

## **Dr. Dirk E. Maier**

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### **ACADEMIC CREDENTIALS**

Ph.D., Agricultural Engineering, Michigan State University, East Lansing, MI. March 1992.

M.S., Agricultural Engineering, Michigan State University, East Lansing, MI. Dec. 1988.

B.S., Agricultural Engineering, Michigan State University, East Lansing, MI. June 1987.

A.S., Engineering, Grand Rapids Junior College, Grand Rapids, MI. May 1985.

### **FIELD OF SPECIALIZATION**

Post-harvest engineering and value-added processing of agricultural crops and biological products including ecosystem modeling, post-harvest loss prevention, food security, stored products protection (IPM, fumigation), alternative crop storage systems, dehydration of biological products, bulk material (grain, feed) handling and segregation (IP), facilities design (including safety, entrapment rescue) and simulation, and feed manufacturing.

### **PROFESSIONAL EXPERIENCE**

Professor. Department of Agricultural & Biosystems Engineering, Iowa State University, since August 2015.

Associate Director, Global Food Security Consortium, Iowa State University, since August 2015.

Professor. Department of Grain Science & Industry, Kansas State University, February – August 2015.

Senior Post-Harvest Engineer. International Grains Program Institute, Department of Grain Science & Industry, Kansas State University, February – August 2015.

Administrative Director and Lead PI, USAID Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss, Kansas State University, January 2014 – May 2015.

Food Systems Leadership Institute Fellow, Cohort #6, 2010-2012

Professor and Head. Department of Grain Science & Industry, Kansas State University, April 2008 – February 2015.

Director. International Grains Program Institute, Department of Grain Science & Industry, Kansas State University, March 2009-February 2015.

Ancillary Food Science Graduate Faculty. Food Science Institute, Kansas State University, September 2008-present

Adjunct Professor. Department of Agricultural & Biological Engineering, Purdue University, April 2008-present.

Associate Head and Graduate Program Chair. Department of Agricultural & Biological Engineering, Purdue University, July 2005 – March 2008.

University Faculty Scholar. Purdue University, July 2005 – 2008.

ESCOP/ACOP Fellow. Class 14 Leadership Development Course, 2004-2005.

Professor and Extension Agricultural Engineer. Department of Agricultural & Biological Engineering, Purdue University, July 2002 – March 2008.

DAAD Guest Professor. University of Hohenheim, College of Agricultural Sciences and Institute of Agricultural Engineering in the Tropics and Subtropics, Stuttgart-Hohenheim, Germany, June 2004.

Guest Professor. University of Torino, College of Agriculture and Department of Agricultural Economics and Mechanization, Torino, Italy, October 2003.

Associate Professor and Extension Agricultural Engineer. Department of Agricultural & Biological Engineering, Purdue University, July 1997 - 2002.

Fulbright Scholar. Universidad Nacional de Mar del Plata, Facultad de Ciencias Agrarias and Instituto Nacional de Tecnología Agropecuaria, Estacion Experimental Agropecuaria, Balcarce, Argentina, January - July 2000.

Assistant Professor and Extension Agricultural Engineer. Department of Agricultural & Biological Engineering, Purdue University, December 1991 - 1997.

Research Associate. Michigan State University, Agricultural Engineering Department. June 1987 - December 1991.

Research Assistant. Michigan State University, Agricultural Engineering Department. April 1986 - May 1987.  
Engineering Aid. U.S. Department of Agriculture, Michigan State University, Farrall Hall. January 1986 - April 1986.

