** Expected Request: $0 **$47,862 deducted*
K-04-SI: *ELUCIDATING THE MECHANISM OF CNF REINFORCEMENT IN WOOD ADHESIVES AND COMPOSITES*					
OREGON STATE: J. Simonsen J. Nairn STUDENT: Maria Muñoz, MS	**IAB TC LEAD:** TBD • ARCLIN • HEXION • OXIQUIM • WVCO	9/27/18	9/10/19	Expected 9/30/22	Year 1 / 3: $45,557 Year 2 / 3: $57,270 Year 3 / 3: $15,462 **Total-to-date: $118,289** Expected Request: $0
J-01-SIN: *UNDERSTANDING ELEVATED TEMPERATURE PERFORMANCE OF WOOD COMPOSITES*					
OREGON STATE: A. Sinha STUDENT: Byrne Miyamoto, PhD	**IAB TC LEAD:** Patrick Farrell, Freres Lumber • ARCLIN • FRERES LUMBER • HEXION • LP	10/24/17	4/1/18	Expected 9/30/21	Year 1 / 2: $54,705 Year 2 / 2: $53,074 **Total-to-date: $107,779** Expected Request: $0

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
***K-05-KA:** ANALYSIS OF ADHESIVE ATOMIZATION ON COMPOSITE BOND PERFORMANCE*					
OREGON STATE: F. Kamke J. Nairn STUDENT: Dylan Willard, MS **IAB TC LEAD:** Jesse Paris, WVCO	• Arauco • Arclin • Boise • G-P Chemicals • Hexion • LP Building Solu • WVCO	9/27/18	7/1/19	Expected 3/31/21	Year 1: $39,989 Year 2: $51,001 **Total-to-date: $90,990** Expected Future Request: $0
FRERES-19: MASS PLYWOOD PANELS: PERFORMANCE, DESIGN AND APPLICATION					
OREGON STATE: F. Kamke – Part I A. Sinha – Part II STUDENT: Matthias Wind, PhD ~~Micah Sutfin, MS~~	**IAB TC LEAD:** Patrick Farrell, Freres Lumber • Freres Lumber • G-P Chemicals • Hexion • LP Building Solu • WVCO	8/1/19	10/1/19	Expected 9/30/21	Year 1: $35,000 Year 2: $35,000 **Total-to-date: $70,000** Expected Future Request: $0
J-04-SIN: USING CRACK GROWTH EXPERIMENTS TO UNDERSTAND MOISTURE AND THERMAL DURABILITY OF WBCS					
OREGON STATE: A. Sinha J. Nairn STUDENT: Sweta Mahapatra, MS	**IAB TC LEAD:** Sudip Chowdhury, WVCO • Arclin • G-P Chemicals • LP Building Solu • Oxiquim • WVCO	10/24/17	4/1/18	9/30/20	Year 1: $52,205 Year 2: $52,074 **Total-to-date: $104,279** Expected Future Request: $0
INVISTA-18: Moisture resistance of wood-based composite materials					
OREGON STATE: F. Kamke S. Leavengood (Luis Molina, MS)	(**IAB TC LEAD:** Mohan Rao, INVISTA) • Arclin • Boise • G-P Chemicals • Hexion • INVISTA • LP Building Solu • Oxiquim • Roseburg	9/27/18	10/1/18	6/30/20	Year 1: $54,302 Year 2: $42,569 **Total WBC Funding: $96,871**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
I-26-KA: ***Characterizing accelerated weathering conditions (continuation of H-13-KA)***					
OREGON STATE: F. Kamke (Micah Sutfin, MS)	(**IAB TC LEAD:** Curtis Burton, WVCO) • Arclin • Boise • WVCO	5/17/17	1/1/18	9/29/19	Year 1: $46,038 Year 2: $1951 **Total WBC Funding: $47,989**
I-06-SIN: ***Understanding moisture gradients during accelerated weathering through numerical modeling***					
OREGON STATE: A. Sinha F. Kamke (Danny Way, PhD)	• Ashland • Boise • Fraunhofer • LP • Weyerhaeuser	10/13/16	4/1/17	8/15/18	Year 1: $56,000 **Total WBC Funding: $56,000**
A-11-SM: ***Improving blending efficiency and resin distribution of the rotary drum blending process using discrete element modeling***					
