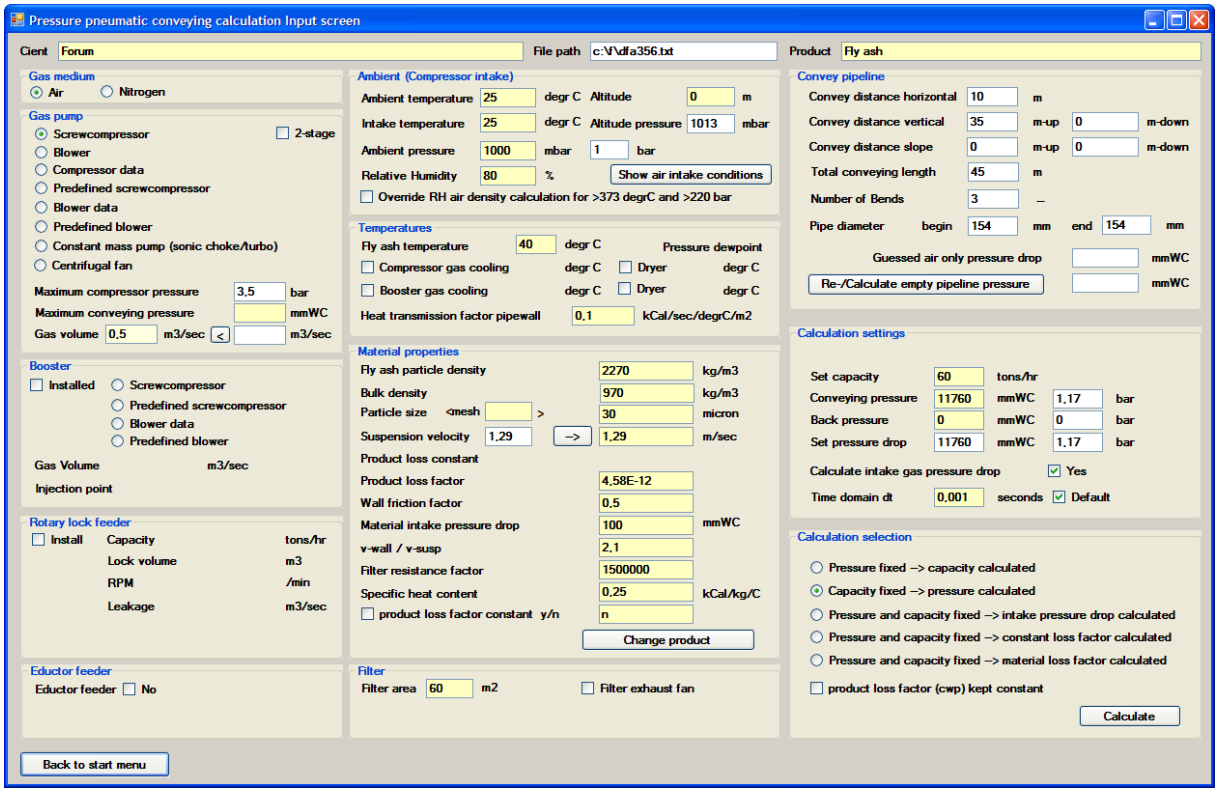
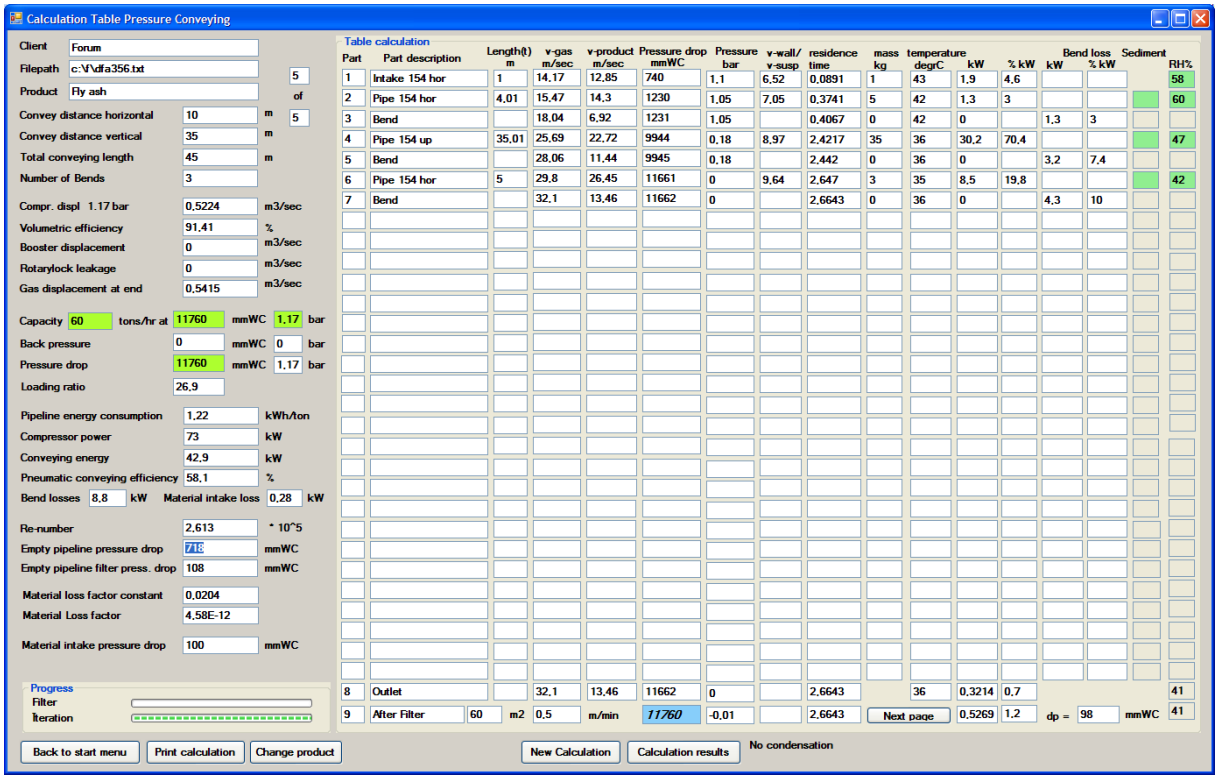
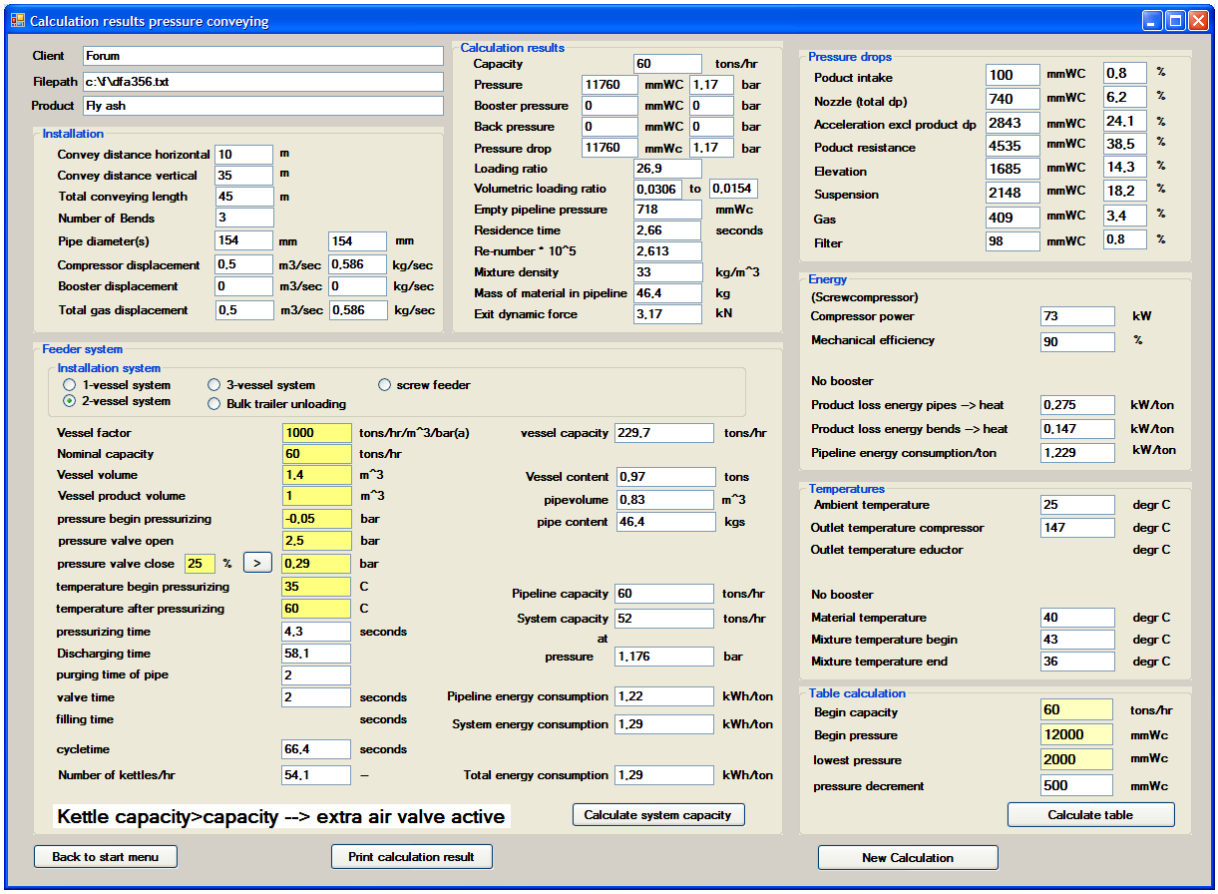
Calculation for Aerzen screwcompressor






Calculation results pressure conveying
Client Forum
Filepath c:\f\dfa356.txt
Product Fly ash
Installation
Convey distance horizontal 10 m
Convey distance vertical 35 m
Total conveying length 45 m
Number of Bends 3
Pipe diameter(s) 154 mm 154 mm
Compressor displacement 0,5 m3/sec 0,586 kg/sec
Booster displacement 0 m3/sec 0 kg/sec
Total gas displacement 0,5 m3/sec 0,586 kg/sec
Calculation results
