

# REFERENCE LIST



## LIDER INNOWACJI 2010

Za innowacyjną technologię:  
„Sposób mokrego gaszenia koksu”

Za innowacyjną technologię:  
„Sposób i układ urządzeń  
do odsmalania wód koksowniczych”

The reference list includes selected technical solutions that have been developed by the PMT "Multicon" sp. z o. o. including research, technical documentation, comprehensive realization of the investment and start-up. Most of the solutions is an original, confirmed granted patents and know - how. The implementation of many of the cited works is the result of research carried out together with the Department of Chemical and Process Equipment Design, Faculty of Chemistry at Silesian University of Technology. This cooperation has also resulted in numerous publications, technical expertise and several doctoral dissertations. Applied in Polish industry solutions, achieved very good technical and economic factors at the same time significantly reduced investment costs compared to domestic and abroad competitive offers.

## **SELECTED REALISATIONS OF APPARATUSES AND TECHNOLOGICAL LINES**

1. **Zakłady Azotowe "Kędzierzyn", Kędzierzyn- Koźle:** *Absorption of nitrogen oxides from the nitric acid production line 2 x 70 000 Nm<sup>3</sup> / h*
2. **Zakłady Chemiczne "Zachem", Bydgoszcz:** *Chlorine dehydration (desiccation)*
3. **Port Handlowy, Gdynia:** *Absorption of benzol vapors generated during the tankers loading*
4. **Zakłady Chemiczne "Blachownia", Kędzierzyn- Koźle:** *Absorption of benzene vapors - yield 3 000 Nm<sup>3</sup>/ h*
5. **Kombinat Koksochemiczny, Coke Plant Radlin:** *1- coke- oven gas cooling, 2- tar removing from coke gas, 3- absorption of benzol from coke- oven gas - yield 33 000 Nm<sup>3</sup>/ h*
6. **Coke Plant Zdzeszowice:** *The tar removing from the coke- oven gas – yield 50 000 Nm<sup>3</sup>/ h*
7. **ZG KGHM Polska Miedź S.A. Sieroszowice:** *Sulfuric acid vapours separator*
8. **Coke Plant Knurów:** *Coke quenching by contraction method using cellular packing*
9. **Coke Plant Zdzeszowice:** *Coke quenching by contraction method using cellular packing*
10. **Coke Plant Dębieńsko:** *Coke quenching by contraction method using cellular packing*
11. **Coke Plant Radlin:** *Coke quenching by contraction method using cellular packing*
12. **Zakłady Metalowe „Duo Stal”, Bytom:** *Coke quenching by contraction method using cellular packing*
13. **Zakłady Azotowe „Kędzierzyn”:** *Ammonia absorption from urea decomposes gases - yield 10 000 Nm<sup>3</sup>/h*
14. **Coke Plant Knurów:** *Ammonia stripper column – sludge yield 15 m<sup>3</sup>/h*
15. **Coke Plant Knurów:** *Ether distillation column from coking wastewater*
16. **ZPT Brzeg:** *Static mixer in the injection method of nitrogen oxides reduction in the boiler*
17. **Zakłady Azotowe „Kędzierzyn”:** *Static mixers of technological solutions*
18. **Zakłady Azotowe „Kędzierzyn”:** *Lamellas in the purification plant of absorption solution*
19. **„Inofama” S.A., Inowrocław:** *Installation of flux regeneration used in the hot dip galvanizing of steel products*
20. **Fabryka Kotłów „RAFAKO” S.A., Racibórz:** *Analysis of the suitability of sludge after water decarbonisation to flue gas desulphurisation at the Siersza Power Plant and development of utilization technologies*
21. **Kombinat Koksochemiczny Zabrze:** *Installation of benzol with a tubular furnace - yield 80 m<sup>3</sup>/h of scrubbing oil*
22. **Zakłady Chemiczne „Anwil”, Włocławek:** *Cellular separator in PVC columns*
23. **Zakłady Azotowe „Kędzierzyn”:** *Installation of complementary waste gas utilization from the urea production plant*