**LICENSES** - Registered Professional Engineer, State of Indiana, PE10100369

**GRANTS** - Over \$20 million in research, technology transfer, and extension education grants.

## **RESEARCH**

Research program focuses on engineered technologies for the protection of stored products, the reduction of post-harvest loss for improved food security, and the delivery of identity-preserved, traceable and biosecure quality grains to the food, biomaterials, biofuels and feed processing industries. Projects include: The development of non-chemical and other alternative preservation technologies (grain chilling, ozonation, modified atmosphere) for the storage of cereal grains, oilseeds and processed products. The modeling of the structural fumigation process including precision fumigation, automated monitoring and decision support. The modeling of stored-grain ecosystems, and the study of the effects of environmental conditions on stored-product pest management (IPM) in the field and laboratory. The determination of food-grade grain (incl. corn, popcorn, wheat, rice) quality as influenced by harvesting, handling, drying, storage and transportation. The evaluation of combining medium and low temperature drying with natural air conditioning using automatic fan and burner controllers, and the effects of stress cracks and non-uniform moistures on processing and end use. The modeling of segregated handling practices for the identity-preservation of value-added grains and oilseeds, and evaluation of facilities design and operation through system simulation. The optimization of grain and oilseed processing and feed manufacturing including quantification of thermal and physical properties, and flaking behavior of soybeans. The study of optimal rescue procedures for grain entrapments in on-farm and commercial structures. Major professor for 17 M.S. and 11 Ph.D. students. Supervisor of 10 post-doctoral research engineers. Host to 6 overseas visiting scientists.

## **EXTENSION**

Active technology transfer and continuing education program in post-harvest engineering, value-added processing and quality assurance of agricultural crops and biological products. Served as Director of K-State's International Grains Program Institute which aims to educate foreign business leaders, industry professionals and government officials about U.S. grains and oilseeds through technical training and assistance programs in storage, handling, milling, marketing, processing and utilization. Director Emeritus of the GEAPS/K-State Grain Operations Distance Education and Credentialing Program which provides continuing education and credentialing to grain industry professionals around the world. Host of international visitors and delegations from around the world.

## **TEACHING**

Quality Grain Management – GEAPS 520; Aeration System Design & Operation – GRSC 521; Grain Drying – GEAPS 524 (1 CEU credit each; distance teach); Introductory Graduate Seminar – GRSC 900, 1 credit (co-teach); Professional Development Seminar – GRSC 910, 2 credits (co-teach).

## **PUBLICATIONS**

Authored or co-authored over 70 refereed journal papers, 130 published proceedings and conference papers and abstracts, 50 invited papers, 1 research station bulletin, 10 non-English technical publications, 1 book, 4 book chapters, and 140 extension and technology transfer publications including numerous articles in farm and grain industry journals. Member of the Editorial Board of the Journal of Stored Products Research. Co-chair of the scientific program of the 1<sup>st</sup> International Congress on Postharvest Loss Prevention in Rome, Italy in October 2015.