UBC: G. Smith (Ying-Li Tsai, PhD)	• Arclin • GP Chemicals	9/15/10	4/1/11	Expected Spring 2017 (3/10/17 defense) 10/17: Delayed indefinitely.	Year 1: $44,000 Year 2: $25,206 Year 3: $36,634 Year 4: $20,817 **Total WBC Funding: $126,657**
F-02-LE: ***Checking in maple plywood***					
OREGON STATE: S. Leavengood L. Muszynski (Elijah Wilson, MS)	• Columbia FP • Henkel • Weyerhaeuser	10/16/14	1/1/16	3/31/18	Year 1: $15,529 Year 2: $31,515 Year 3: $24,236 **Total WBC Funding: $70,280**
I-20-KA: ***Comparison of accelerated weathering test protocols – Part B (continuation of H-13-KA)***					
OREGON STATE: F. Kamke (Luis Molina, BS)	• Arclin • Ashland • Boise • WVCO	5/17/17	8/1/17	1/23/18	Year 1: $6625 **Total WBC Funding: $6625**
Fraunhofer-16: ***Wood composite performance assessment and certification needs for Western U.S.***					
OREGON STATE: F. Kamke P.F. Laleicke	• Arclin • Fraunhofer • WVCO	4/6/16	6/1/16	12/31/17	Year 1: $105,736 Year 2: $68,527 Year 3: $59,422 **Total WBC Funding: $233,685**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
I-08-LI: ***Lignin-based polymers with enhanced adhesive and elastomeric properties***					
OREGON STATE: Z. Glen Li (Dylan Packard, BS)	• Arclin • GP Chemicals • Hexion • Oxiquim • WVCO	10/13/16	11/1/16	10/31/17	Year 1: $16,650 **Total WBC Funding: $16,650**
I-15-NA: ***Numerical simulations of adhesive penetration in various wood species***					
OREGON STATE: J. Nairn (Chad Hammerquist, PhD)	• Arclin • GP Chemicals • Hexion • WVCO	10/13/16	10/1/16	10/1/17	Year 1: $28,166 **Total WBC Funding: $28,166**
F-08-KA (OSU only): ***Wetting and diffusion associated with selected liquid/wood interfaces***					
OREGON STATE: F. Kamke (Balkis Bakar, Elizabeth Mills) **VIRGINIA TECH:** C. Frazier (Christa Stables, MS)	• Arclin • Hexion • WVCO	10/16/14	4/1/15 (OSU) 6/15/15 (VT)	1/1/17 9/6/17	Year 1: $21,670 Year 2: $45,694 Year 3: $11,227 **Total WBC Funding: $78,591**
F-01-KA: ***Multi-scale accelerated weathering of wood composite materials***					
OREGON STATE: F. Kamke A. Sinha (Danny Way, MS)	• Arclin • Ashland • Boise • Fraunhofer • LP	10/16/14	4/1/15	3/31/17	Year 1: $55,857 Year 2: $44,904 **Total WBC Funding: $100,761**
H-13-KA: ***Comparison of accelerated weathering test protocols***					
OREGON STATE: F. Kamke (Valeria Luna, BS, Tomas Lasserre, BS)	• Arclin • Ashland • Hexion	4/6/16	7/1/16	12/31/16	Year 1 : $8500 **Total WBC Funding: $8500**
FUND-13: ***Multi-scale investigation of adhesive bond durability***					
OREGON STATE: F. Kamke A. Sinha (Paige McKinley, MS w/D. Ching, PhD, D.Way, PhD)	• • Arclin • APS • USDA FPL	8/1/13 (2-year award)	7/1/14	12/31/16 (NCE)	Year 1: $98,096 Year 2: $98,095 **Total NSF Funding: $196,191** **Total WBC Funding: $0**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
H-15-KA: ***Analysis of vertical density profile during hot pressing***					
OREGON STATE: F. Kamke (Kenya Hazell, PhD, Günther Schagerl, BS)	• Arauco • Arclin • Hexion • LP • Oxiquim	4/6/16	7/1/16	10/31/16	Year 1 : $8845 **Total WBC Funding: $8845**