24. **PKN Orlen:** *Extraction column WE 1998/1999*
25. **Zakłady Azotowe „Anwil”, Włocławek:** *Gas drying column, 2000*
26. **Rafineria Czechowice:** *Column for paraffin deodorization, 2000*
27. **Zakłady Chemiczne Police:** *Installation of titanium dioxide micronization, 2001*
28. **Petrochemia Blachownia:** *Installation of hydrocarbon fractions distillation, 2001*
29. **Zakłady Chemiczne Zachem, Bydgoszcz:** *Utilization node of gases containing hydrogen chloride and phosgene, 2002*
30. **SPED-KOL Blachownia, Kędzierzyn-Koźle:** *Hermetization of tank evaporation used to transport liquid hydrocarbon mixtures, 2002*
31. **PPH POCh, Gliwice:** *Implementation of multistage absorbers with cellular packing in POCh installations – 12 objects in 2004 ÷ 2008. Installations: potassium cyanate, palladium chloride, TDA catalyst combustion, ammonium phosphate, cadmium nitrate, hydrofluoric acid dilution, distillation of hydrofluoric acid, ammonium fluoride, ammonium fluoroborate, fluorosilicic acid, chlorination installation, stannous chloride installation and brominating plant. Multi-component absorption with chemical reaction eliminates the following gas components: NO<sub>2</sub>, HCl, Cl<sub>2</sub>, HNO<sub>3</sub>, NO<sub>3</sub>, Br<sub>2</sub>, HBr, soot.*
32. **Zakłady Koksownicze „Zdzieszowice”:** *Two-stage static mixing station for coagulants in the tar removing coke- oven water system, 2005*
33. **Zakłady Chemiczne Nitro- Chem, Bydgoszcz:** *Installation of NO<sub>x</sub> absorption, 2008*
34. **Soda Polska Ciech – Mątwy:** *Installation project of furnace gas dedusting in a Lime Furnaces System, 2008*
35. **RATech Polska, Bytom:** *Fan air coolers WF – 0801, 2008*
36. **Zakłady Chemiczne ZACHEM S.A., Bydgoszcz:** *Technical documentation for the modernization of chlorine absorption tower, 2009*
37. **Poltegor Instytut - Instytut Górnictwa Odkrywkowego, Wrocław:** *- Design and implementation installation of lignite gasification, 2010*
38. **PWiK Rybnik -** *Implementation of sequential installation of biomass conversion method, 2011*
39. **SGL CARBON POLSKA SA, Racibórz:** *- Development of the concept and design documentation vapor condenser tanks for tar and pitch, 2011*
40. **Zakłady Chemiczne POLICE S.A., Police:** *Modernization concept of existing gas purification systems (dedusting and absorption) on PN1 and MAP fertilizer plants, 2012*
41. **Gryfskand Sp. z o.o., Gryfino:** *Flue gas separator with cellular packing, 2012*
42. **HUTNI PROJEKT Frydek- Mistek a.s., Czech Republic:** *Assumptions for development of quenching tower in coke-oven batteries under project TA 02021153 for warranty parameters 50 g / t dry coke, 2012*
43. **Zakłady Chemiczne POLICE S.A., Police –** *The concept of modernization of the wet gas dedusting nipple X PN1, 2013*
44. **CARBOAUTOMATYKA S.A., Tychy:** *The project of the Composite Solid Fuels Production Line with a capacity of 60 000 tonnes per year, 2013*
45. **CARBOAUTOMATYKA S.A., Tychy:** *Technical assistance in the launch of the Department of Composite Fuels. Investor: Polski Koks "Construction of a Solid Composite Plant with capacity of 60 thousand tonnes per year", 2013*
46. **CHEMADEX S.A., Warszawa:** *Conceptual design of equipment modification "Biological wastewater treatment plant from Nordzucker Polska S.A. Plant in Opalenica, 2013*