## PEER-REVIEWED PUBLICATIONS

1. Roberts, M.J., Field, W.E., Maier, D.E. and Stroshine, R.L. 2015. Determination of entrapment victim extrication forces with and without use of a grain rescue tube. *Journal of Agricultural Safety and Health*. 21(2):71-83.
2. Boac, J.M., Ambrose, R.P.K., Casada, M.E., Maghirang, R.G., and Maier, D.E. 2014. Applications of discrete element method in modeling of grain postharvest operations. *Food Engineering Reviews*. 10.1007/s12393-014-9090-y
3. Martinez-Kawas, A. and Maier, D.E. 2014. Improvements in quantification of biomass feedstock availability to a biorefinery using a GIS-based method. *Transactions of the ASABE*, 57(2):533-542.
4. Rigdon, A.R., Jumpponen, A., Vadlani, P.V., and Maier, D.E. 2013. Impact of various storage conditions on enzymatic activity, biomass components and conversion to ethanol yields from sorghum biomass used as a bioenergy crop. *Bioresource Technology*. 132:269-275.
5. Campabadal, C.A., Maier, D.E., and Mason, L.J. 2013. Efficacy of fixed bed ozonation treatment to control insects in stored bulk grain. *Applied Engineering in Agriculture*. 29(5):693-704.
6. McClurkin, J.D., Maier, D.E., and Ileleji, K.E. 2013. Half-life time of ozone as a function of air movement and conditions in a sealed container. *Journal of Stored Products Research*. 55:41-47.
7. Lawrence, J., Maier, D. E., and Stroshine, R.L. 2013. Three-dimensional transient heat, mass, momentum and species transfer in the stored grain ecosystem: Part I: Model development and evaluation. *Transactions of ASABE*. 56(1):179-188.
8. Lawrence, J., Maier, D. E., and Stroshine, R.L. 2013. Three-dimensional transient heat, mass, momentum and species transfer in the stored grain ecosystem: Part II: Model validation. *Transactions of ASABE*. 56(1):189-201.
9. Yigezu Y.A., Alexander, C.E., Preckel, P.V., Maier, D.E., Mason, L.J., Woloshuk, C.P., Lawrence, J., and Moog, D.J. 2013. Integrated joint pest management strategies in the presence of control spillovers. *European Review of Agricultural Economics*. pp.1-21. Published online January 11, 2013.
10. Roberts, M. J., Field, W. E., Maier, D. E., and Stroshine, R. L. 2012. Determination of effort required to insert a rescue tube into various grain types. *Journal of Agricultural Safety and Health*. 18(4):293-308.
11. Chayaprasert, W., Maier, D. E, Subramanyam, Bh., and Hartzler, M. 2012. Gas leakage and distribution characteristics of methyl bromide sulfuryl fluoride during fumigations in a pilot flour mill. *Journal of Stored Product Research*, 50:1-7.
12. Lawrence, J. and Maier, D. E. 2012. Prediction of temperature distributions in peaked, leveled and inverted cone grain mass configurations during aeration of corn. *Applied Engineering in Agriculture*, 28(4).
13. Lawrence, J., Maier, D. E., Hardin, J., and Jones, C. 2012. Development and validation of a headspace model for a stored grain silo filled to its eave. *Journal of Stored Products Research*, 49: P. 176-183.
14. Linton, R.H., Nutsch, A., McSwane, D., Kastner, J., Bhatt, T., Hodge, S., Getty, K., Maier, D., Kastner, C., Chaturvedi, A., and Woodley, C. 2011. Use of a stakeholder-driven DACUM process to define knowledge areas for food protection and defense. *Journal of Homeland Security and Emergency Management*. Published on-line July 2011. Vol. 8, Issue 2.
15. McDonough, M.X., Campabadal, C.A., Mason, L.J., Maier, D.E., Denvir, A., and Woloshuk, C. 2011. Ozone application in a modified screw conveyor to treat grain for insect pests, fungal contaminants, and mycotoxins. *Journal of Stored Products Research*. In press. Published on-line May 19, 2011.
16. Tsai, W.T., Mason, L.J., Chayaprasert, W., Maier, D.E., and Ileleji, K.E. 2011. Investigation of fumigant efficacy in flour mills under real-world fumigation conditions. *Journal of Stored Products Research*. 47(3):179-184.
17. Lawrence, J., and D. E. Maier. 2011. Three-dimensional airflow distribution in a maize silo with peaked, levelled and cored grain mass configurations. *Biosystems Engineering*. 110(3):321-329.
18. Lawrence, J. and D. E. Maier. 2011. Aeration strategies simulations for wheat storage in the sub-