H-03-LI: ***Bio-based polyamide with oligomeric lignin backbone***					
OREGON STATE: Z. (Glen) Li (Jacob Staudhammer, BS)	• Arclin • Henkel • Oxiquim	10/15/15	1/4/16	10/1/16	Year 1 : $2500 **Total WBC Funding: $2500**
H-01-NA: ***Numerical simulation of adhesive penetration into realistic wood structures***					
OREGON STATE: John Nairn (Chad Hammerquist, PhD)	• States Industries • WVCO	10/15/15	1/1/16	5/1/16	Year 1 : $8750 **Total WBC Funding: $8750**
B-02-NA: ***Methodologies for ranking resins by their effects on durability of wood composites***					
OREGON STATE: J. Nairn A. Sinha (B. Mirzaei, PhD, w/J. Adam, BS, D. Terry, BS)	• Arclin • Fraunhofer-WKI • GP Chemicals	10/18/12	1/1/13	3/31/16	Year 1: $43,498 Year 2: $43,373 Year 3: $49,682 **Total WBC Funding: $136,553**
D-02-KA: ***Application of accelerated weathering for the development of an NDT product durability assessment toolkit***					
OREGON STATE: F. Kamke (P.F. Laleicke, PhD)	• GP Chemicals • WVCO	10/8/13	1/1/14	12/31/15	Year 1: $25,670 Year 2: $54,325 **Total WBC Funding: $79,995**
SUPP-OSU-13: ***I/UCRC Innovations Fellows Supplement (NSF-funded)***					
OREGON STATE: F. Kamke (M. Schwarzkopf, PhD)	• Fraunhofer-WKI	9/25/13 (1-yr award)	9/25/13	7/30/14	Year 1: $16,633 **Total WBC Funding: $0** **Total NSF Funding: $16,633**
A-22-SM: ***Resin efficiency for non-structural panels***					
UBC: G. Smith (J. Dettmer, MS) **OREGON STATE:** L. Muszynski J. Simonsen (N. Lampert, MS)	• Ashland • GP Chemicals • Momentive	9/15/10	4/1/11	4/16/14	Year 1: $59,500 Year 2: $53,811 **Total WBC Funding: $113,311**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
A-04-KA: *Microscale wood adhesive interaction*					
OREGON STATE: F. Kamke L. Muszynski J. Nairn (J. Paris, PhD, M. Schwarzkopf, PhD)	• Arclin • Ashland • Henkel • Weyerhaeuser	9/15/10	10/1/10	10/1/13	Year 1: $35,600 (total: $85,600) Year 2: $62,230 Year 3: $48,577 **Total WBC Funding:** **$146,407**
C-01-KA: *Preliminary investigation of adhesive bonds using IR microscopy*					
OREGON STATE: F. Kamke (P. Boehm, MS, S. Freitas, PhD)	• GP Chemicals • WVCO	10/18/12	2/1/13	7/31/13	Year 1: $10,937 **Total WBC Funding:** **$10,937**
A-19-GU: *Impact of short veneer on bending properties of LVL*					
OREGON STATE: R. Gupta F. Kamke (S. Mlasko, BS, M. Belda, BS)	• GP Chemicals • Momentive • Weyerhaeuser	9/15/10	1/1/11	7/30/11	Year 1: $9000 **Total WBC Funding:** **$9,000**

VIRGINIA TECH					
N-06-CA: *Bench-Scale Characterization of Joints and Coatings*					
VIRGINIA TECH: S. Case B. Lattimer **STUDENT:** Akhilesh Kulkarni, MS	**IAB TC LEAD:** Sudip Chowdhury, WVCO • Arclin • Freres • LP	10/14/2021	1/1/2022	Expected 08/30/2022	**Year 1 / 1:** $31,342 **Total-to-date:** **$31,342** Expected Request: $0
K-02-CA: *Bench-Scale Screening Test for ASTM E119*					
VIRGINIA TECH: S. Case B. Lattimer **STUDENT:** Michael Gangi, PhD	**IAB TC LEAD:** Jim Ni, LP • ARCLIN • FRERES LUMBER • G-P CHEMICALS • LP • OXIQUIM	10/10/19	1/1/20	Expected 12/2021	Year 1: $55,399 Year 2: $55,000 **Total-to-date:** **$110,399** Expected Request: $0