47. **MATUSEWICZ Budowa Maszyn S.J., Gryfów Śląski:** *Process design of fumes purification node coming from the titanium elements electrolytic etching line*, 2014
48. **Soda Polska CIECH SA, Inowrocław:** *Construction assumptions and calculation of SBCL gas scrubber*, 2014
49. **Soda Polska CIECH SA, Inowrocław:** *Project documentation for the modernization of furnace gas purifying facilities*, 2015
50. **Grupa Azoty - Zakłady Chemiczne POLICE S.A., Police:** *Concept for improving the operation of monohydrate neutralization plant*, 2015
51. **PROCHEM SZEJA:** *Adaptation of the thermoconverter and thermal decomposition test of polyolefins*, 2015
52. **STEICO Sp. z o.o., Czarnków:** *Process design of the heat recovery node from drying gases*, 2015
53. **Silekol Sp. z o.o., PFLEIDERER GROUP, Kędzierzyn- Koźle:** *Conceptual and process project for investment "Purification of gases from R1 ... R8 reactors of urea adhesive and gases cleaning from spray drying"*, 2015
54. **Silekol Sp. z o.o., PFLEIDERER GROUP, Kędzierzyn- Koźle:** *Conceptual and process project for investment "Drying gas cleaning"*, 2015
55. **Silekol Sp. z o.o., PFLEIDERER GROUP, Kędzierzyn- Koźle:** *Conceptual and process design for an investment project "Air purification from urea pneumatic transport system"*, 2015
56. **MetalCo Sp. z o.o., Katowice:** *Design, implementation and delivery of the gas purification node from rotary drum furnace*, 2016
57. **Grupa Azoty Zakłady Chemiczne POLICE S.A.:** *Updating the concept of modernization of existing gas purification systems (dedusting and absorption) in the MAP production node at the PN3 production plant in the Azoty Chemical Plant "POLICE" S.A.*, 2016
58. **MESKO, Pionki:** *Dust collector for process air cleaning*, 2016
59. **KGHM Polska Miedź SA Oddział Huta Miedzi Legnica:** *Development of a technical project and execution of a pilot installation - "Preliminary technical assumptions for the process of preparing a feed for a shaft furnace - pilot trials"*, Executive Consortium: Silesian University of Technology in Gliwice - PMT "MULTICON", 2016
60. **BT SODACONSULT s.c., Kraków:** *Development of structural desing assumptions and process calculations for LCL modernization at CIECH Soda Plant in Stassfurt, Germany*, 2016
61. **URSA Polska Sp. z o.o., Dąbrowa Górnicza:** *Measurement of gaseous and particulate pollutants in the gas purification system and development of results*, 2017
62. **ALKAT Sp. z o.o., Kraków:** *Process analysis of the existing cooling system and proposed system modernization in the Company ALKAT in Dąbrowie Górniczej*, 2017
63. **BT SODACONSULT s.c., Kraków:** *Structural design assumptions and process calculations of the absorption column in a small absorption installation in CIECH Soda Polska - Maławy*, 2017
64. **KGHM ZANAM S.A., Polkowice:** *Design and construction of a hybrid scrubber in converter slag granulation plant in HMG I*, 2017
65. **AVANTOR Performance Materials Poland S.A. Gliwice:** *The hybrid absorber with cellular packing*, 2017
66. **BT SODACONSULT s.c., Kraków:** *Calculation and design work of the DCB column at the CIECH Soda Deutschland - Stassfurt*, 2017
67. **SGL CARBON Polska, Nowy Sącz:** *Technical project of the hybrid column of the absorption node*, 2017

