



REFERENCE LIST

Selected references/Refurbishment and Overhaul Services

| Order | Completion | Project | Customer |
|-------|------------|---|--|
| | 2018 | <p>Jyväskylä, Keljo CHP, Finland. Repair of Turbogenerator T3ΦΠ-220-2Y3 (Elektrosila)</p> <p>Withdrawal of Generator rotor, removal/installation of retaining rings, maintenance works, checking of winding condition under retaining rings. Maintenance works in stator: partial re-wedging of slots, restoration of semi-conductive coating on the outlet from the slot in worn out places. Assembling of generator, balancing of GR. Project Management. Management at Site Maintenance services jointly with PJSC "Power Machines", Russia and Fortum Oy, Finland.</p> | <p>Jyväskylän Voima Oy, Finland</p> |
| | 2018 | <p>Raahе CHP, Raahе, Finland. Current maintenance of steam turbine unit 120 MW during warranty period</p> <p>Dismantling/re-installation of end shields from the side of brush gear on generator T3ΦΠ-110-2MY3. Visual survey of generator stator winding condition. Services on current maintenance of steam turbine unit KT-120-8,2. Project Management. Management at Site Maintenance services jointly with PJSC "Power Machines", Russia and OJSC "Teploenergoremont", Russia.</p> | <p>Raahen Voima Oy, Finland</p> |
| | 2018 | <p>Jyväskylä, Keljo CHP, Finland. Current overhaul of steam turbine unit T-185/210-16.2 (LMZ)</p> <p>Revision of turbine bearings № 5, 6. Revision of Generator rear bearing №7. Visual inspection of blades condition on last stages of LP rotor. Services on current maintenance of steam turbine unit</p> | <p>Jyväskylän Voima Oy, Finland</p> |



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| | | Project Management. Management at Site Overhaul services jointly with PJSC "Power Machines", Russia and OJSC "Teploenergoremont", Russia. | |
| | 2018 | Alholma CHP. Works within frames of planned outage of LMZ steam turbine K-255-162. Revision and overhaul of non-return valve servomotor (KOS) on extraction No.2 Visual inspection of blades condition on last stages of LP rotor. Project Management. Management at Site Overhaul services jointly with PJSC "Power Machines", Russia and OJSC "Teploenergoremont", Russia. | Alholmens Kraft Ab, Finland |
| | 2015 | Jyväskylä, Keljo CHP, Finland. Assembling of turbogenerator T3ΦΠ-220- 2Y3 (Elektrosila) Installation of Generator Rotor, alignment with LP rotor, assembling of semicouplings. Assembling of brushless exciter БВДΠ-520- 3000 У, alignment with GR, assembling of semi- couplings. Installation of end shields. Project Management. Management at Site Overhaul services jointly with PJSC "Power Machines", Russia and OJSC "Centroenergomontaz", Russia. | Jyväskylän Voima Oy, Finland |
| | 2014 | Jyväskylä, Keljo CHP, LMZ steam turbine T-185/210-16.0-P: Re-alignment of IPR/LPR, revision of bearings, works on current service. Re-alignemnt or IP / LP rotors, revision of bearings 3, 4, 5, 6, modernization of oil sealings on front LPC bearing. IP rotor balancing. Project Management. Management at Site Overhaul services jointly with PJSC "Power Machines", Russia and OJSC "Centroenergomontaz", Russia. | Jyväskylän Voima Oy, Finland |



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| | 2014 | <p>Survey of condition and operation conditions of turbogenerator TVF-63-2, Raahe CHP, Raahe, Finland</p> <p>Condition and operation survey of generator shaft oil sealings. Project Management. Management at Site Jointly with PJSC "Power Machines", Russia</p> | Rautaruukki Oy, Finland |
| | 2014 | <p>Alholma CHP Project. Works within frames of planned outage of LMZ steam turbine K-255-162.</p> <p>Overhaul of IP Control Valve. Adjustment of servomotors characteristics on turbine steam valves. Project Management. Management at Site Overhaul services jointly with PJSC "Power Machines", Russia and OJSC "Centroenergomontaz", Russia.</p> | Alholmens Kraft Ab, Finland |
| 2013 | 2013 | <p>Alholma CHP Project. Major Overhaul of Steam Turbine on Alholma CHP</p> <p>Major overhaul of Turbine auxiliary equipment and systems: Tests before turbine trip (vacuum & steam distribution); After turbine trip: revision of Governing system (hydraulic part); revision and overhaul of governing oil pump 1, revision of steam valves servomotors; Revision and overhaul of turbine steam valves; revision of lubrication and jacking oil system; revision of LPC cooling system; Revision of Sealing system; vacuum system; Revision of KOS valves on turbine extractions.</p> | Alholmens Kraft Ab |
| 2012 | 2012 | <p>Jyväskylä CHP Project. Turbogenerator</p> <p>First inspection and overhaul of air-cooled synchronous Turbo-Generator of type T3ΦΠ-220-2Y3 with withdrawal of Generator rotor. Turbo-Generator manufactured by Elektrosila,</p> | Jyväskylän Voima Oy |