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
J-02-HA: GEOMETRY AND MECHANICS OF PANEL WARPAGE					
VIRGINIA TECH: J. Loferski Univ of Nevada/Reno: J. Hanna STUDENT: ~~Harrison Wood, MS;~~ Kerrigan Strong, MS	**IAB TC LEAD:** Dave Ruth, Boise) • Boise • CFP • Oxiquim • Roseburg	10/24/17	12/26/17	Expected 7/13/21	Year 1: $47,810 Year 2: $50,000 Year 3: $42,079 **Total-to-date: $139,889** Expected Future Request: $0
I-01-DI: DEVELOPING METHODOLOGY TO INTERROGATE HIGH/LOW DENSITY WOOD BONDS (FORMERLY: CHARACTERIZING ADHESION BETWEEN HIGH AND LOW DENSITY WOODS)					
VIRGINIA TECH: S. Case D. Dillard C. Frazier STUDENT: ~~Kayla Howes, MS~~ Yuqin Li, PhD ~~Angelo Said, BS~~ ~~Jessie Johnson, BS~~	**IAB TC LEAD:** Sudip Chowdhury • CFP • G-P Chemicals • Queensland • WVCO	10/13/16	5/1/17	Expected 12/30/20	Year 1: $42,153 Year 2: $43,766 Year 3: $43,773 **Total-to-date: $129,692** Expected Future Request: $0
H-17-ZS: ***Adhesive challenges with maple & hickory veneer at low moisture levels***					
VIRGINIA TECH: Zink-Sharp (Cody Wykle, MS; Alexandra Flevarakis, BS; Dylan Harris, BS)	(**IAB TC LEAD:** Fred Carter, CFP) • CFP • Henkel	4/6/16	9/1/16	4/15/19	Year 1 : $38,784 Year 1.5: $20,446 **Total WBC Funding: $59,230**
I-31-RO: ***Dispersion force-based new adhesive concept***					
VIRGINIA TECH: M. Roman (Apratim Jash, PhD)	(**IAB TC LEAD:** TBD) • Arclin • Fraunhofer • GP Chemicals • Hexion • Oxiquim • WVCO	5/17/17	1/1/18	Expected 12/31/21 (Project cancelled by IAB TC, 10/18)	Year 1: $48,582 **Total-to-date: $48,582** Expected Year 2 Request: $50,338 (Fall 2018) (9/27/18: cancelled; returned $34,431)
F-07-FR: ***MDF fiber quality***					
VIRGINIA TECH: C. Frazier (Mohammad Tasooji, PhD)	• Arauco NA • Arclin • Columbia FP • GP Chemicals • WVCO	10/16/14	10/20/14	5/9/18	Year 1 : $48,890 Year 2: $48,890 Year 3: $27,310 **Total WBC Funding: $125,090**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
F-08-KA (VT only): ***Wetting and diffusion associated with selected liquid/wood interfaces***					
OREGON STATE: F. Kamke (Balkis Bakar, Elizabeth Mills) **VIRGINIA TECH:** C. Frazier (Christa Stables, MS)	• Arclin • Hexion • WVCO	10/16/14	4/1/15 (OSU) 6/15/15 (VT)	1/1/17 9/6/17	Year 1: $42,559 Year 2: $39,255 **Total WBC Funding: $81,814**
F-05-FR: ***Biogenic formaldehyde emission***					
VIRGINIA TECH: C. Frazier (Guigui Wan, PhD)	• Arauco NA • Arclin • Hexion • Oxiquim	10/16/14	10/1/14	12/20/16	Year 1: $48,890 Year 2: $41,890 **Total WBC Funding: $90,780**
F-04-FR: ***Organic fillers used in PF resoles***					
VIRGINIA TECH: C. Frazier (X. (Chuck) Wang, MS)	• Arclin • GP Chemicals • Hexion • WVCO	10/16/14	10/30/14	8/31/16	Year 1 : $16,000 Year 2: $47,446 **Total WBC Funding: $63,446**
SUPP-IMD-13: ***Innovative Managing Director Model I/UCRC Supplement***					