68. **CIECH Soda Polska S.A., Inowrocław:** *Modification of the gas scrubber SB-CL*, 2017
69. **KGHM Polska Miedź S.A. Huta Miedzi „Legnica”:** *Research and development work: Reduction of As and Hg emissions from the gas purification installation from copper concentrate dryers in the „Legnica” Copper Smelter - Consortium Member* – 2017
70. **ALSTAL Serwis Sp. z o.o., Sp.k. Jacewo:** *Execution and delivery of the MAB absorption column for absorption and carbonization installations at CIECH Soda Polska SA - ZP Mątwy*, 2017
71. **CIECH Soda Polska S.A. ZP Janikowo:** *Design and construction of equipment for the furnace gas treatment node at CIECH Soda Polska S.A. – Janikowo*, 2018
72. **KGHM Polska Miedź SA Huta Miedzi Głogów:** *Modernization of the exhaust system from the TM18 foundry machine at the P-24 Department - turnkey implementation - Consortium Leader*, 2018
73. **BSiPCE Projchłod Sp. z o.o., Gliwice:** *The concept of upgrading coke quenching tower at the "Jadwiga" Coking Plant with the use of cellular packing*, 2018
74. **CIECH Soda Polska S.A., Inowrocław:** *Expertise of damaged demisters in the Salt Brewery Installation at ZP Janikowo*, 2018
75. **BT SODACONSULT s.c., Kraków:** *Process and engineering calculations of the DCB column for CIECH Soda Polska SA*, 2018
76. **Wałbrzyskie Zakłady Koksownicze „VICTORIA” S.A., Wałbrzych:** *Overhaul project of the No. 1 coke quenching tower for reducing dust emissions with the use of cellular packing's low-emission system (conceptual- process and executive projects)*, 2018
77. **Wałbrzyskie Zakłady Koksownicze „VICTORIA” S.A., Wałbrzych:** *Overhaul project of the No. 2 coke quenching tower for reducing dust emissions with the use of cellular packing's low-emission system (conceptual- process and executive projects)*, 2018
78. **Carbo- Koks Sp. z o.o., Bytom:** *Modernization of coke quenching tower in Carbo - Koks Sp. z o.o. Bytom to adapt its operating parameters to the requirements arising from BAT 51 conclusions*, 2019
79. **BT SODACONSULT s.c., Kraków:** *Process and engineering calculations of the CC distillation column for DS – condensate for CIECH Soda Deutschland*, 2019
80. **BT SODACONSULT s.c., Kraków:** *Process and engineering calculations of the CC distillation column for Kalzi – condensate for CIECH Soda Deutschland*, 2019
81. **Fabryka Papieru Kaczory Sp. z o.o., Kaczory:** *Design, construction and delivery of a high-velocity cooler for circulating water - 2 sets*, 2020
82. **CIECH Soda Deutschland, Stassfurt:** *Washing systems for LCL absorption columns - 2 sets - production and delivery*, 2020
83. **KGHM Polska Miedź S.A. Huta Miedzi Legnica:** *Construction of the 2nd stage of wet dedusting in the gas purification installation from copper concentrate dryers to reduce As and Hg emissions to the levels specified in the BAT conclusion - Consortium Leader*, 2021