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| | | <p>Russia.</p> <ul style="list-style-type: none"> * Revision of brushless exciter БВДТТ-520-3000 У3. * Revision of Generator (with removal of rotor) * Overhaul Services jointly with Power Machines, Russia. | |
| 2011 | 2011 | <p>Toppila 2 Steam Turbine Plant, 140 MW</p> <p>Overhaul of steam turbine T-140-145, manufactured by Leningrad metal Works (LMZ),</p> <ul style="list-style-type: none"> * Refurbishment of LPC * Replacement of last stage blades * Annual overhaul services, jointly with Power Machines, Russia and BERN, Belorussia | Oulun Energia Oy, Finland |
| | 2003-2012 | <p>Alholma 2 Steam Turbine Plant, 255 MW</p> <p>Annual operation monitoring and overhaul services of 255 MW steam turbine, manufactured by Leningrad metal Works (LMZ), jointly with Power Machines, Russia and Centroenergmontazh, Russia</p> | Oy Alholmens Kraft Ab, Finland |
| 2009/2010 | 2011 | <p>Raahе Steam Turbine Plant, 55 MW</p> <p>Delivery of new turbine rotor and spare parts for turbine and generator overhaul, jointly with Power Machines, Russia</p> | Rautaruukki Oy Finland |
| 2010 | 2010 | <p>Toppila 2 Steam Turbine Plant, 140 MW</p> <ul style="list-style-type: none"> * Major overhaul of steam turbine T-140-145, manufactured by Leningrad metal Works (LMZ), jointly with Power Machines, Russia and BERN, Belorussia * Delivery of spare parts for the overhaul | Oulun Energia Oy, Finland |



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| 2010 | 2010 | <p>Toppila 1 Steam Turbine Plant, 67 MW</p> <p>* Major overhaul of steam turbine 11P68-0-6, manufactured by ZAMECH, Poland, jointly with Power Machines, Russia and BERN, Belorussia</p> | Oulun Energia Oy, Finland |
| | 2000 2001 2002 2005 2006 2008 2009 | <p>Toppila 2 Steam Turbine Plant, 140 MW</p> <p>Annual overhaul services of steam turbine T-140-145, manufactured by Leningrad metal Works (LMZ), jointly with Power Machines, Russia and Centroenergomontazh, Russia</p> | Oulun Energia Oy, Finland |
| 2005 | 2006 | <p>Pamilo Hydro Power Plant</p> <p>Upgrade and refurbish of Hydro machinery 32,4 MW jointly with Fortum Service Oy</p> <p>* consortium leader</p> <p>* project coordination</p> <p>* delivery of new generator stator (manufactured by Power Machines Group, branch Electrosila, St. Petersburg, Russia)</p> <p>* delivery of new turbine runner and wicket gate (manufactured by Power Machines Group, branch LMZ, St. Petersburg, Russia)</p> <p>* automation updates</p> <p>* other minor local deliveries</p> | Pamilo Oy (Vattenfall), Finland |
| 2004 | 2004 | <p>Toppila 2 Steam Turbine Plant, 140 MW</p> <p>* Major overhaul of steam turbine T-140-145, manufactured by Leningrad metal Works (LMZ), jointly with Power Machines, Russia and Centroenergomontazh, Russia</p> <p>* Delivery of spare parts for the overhaul</p> | Oulun Energia Oy Finland |



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| 2004 | 2004 | <p>Raahe Steam Turbine Plant, 55 MW</p> <ul style="list-style-type: none"> * Major overhaul of steam turbine K-50-90-4, manufactured by Leningrad Metal Works (LMZ), jointly with Power Machines, Russia and Centroenergomontazh, Russia * Delivery of spare parts for the overhaul | Rautaruukki Oy Finland |
| 2001 | 2004-2005 | <p>Refurbishment and major overhaul of two 215 MW steam turbines, Narva, Estonia</p> <ul style="list-style-type: none"> * project coordination * basic and detail engineering * inspection of actual condition of turbine plant, residual life assessment * refurbishment and uprating of low pressure turbine * complete overhaul and upratings of HP and IP turbines * modernization of turbine control, monitoring and auxiliary systems * refurbishment of turbine oil system * implementation of rotors jacking oil system * full replacement of condenser tube system modules by new modules with stainless steel pipes * refurbishment of gland steam system * implementation of two-bypass start-up system (turbine start-up through intermediate pressure cylinder) * miscellaneous modifications ** modification of flange and studs heating system ** pre-start warming-up of the IP rotor ** turbine drain system modifications ** anti-friction coating for turbine support legs * deliveries of equipment and parts for refurbishment * dismantling and re-erection of turbine and modernized equipment * site management and supervision * commissioning of refurbished plant | Foster Wheeler Energia Oy, Finland |



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| 1998 | 1999-2001 | <p>Retrofit of Feed Water Pumps, Perm 3x800 MW Power Plant jointly with KSB (Germany)</p> <ul style="list-style-type: none"> * project management * retrofit of 6 pcs of feed water pumps * delivery of 6 pcs of booster pumps * erection supervision and commissioning | Permskaya GRES, Russia |
| 1998 | 1998 | <p>Tahkoluoto Steam Turbine Plant, 240 MW</p> <ul style="list-style-type: none"> * Major overhaul of steam turbine manufactured by Leningrad Metal Works (LMZ) * delivery of spare parts | PVO-Lämpövoima Oy, Finland |
| 1994 | 1995 | <p>Refurbishment of Low-Pressure Turbine for Tahkoluoto Power Plant</p> <p>Delivery of new Low-Pressure Rotor and internal casing for 240 MW condensing turbine plant jointly with LMZ Energy Ltd</p> | PVO-Lämpövoima Oy, Finland |
| 1991 | 1992 | <p>Lielhti Combined Cycle Power Plant, Finland</p> <p>Dry Low Nox Conversion of 2 x 40 MW Gas Turbine Units jointly with General Electric Company, USA</p> <ul style="list-style-type: none"> * coordination of local supplies and services * site management * agency activities | Tampere City Electricity Works, Finland |