VIRGINIA TECH: C. Frazier (L. Caudill)	• NA	9/18/13 (up to 3 yr. award)	9/18/13	7/31/16	Year 1: $200,000 Year 2: $200,000 **Total NSF Funding: $400,000** **Total WBC Funding: $0**
G-05-FR: ***Surfactants: Fundamental impacts in veneer bonding***					
VIRGINIA TECH: C. Frazier (TBD)	• Arclin • GP Chemicals • Hexion	5/7/15	TBD	(Postponed indefinitely due to Phase II delay)	Year 1: $49,636 **Total-to-date: $0** Expected Year 2 funding request: $49,636
Queensland-13: ***Adhesion fundamentals in spotted gum (Corymbia sp.)***					
VIRGINIA TECH: C. Frazier (C. Burch, MS)	• Hexion • Queensland Govt.	7/1/12	1/22/13	11/6/15	Year 1: $40,000 Year 2: $40,000 **Total WBC Funding: $80,000**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
B-18-ZS: ***Understanding the differences in bonding characteristics of Douglas-fir and SYP wood***					
VIRGINIA TECH: Zink-Sharp S. Renneckar (K. Mirabile, MS)	• GP Chemicals • Henkel • Hexion	9/21/11	1/8/13	11/9/15	Year 1: $29,550 Year 2: $29,750 Year 3: $3006 **Total WBC Funding: $62,306**
F-06-FR: ***Formaldehyde in tree increment cores***					
VIRGINIA TECH: C. Frazier (H.Wise, BS, G.Lewis, BS)	• Arauco NA • GP Chemicals	10/16/14	10/20/14	7/15/15	Year 1 : $7300 **Total WBC Funding: $7300**
A-12-CO: ***Fundamentals of formaldehyde detection and emission determination***					
Maine: B. Cole D. Gardner R. Fort **VIRGINIA TECH:** C. Frazier (S. Blosch, A. Hellenbrand, MS)	• Arclin • GP Chemicals • Momentive • Solenis	9/15/10	1/10/11	12/31/14	Year 1: $19,500 (Total: $44,500) Year 2: $45,964 Year 3: $47,340 Year 4: $48,950 **Total WBC Funding: $186,754**
FUND-12: ***Mechanisms of wood-generated formaldehyde emission*** **(Continued as F-05-FR:** ***Biogenic formaldehyde emission,*** **Fall 2014)**					
VIRGINIA TECH: C. Frazier (G. Wan, PhD)	• NA/pending	8/15/11 (2-yr. award)	5/21/12	9/30/14	Year 1: $99,725 Year 2: $99,725 **Total NSF Funding: $199,450** **Total WBC Funding: $0**
A-24-FR: ***Influence of filler particle size on adhesive penetration and performance***					
VIRGINIA TECH: C. Frazier (X. Yang, PhD)	• GP Chemicals • Momentive • WVCO	9/15/10	1/18/11	9/22/14	Year 1: $11,612 Year 2: $7836 Year 3: $38,760 Year 4: $38,687 **Total WBC Funding: $96,895**

FACULTY	TECHNICAL ADVISORS	AWARD DATE	START DATE	END DATE	FUNDING
A-14-FR: ***Formaldehyde determination through liquid extraction*** **(formerly,** ***Wood modifications promoting durable adhesion)***					
VIRGINIA TECH: C. Frazier Zink-Sharp (M. Tasooji, MS)	• Henkel • Weyerhaeuser • WVCO	9/15/10	8/10/11	5/29/14	Year 1: $48,000 Year 2: $38,000 Year 3: $18,600 **Total WBC Funding: $104,600**
D-01-FR: ***Formaldehyde/wood mass transfer***					
VIRGINIA TECH: C. Frazier (C. Burch – reassigned to Queensland-13)	• Arclin	10/8/13	8/26/13	Project terminated 4/17/14	Year 1 : $38,795 **Total WBC Funding: $0** (LCC: funds returned)
B-01-LI: ***Developing a reference material for formaldehyde emissions testing***					
VIRGINIA TECH: J. Little S. Cox C. Frazier (X. Zhao, MS)	• Arclin • Weyerhaeuser	6/20/12	8/27/12	8/26/13	Year 1: $44,500 **Total WBC Funding: $44,500**