- tropical region of North India. *Transactions of ASABE* 54(4):1395-1405.
19. Lawrence, J. and D. E. Maier. 2011. Development and validation of a model to predict air temperatures and humidities in the headspace of partially filled stored grain silos. *Transactions of ASABE* 54(5):1809-1817.
  20. Takhar, P.S., Maier, D.E., Campanella, O.H., and Chen, G. 2011. Hybrid mixture theory based moisture transport and stress development in corn kernels during drying. *Validation and Simulation Results. Journal of Food Engineering.* 106:275-282.
  21. Roberts, M.J., Deboy, G.R., Field, W.E. and Maier, D.E. 2011. Summary of prior grain entrapment rescue strategies. *Journal of Agricultural Safety and Health.* 17(4):303-325.
  22. Martinez-Kawas, A. and Maier, D.E. 2011. Quantifying feedstock availability using a geographical information system. *Applied Engineering in Agriculture.* 4(3):133-146.
  23. Brijwani, K., Vadlani, P.V., Hohn, K.L., and Maier, D.E. 2011. Experimental and theoretical analysis of a novel deep-bed solid-state bioreactor for cellulosic enzyme production. *Biochemical engineering Journal.* 58-59:110-123.
  24. Chayaprasert, W. and Maier, D.E. 2010. Evaluating the effects of sealing quality on gas leakage rates during structural fumigation by pressurization testing and CFD simulations. *ASABE Transactions.* 53(3):853-861.
  25. Kingsly, A.R.P., Ileleji, K.E., Clementson, C.L., Garcia, A., Maier, D.E., Stroshine, R.L., Radcliff, S. 2010. The effect of process variables during drying on the physical and chemical characteristics of corn dried distillers drains with solubles (DDGS) - Plant Scale Experiments. *Bioresource Technology.* 101(1): 193-199.
  26. Yigezu Y.A., Alexander, C.E., Preckel, P.V., Maier, D.E., Mason, L.J., Woloshuk, C.P., Lawrence, J., and Moog, D.J. 2010. Economics of integrated insect management in stored corn. *Journal of Economic Entomology.* 103(5):1896-1908.
  27. Jiru, T.E., Kaufman, B.G., Ileleji, K.E., Ess, D.R., Gibson, H.G., and Maier, D.E. 2009. Testing the performance and compatibility of degummed soybean heating oil blends for use in residential furnaces. *Journal for the Science and Technology of Fuel and Energy.* 89:105-113.
  28. Chayaprasert, W., Maier, D.E., Ileleji, K.E., and Murthy, J.Y. 2009. Effects of weather conditions on sulfuryl fluoride and methyl bromide leakage during structural fumigation in a flour mil. *Journal of Stored Products Research.* 45(1):1-9.
  29. Chen, G., D. E. Maier, O. H. Campanella and P. S. Takhar. 2009. Modeling of moisture diffusivities for components of yellow–dent corn kernels. *Journal of Cereal Science* **50**: 82-90.
  30. Chayaprasert, W., Maier, D.E., Ileleji, K.E. and Murthy, J. 2008. Development and validation of Computational Fluid Dynamics models for precision structural fumigation. *Journal of Stored Products Research.* 44(1):11-20.
  31. Yigezu A.Y., Alexander, C.E., Preckel, P.V., Maier, D.E., Woloshuk, C.P., Mason, L.J., Lawrence, J. and Moog, D.J. 2008. Optimal management of molds in stored corn. *Agricultural Systems.* 98(3):220-227.
  32. Karaca, U., Alexander, C. and Maier, D.E. 2007. Does on-farm quality assurance pay? A cost-benefit analysis of the Grainsafe program. *Journal of Agriculture and Applied Economics.* 39(3):541-556. Purdue ARP No. 18012.
  33. Bartosik, R.E. and Maier, D.E. 2007. Study of adsorption and desorption equilibrium relationships for three different corn types using the modified Chung-Pfost equation. *ASABE Transactions.* 50(5):1741-1749. ARP No. 18085.
  34. Ileleji, K.E., Maier, D.E. and Woloshuk, C.P. 2007. Evaluation of different temperature management strategies for suppression of *Sitophilus zeamais* (Motschulsky) in stored maize. *Journal of Stored Products Research.* 43:480-488.
  35. Bartosik, R.E. and Maier, D.E. 2007. Field implementation and model validation of a model-based fan and burner control strategy for the in-bin drying and conditioning of corn. *Applied Engineering in Agriculture.* 23(2):195-205. Purdue ARP No. 18026.