#### **HIGH-VELOCITY COOLERS WITH CELLULAR PACKING, SELECTED IMPLEMENTATIONS:**

1. PZMI "Izoopol" w Trzemesznie:  $V_w = 100 \text{ m}^3/\text{h}$ ,  $t_{w1} = 95^\circ\text{C}$ ,  $t_{w2} = 45^\circ\text{C}$
2. Zakłady Chemiczne "Zachem" w Bydgoszczy:  $V_w = 168 \text{ m}^3/\text{h}$ ,  $t_{w1} = 40^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
3. ZPOW "Pudliszki" w Pudliszkach:  $V_w = 6 \text{ m}^3/\text{h}$ ,  $t_{w1} = 40^\circ\text{C}$ ,  $t_{w2} = 21^\circ\text{C}$
4. ZPS "Polmos" w Lesznie:  $V_w = (150...200) \text{ m}^3/\text{h}$ ,  $t_{w1} = 50^\circ\text{C}$ ,  $t_{w2} = 28^\circ\text{C}$
5. Śląskie Zakłady Rafineryjne Czechowice-Dziedzice:  $V_w = 5 \times 200 \text{ m}^3/\text{h}$ ,  $t_{w1} = 46^\circ\text{C}$ ,  $t_{w2} = 27^\circ\text{C}$
6. ZPG "Stomil" w Grudziądzu:  $V_w = 2 \times 450 \text{ m}^3/\text{h}$ ,  $t_{w1} = 27^\circ\text{C}$ ,  $t_{w2} = 20^\circ\text{C}$
7. Z T S "Erg" w Gliwicach:  $V_w = 120 \text{ m}^3/\text{h}$ ,  $t_{w1} = 35^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
8. Zakłady Gazów Technicznych "Polgaz" w Oświęcimiu:  $V_w = 50 \text{ m}^3/\text{h}$ ,  $t_{w1} = 30^\circ\text{C}$ ,  $t_{w2} = 23^\circ\text{C}$
9. TAM-Maribor, Jugosławia:  $V_w = 150 \text{ m}^3/\text{h}$ ,  $t_{w1} = 29^\circ\text{C}$ ,  $t_{w2} = 24^\circ\text{C}$
10. Rafineria Nafty "Jedlicze" w Jedliczach:  $V_w = 200 \text{ m}^3/\text{h}$ ,  $t_{w1} = 37^\circ\text{C}$ ,  $t_{w2} = 27^\circ\text{C}$
11. ZPS „POLMOS” Żyrardów:  $V_w = 50 \text{ m}^3/\text{h}$ ,  $t_{w1} = 90^\circ\text{C}$ ,  $t_{w2} = 30^\circ\text{C}$
12. „ARMATURA” Kraków:  $V_w = 100 \text{ m}^3/\text{h}$ ,  $t_{w1} = 45^\circ\text{C}$ ,  $t_{w2} = 35^\circ\text{C}$
13. „STREM” Dąbrowa Górnicza:  $V_w = 80 \text{ m}^3/\text{h}$ ,  $t_{w1} = 27^\circ\text{C}$ ,  $t_{w2} = 22^\circ\text{C}$
14. „IZOPOL” Trzemeszno:  $V_w = 150 \text{ m}^3/\text{h}$ ,  $t_{w1} = 35^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
15. „POWEN” Zabrze:  $V_w = 47 \text{ m}^3/\text{h}$ ,  $t_{w1} = 38^\circ\text{C}$ ,  $t_{w2} = 28^\circ\text{C}$
16. „Hydrovacuum” Grudziądz:  $V_w = 80 \text{ m}^3/\text{h}$ ,  $t_{w1} = 38^\circ\text{C}$ ,  $t_{w2} = 28^\circ\text{C}$
17. Z.K. „ZABRZE” w Zabrze:  $V_w = 4 \times 125 \text{ m}^3/\text{h}$ ,  $t_{w1} = 45^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
18. WPPZ Luboń:  $V_w = 2 \times 60 \text{ m}^3/\text{h}$ ,  $t_{w1} = 48^\circ\text{C}$ ,  $t_{w2} = 28^\circ\text{C}$
19. KGHM Polska Miedź S.A. HM „Głogów II”:  $V_w = 1200 \text{ m}^3/\text{h}$ ,  $t_{w1} = 68^\circ\text{C}$ ,  $t_{w2} = 48^\circ\text{C}$
20. KGHM Polska Miedź S.A. HM „Głogów II”:  $V_w = 1200 \text{ m}^3/\text{h}$ ,  $t_{w1} = 48^\circ\text{C}$ ,  $t_{w2} = 32^\circ\text{C}$
21. KGHM Polska Miedź S.A. HM „Głogów II”:  $V_w = 450 \text{ m}^3/\text{h}$ ,  $t_{w1} = 45^\circ\text{C}$ ,  $t_{w2} = 30^\circ\text{C}$
22. ZCh „Police” S.A.:  $V_w = 80 \text{ m}^3/\text{h}$ ,  $t_{w1} = 40^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
23. Herbapol – „Techplant”:  $V_w = 2 \times 60 \text{ m}^3/\text{h}$ ,  $t_{w1} = 45^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
24. Eurocentrum Innowacji i Przedsiębiorczości Pleszew:  $V_w = 80 \text{ m}^3/\text{h}$ ,  $t_{w1} = 70^\circ\text{C}$ ,  $t_{w2} = 50^\circ\text{C}$
25. W2 Technologia Sp. z o.o. Kraków:  $V_w = 15 \text{ m}^3/\text{h}$ ,  $t_{w1} = 35^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$
26. Fabryka Papieru Kaczory Sp. z o.o., Kaczory:  $V_w = 10 \text{ m}^3/\text{h}$ ,  $t_{w1} = 45(38)^\circ\text{C}$ ,  $t_{w2} = 25^\circ\text{C}$