Capacity 60 tons/hr
Pressure 11760 mmWC 1,17 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Pressure drop 11760 mmWc 1,17 bar
Loading ratio 26,9
Volumetric loading ratio 0,0306 to 0,0154
Empty pipeline pressure 718 mmWc
Residence time 2,66 seconds
Re-number * 10^5 2,613
Mixture density 33 kg/m^3
Mass of material in pipeline 46,4 kg
Exit dynamic force 3,17 kN
Pressure drops
Poduct intake 100 mmWC 0,8 %
Nozzle (total dp) 740 mmWC 6,2 %
Acceleration excl product dp 2843 mmWC 24,1 %
Poduct resistance 4535 mmWC 38,5 %
Elevation 1685 mmWC 14,3 %
Suspension 2148 mmWC 18,2 %
Gas 409 mmWC 3,4 %
Filter 98 mmWC 0,8 %
Energy
(Screwcompressor)
Compressor power 73 kW
Mechanical efficiency 90 %
No booster
Product loss energy pipes --> heat 0,275 kW/ton
Product loss energy bends --> heat 0,147 kW/ton
Pipeline energy consumption/ton 1,229 kW/ton
Temperatures
Ambient temperature 25 degr C
Outlet temperature compressor 147 degr C
Outlet temperature eductor degr C
No booster
Material temperature 40 degr C
Mixture temperature begin 43 degr C
Mixture temperature end 36 degr C
Table calculation
Begin capacity 60 tons/hr
Begin pressure 12000 mmWc