36. Subramanyam, Bh., M.D. Toews, K.E. Ileleji, D.E. Maier, G.D. Thompson, and T.J. Pitts. 2007. Evaluation of spinosad as a grain protectant on three Kansas farms. *Crop Protection*. 26(7):1021-1030.
37. Bartosik, R.E. and Maier, D.E. 2006. Effect of airflow distribution on the performance of NA/LT in-bin drying of corn. *ASAE Transactions*. 49(4):1095-1104. Purdue ARP No. 17944.
38. Maier, D.E., K.E. Ileleji, C. Bhat and C.P. Woloshuk. 2006. Detection of a developing hot spot in stored grain with a CO<sub>2</sub> sensor. *Applied Engineering in Agriculture*. 22(2):275-289. Purdue ARP No. 17621.
39. Bartosik, R.E. and Maier, D.E. 2005. Field testing of a new variable heat low temperature in-bin drying control strategy. *Applied Engineering in Agriculture*. 21(3):445-453. Purdue ARP No. 17359.
40. Bartosik, R.E. and Maier, D.E. 2004. Evaluation of three NA/LT in-bin drying strategies in five Corn Belt locations. *ASAE Transactions*. 47(4):1195-1206. Purdue ARP No. 17161.
41. Singh, P.P., Maier, D.E., Cushman, J.H., Haghighi, K., Corvalan, C. 2004. Effect of viscoelastic relaxation on moisture transport in foods. Part I: Solution of general transport equation. *Journal of Mathematical Biology*. 49(1):1-19. ARP No. 17119.
42. Singh, P.P., Maier, D.E., Cushman, J.H., and Campanella, O.H. 2004. Effect of viscoelastic relaxation on moisture transport in foods. Part II: Sorption and drying of soybeans. *Journal of Mathematical Biology*. 49(1):20-35. ARP No. 17120.
43. Singh, P.P., Cushman, J.H., and Maier, D.E. 2003. Three scale thermomechanical theory for swelling of biopolymeric systems. *Chemical Engineering Science*. 58:4017-4035. ARP No. 17121
44. Singh, P.P., Cushman, J.H., and Maier, D.E. 2003. Multiscale fluid transport theory for swelling biopolymers. *Chemical Engineering Science*. 58(11):2409-2419. ARP No. 17118.
45. Singh, P.P., Cushman, J.H., Bennethum, L.S., and Maier, D.E. 2003. Thermomechanics of swelling biopolymeric systems. *Transport in Porous Media*. 53(1):1-24. ARP No. 17117.
46. Montross, M.D., Maier, D.E., and Haghighi, K. 2002. Development of a new finite element stored grain ecosystem model. *ASAE Transactions*. 45(5):1455-1464. Purdue ARP No. 16422.
47. Montross, M.D., Maier, D.E., and Haghighi, K. 2002. Validation of a new finite element stored grain ecosystem model. *ASAE Transactions*. 45(5): 1465-1474. Purdue ARP No. 16422.
48. Mendez, F., Maier, D.E., Mason, L.J. and Woloshuk, C.P. 2002. Penetration of ozone into columns of stored grains and effects on chemical composition and processing performance. *Journal of Stored Products Research*. 39(1):33-44. Purdue ARP No. 16636.
49. Singh, P.P., Maier, D.E., and Campanella, O. 2001. Effect of temperature and moisture on dynamic viscoelastic properties of soybeans. *ASAE Transactions*. 44(6):1713-1719. Purdue ARP No. 16405.
50. Arthur, F.H., Throne, J.E., Maier, D.E. and Montross, M.D. 2001. Impact of aeration on maize weevil (*Coleoptera: Curculionidae*) populations in corn stored on the northern United States: Simulation studies. *American Entomologist*. Summer 2001. 104-110.
51. Berruto, R. and Maier, D.E. 2001. Analyzing the receiving operation of different grain types in a single pit country elevator. *ASAE Transactions*. 44(3):631-638. Purdue ARP No. 16209.
52. Watkins, A.E. and Maier, D.E. 2001. Thin-layer drying rates, stress-cracking, and digestibility of selected high-oil corn hybrids. *ASAE Transactions*. 44(3):617-622. Purdue ARP No. 16156.
53. Kingman, D.M., Field, W.E. and Maier, D.E. 2001. Summary of fatal entrapments in on-farm grain storage bins - 1966 to 1998. *Journal of Agricultural Safety and Health*. 7(3) 169-184.
54. Singh, P.P. and Maier, D.E. 2001. Transient heat conduction and hotspot development prediction in a flaking roll with revolving heat flux and convection boundary conditions. *Journal of the American Oil Chemist Society*. 78:787-792. Purdue ARP No. 16513.
55. Kells, S.A., Mason, L.J., Maier, D.E., and Woloshuk, C.P. 2001. Efficacy and fumigation characteristics of ozone in stored maize. *Journal of Stored Products Research*. 37:371-382. Purdue ARP No. 16278.
56. Montross, M.D. and Maier, D.E. 2000. Reconditioning corn and soybeans to optimal processing moisture contents. *Applied Engineering in Agriculture*. 16(5):527-535. Purdue ARP No. 15973.