#### **LAMELLA SETTLER, SELECTED PROJECTS:**

1. Kopalnia „Pokój”, Ruda Śląska: Chamber separator containing plate filling for the purification of mine waters.
2. Zakłady Azotowe, Kędzierzyn- Koźle: Lamella settler for purifying soda solution, supplying the NOx absorption node, after nitric acid installation, to reduce NOx emissions.
3. Zakłady Koksownicze „Zdzieszowice”: Counterflow plate settler for water purification after coke quenching tower ( $400 - 550 \text{ m}^3/\text{h}$ ), 2 nodes.
4. Zakłady Koksownicze „Zdzieszowice”: Silage settler for coke water tar removing by coagulant and sedimentation method (about  $70 \text{ m}^3/\text{h}$ ), 3 nodes.
5. Water Treatment Plant, Zbylitowska Góra: Development of design guidelines for modernization of settlers of water treatment plants
6. Coke Plant Kraków, Lamella settler for coke water tar removing by coagulant and sedimentation method (about  $40 \text{ m}^3/\text{h}$ ), 2 nodes, 2011
7. Bumar Amunicja Skarżysko- Kamienna: Lamella settler for circulating water purification in a gas purification plant of a tungsten heavy alloy plant, 3 knots, 2014
8. MetalCo Sp. z o.o., Katowice: Lamella settler for separation of solid particles from process water used in wet dedusting of furnace gases - Gas purification node from rotary drum furnace, 2016

**HYBRID DEDUSTER (for simultaneous processes of dedusting, absorption and heat utilization ) - SELECTED PROJECTS:**

1. Janikowskie Zakłady Sodowe „Janikosoda”: *Wet hybrid soda deduster*, 2005
2. Soda Mątwy – Inowrocław: *Wet hybrid soda deduster*, 2006
3. Bereznikowskie Zakłady Sodowe – Berezniki, Russia: *Wet hybrid soda deduster*, 2008
4. Bumar Amunicja Skarżysko-Kamienna: *Wet hybrid dust separators for gas purification from tungsten heavy alloy plant, 3 nodes*, 2014
5. Steico Sp. z o.o., Czarnków: *Hybrid scrubber for heat recovery from drying gases*, 2015
6. Silekol Sp. z o.o. PFLEIDERER GROUP, Kędzierzyn- Koźle: *The S1, S2, S3 hybrid scrubber for process air cleaning from R1...R8 reactors of urea adhesive*, 2015
7. Silekol Sp. z o.o. PFLEIDERER GROUP, Kędzierzyn- Koźle: *The S1 scrubber for drying gas purification*, 2015
8. Silekol Sp. z o.o. PFLEIDERER GROUP, Kędzierzyn- Koźle: *The S2 scrubber for drying gas purification*, 2015
9. Soda Polska CIECH S.A.: *The hybrid scrubber for high temperature gas purification*, 2015
10. MetalCo Sp. z o.o., Katowice: *The scrubber for gas purification from rotary drum furnace*, 2016
11. KGHM ZANAM S.A., Polkowice: *The hybrid scrubber in converter slag granulation plant in HMG I*, 2017
12. CIECH Soda Polska S.A ZP Janikowo: *The hybrid scrubber for furnace gas purification*, 2018
13. KGHM Polska Miedź SA Huta Miedzi Głogów: *The SHM10.1 and SHM20.1 hybrid scrubbers with cellular packing for Modernization of the exhaust system from the TM18 foundry machine at the P-24 Department*, 2018
14. KGHM Polska Miedź S.A. Huta Miedzi Legnica: *The SHM1, SHM2 hybrid scrubbers with cellular packing for 2nd stage of wet dedusting in the gas purification installation from copper concentrate*, 2021

## Laureate of the Nationwide Competition "Leader of Innovation"

Certificate awarded by Regional Innovation Center and Silesian Technical Club and Rationalization in Katowice under the auspices of the Marshal of the Silesia and the President of the Patent Office of the Republic of Poland



### Leader of Innovation 2010

for innovative technology:

*"Method and equipment of the tar removing system from the coal water "*



### Leader of Innovation 2010

for innovative technology:

*"Wet coke quenching method"*

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