

ATTACHMENT 1

ESA VAKKILAINEN

Born in 1957 citizen of Finland

Education

Ph.D.

Current Position

Leading Technology Specialist - Recovery
Pöyry Forest Industry Oy, Pulp Technology Division

Languages

Finnish, English, Swedish, French, German

Specialty

Recovery boilers, liquor chemistry, recovery technology

Pöyry Experience

Mr. Vakkilainen has joined Jaakko Pöyry Oy 1.8.2001 as a Recovery Specialist and Project Manager.

Major Projects

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| 2006 | Confidential Client, USA
Process Specialist. Mill operation studies. |
| 2006 | UPM-Kymmene Oyj, Kuusankoski, Finland
Process Specialist. Implementation of new recovery line for a 700 000 ADt/a pulp mill. |
| 2005- | Gunns Limited, Tasmanian Pulp Mill, Australia
Process Specialist for recovery. Pre-engineering of a new pulp line. |
| 2004-2005 | Suzano Bahia Sul, Brazil
Process Specialist for recovery. Pre-engineering of a new 1 000 000 ADt/a pulp line. |
| 2003-2005 | UPM-Kymmene Oyj, Kuusankoski, Finland
Project Manager. Pre-engineering of new recovery line for a 700 000 ADt/a pulp mill. |
| 2003 - | Recovery Boiler of the Future
Project Co-Ordinator for the National Development Project. |

- 2003 Visy, Australia
Process Specialist for recovery line. Recovery debottlenecking study.
- 2003-2004 Stora-Enso Oyj, Imatra, Finland
Process Specialist for recovery. Power production efficiency improvement study for three pulp mills.
- 2002 Kymi-Paper Oy, Kuusankoski, Finland
Project Manager. Feasibility Study for new recovery line for a 690 000 ADt/a pulp mill.
- 2002-2003 Veracel, Brazil
Process Specialist for recovery. Feasibility study of strategic plan for 800 000 ADt/a pulp mill.
- 2002 Stora-Enso, Skoghall, Sweden
Project Specialist for recovery boiler. Upgrade of old recovery line.
- 2002 Finnish recovery boiler users association
Project Manager and Process Specialist. Development of recommendations for firing NCG in recovery boiler Study "NOx formation and reduction in recovery boilers".
- 2001-2003 UPM-Kymmene Oyj Wisaforest, Finland.
Process Specialist for recovery line. Tender comparisons and technical discussions for the purchase of a new 4450 tds/d recovery boiler and 1000 t/h evaporation.
- 2001 Gap Insaat Yatirim Ve Dis Ticaret A.S., Turkey.
Area Manager for recovery line. Feasibility study and basic engineering for a new 60 000 ADt/a non wood pulp and paper mill in Turkmenistan.

Other Experience

- 2000-2001 Senior Development Manager, Andritz-Ahlstrom Corporation, Kraft Mill Business
- responsible for technical content in recovery boiler proposals
 - responsible for guarantees in recovery boiler proposals
 - development of standards for recovery boiler offerings
 - responsible for recovery boiler audits and performance tests.
- 1988-1991 Development Manager, CAE, A. Ahlström Osakeyhtiö, Varkaus
- management of CAE in Varkaus Boilerworks
 - steam and water circulation
 - black liquor combustion
 - kraft recovery boiler process
 - pressurized gasification of biofuels
 - fouling of heat transfer surfaces
 - off-design behaviour of steam generators.

- 1985-1988 Process Engineer, Ahlstrom Boiler Works, Varkaus
- combustion of biofuels
 - material and energy balances
 - heat transfer in steam generators
 - fluidized bed burning process
 - responsible for development of new generation of dimensioning programs for steam generator thermal design.
- 1984-1985 Assistant Professor of Power plants, Lappeenranta University of Technology
- furnace heat transfer
 - optimization of combined cycle processes
 - district heating
 - combustion of biofuels.
- 1981-1984 Researcher, Lappeenranta University of Technology
- small steam generator process, design and testing
 - solar technology for electricity generation
 - efficient use of energy and heat in industry.

Academic Training

- 1975 Graduate from Bridgeport Community High School, Mich. USA.
- 1982 M.Sc (DI), Lappeenranta University of Technology.
- 1986 Licentiate of Technology (TkL), Lappeenranta University of Technology.
- 1990-1991 Special studies, Institute of Paper Science and Technology, Atlanta, Georgia.
- 1993 Ph.D. (TkT), Lappeenranta University of Technology.
- 1997 Docent, Helsinki University of Technology.
- 1998 Docent, Lappeenranta University of Technology.

Patents

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| FI 954180 | Process and Equipment for Handling Smelt. |
| US 2002043221 &
FI 20000002285 | Arrangement for feeding black liquor into a recovery boiler. |
| US 6146604 & FI 104793 B | Method to Reduce Nitrogen Oxide Emissions from Recovery Boiler Fluegas. |
| US 2002162491 | Combustion air system for recovery boilers. |