57. Montross, M.D. and Maier, D.E. 2000. Simulated performance of conventional high-temperature drying, dryeration, and combination drying of shelled corn with automatic conditioning. *ASAE Transactions*. 43(3):691-699. Purdue ARP No. 16017.
58. Briggs, J.L., Maier, D.E., Watkins, B.A., and Behnke, K.C. 1999. Effect of ingredients and processing parameters on pellet quality. *Journal of Poultry Science*. 78:1464-1471. Purdue ARP No. 15838.
59. Singh, P.P., Maier, D.E., Okos, M.R., Cattanach, E., and Trumble, K.P. 1999. The effect of physical properties and operating parameters on soybean flaking. *Journal of the American Oil Chemist Society*. 76(8): 981-987. Purdue ARP No. 15984.
60. Rulon, R.A., Maier, D.E., and Boehlje. 1999. A post-harvest economic model to evaluate grain chilling as an IPM technology. *Journal of Stored Products Research*. 34(4):369-383. Purdue ARP No. 15722.
61. Arthur, F.H., Throne, J.E., Maier, D.E., and Montross, M.D. 1998. Feasibility of aeration for management of maize weevil populations in corn stored in the southern United States: Model simulations based on recorded weather data. *American Entomologist*. Summer 1998. Pp. 118-123.
62. Freeman, S.A., Kelley, K.W., Maier, D.E., and Field, W.E. 1998. Review of entrapments in bulk agricultural materials at commercial grain facilities. *Journal of Safety Research*. 29(2):123-134. Purdue ARP No. 15242.
63. Maier, D.E., Rulon, R.A., and Mason, L.J. 1997. Chilled versus ambient aeration and fumigation of popcorn - Part 1: Temperature management. *Journal of Stored Products Research*. 33(1):39-49. Purdue ARP No. 14934
64. Mason, L.J., Rulon, R.A., and Maier, D.E. 1997. Chilled versus ambient aeration and fumigation of popcorn - Part 2: Pest management. *Journal of Stored Products Research*. 33(1):51-58. Purdue ARP No. 15029.
65. Maier, D.E., and Rulon, R.A. 1996. Evaluation and optimization of a new commercial chiller. *Applied Engineering in Agriculture*. 12(6):725-730. Purdue AES No. 14840.
66. Maier, D.E., Adams, W.H., Throne, J.E., and Mason, L.J. 1996. Temperature management of the maize weevil (Coleoptera: Curculionidae) in three locations in the United State. *Journal of Stored Products Research*. 32(3):255-273. Purdue AES No. 14841.
67. Maier, D.E., Bakker-Arkema, F.W., and Ilangantileke, S.G. 1993. Ambient and chilled paddy aeration under Thai conditions. *Agricultural Engineering Journal*. 2(1&2):15-33.
68. Marks, B.P., Maier, D.E. and Bakker-Arkema, F.W. 1993. Optimization of a new in-bin counterflow corn drying system. *ASAE Transactions*. 36(2):529-534. Purdue AES No. 13515.
69. Maier, D.E. and Bakker-Arkema, F.W. 1992. The counterflow cooling of feed pellets. *Journal of Agricultural Engineering Research*. 53(4):305-320. Purdue AES No. 13420.
70. Maier, D.E., Bakker-Arkema, F.W. and Moreira, R.G. 1992. Comparison of conventional and chilled aeration of grains under Texas conditions. *Applied Engineering in Agriculture*. 8(5):661-667.
71. Bakker-Arkema, F.W., Maier, D.E., and Schisler, I.P. 1987. Drying rates and dryer capacities of different seed grains. *Drying Technology*. 5(4):527-540.

I want to see their transcript and I talk to them but I am sceptical of credentialism. I really form an opinion of a student by working with them at the lab bench in a Master/Apprentice relationship. It is the only thing that I know of that works. What are credentials?

"Credentials" often refer to academic or educational qualifications, such as degrees or diplomas that you have completed or partially-completed. "Credentials" can also refer to occupational qualifications, such as professional certificates or work experience. If you did your credentials outside of Canada, these are called "international credentials" or "foreign credentials" in Canada. You may need to get your credentials evaluated if you want to work or study in Canada.

Academic Credentials. credentials " I noun authorization, certificates, certification, documents, identification, papers, passport, proof of authority, recommendations, records, references, testimonials, vouchers II index certificate, certification (certification of proficiency), " " Law dictionary. " List of credentials in psychology " This list is of professional and academic credentials in the field of psychology and allied fields, including psychotherapy, counseling and social work.