lowest pressure 2000 mmWc
pressure decrement 500 mmWc
Calculate table
Feeder system
Installation system
1-vessel system
2-vessel system
3-vessel system
Bulk trailer unloading
screw feeder
Vessel factor 1000 tons/hr/m^3/bar(a)
Nominal capacity 60 tons/hr
Vessel volume 1,4 m^3
Vessel product volume 1 m^3
pressure begin pressurizing -0,05 bar
pressure valve open 2,5 bar
pressure valve close 25 % > 0,29 bar
temperature begin pressurizing 35 C
temperature after pressurizing 60 C
pressurizing time 4,3 seconds
Discharging time 58,1
purging time of pipe 2
valve time 2 seconds
filling time seconds
cycletime 66,4 seconds
Number of kettles/hr 54,1 --
vessel capacity 229,7 tons/hr
Vessel content 0,97 tons
pipevolume 0,83 m^3
pipe content 46,4 kgs
Pipeline capacity 60 tons/hr
System capacity 52 tons/hr
at
pressure 1,176 bar
Pipeline energy consumption 1,22 kWh/ton
System energy consumption 1,29 kWh/ton
Total energy consumption 1,29 kWh/ton
Kettle capacity>capacity --> extra air valve active
Calculate system capacity
Back to start menu
Print calculation result
New Calculation

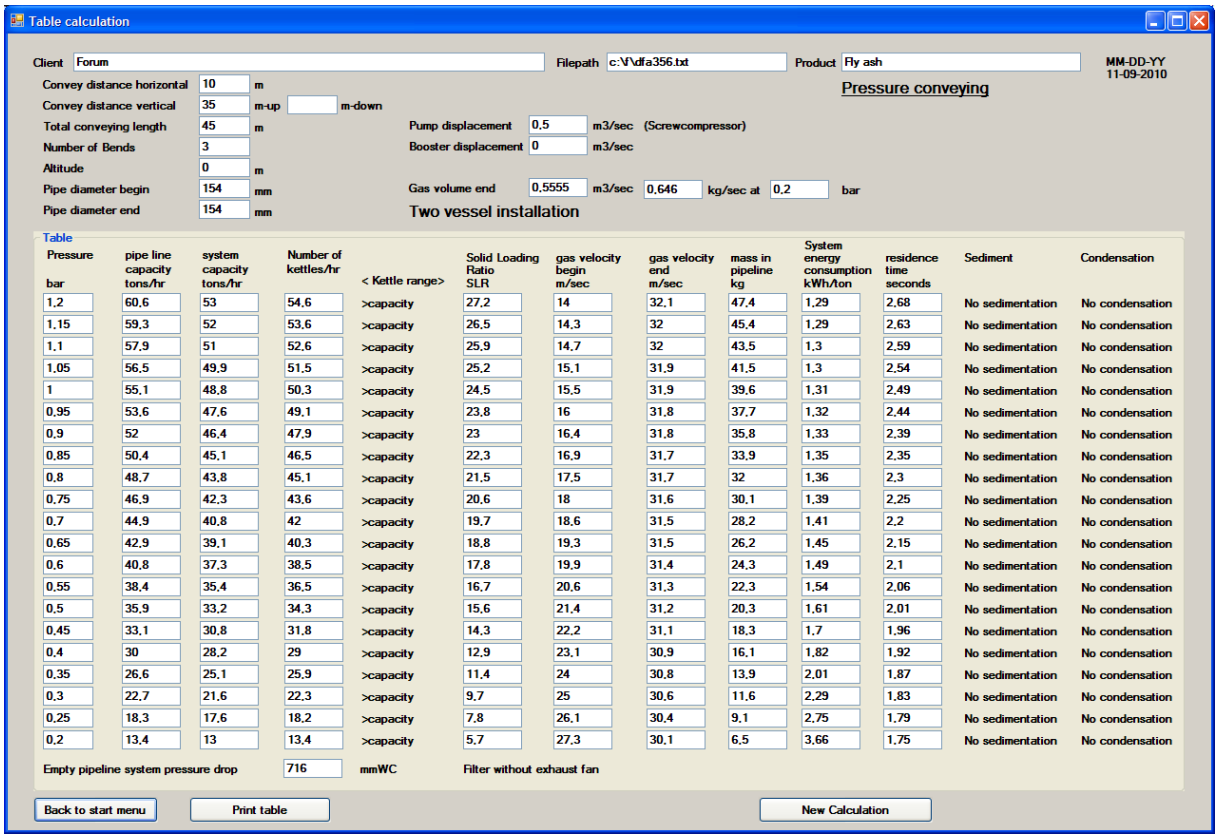
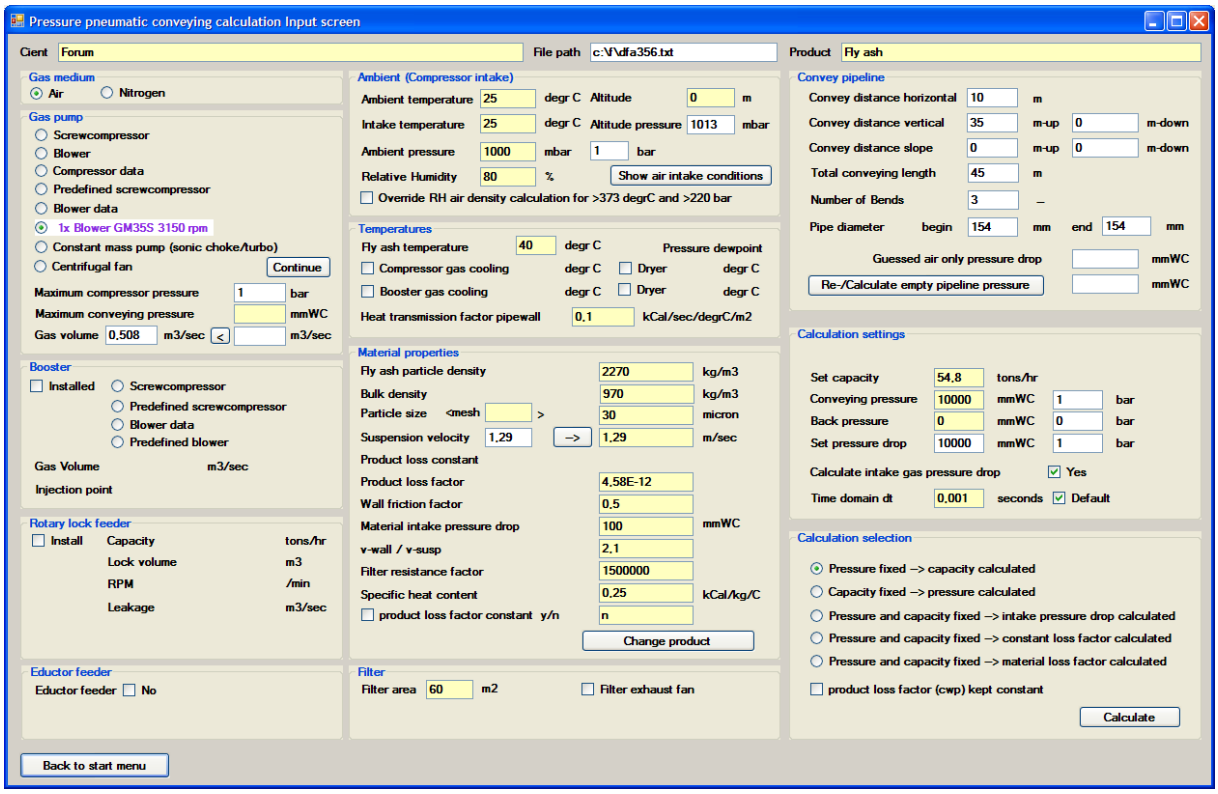
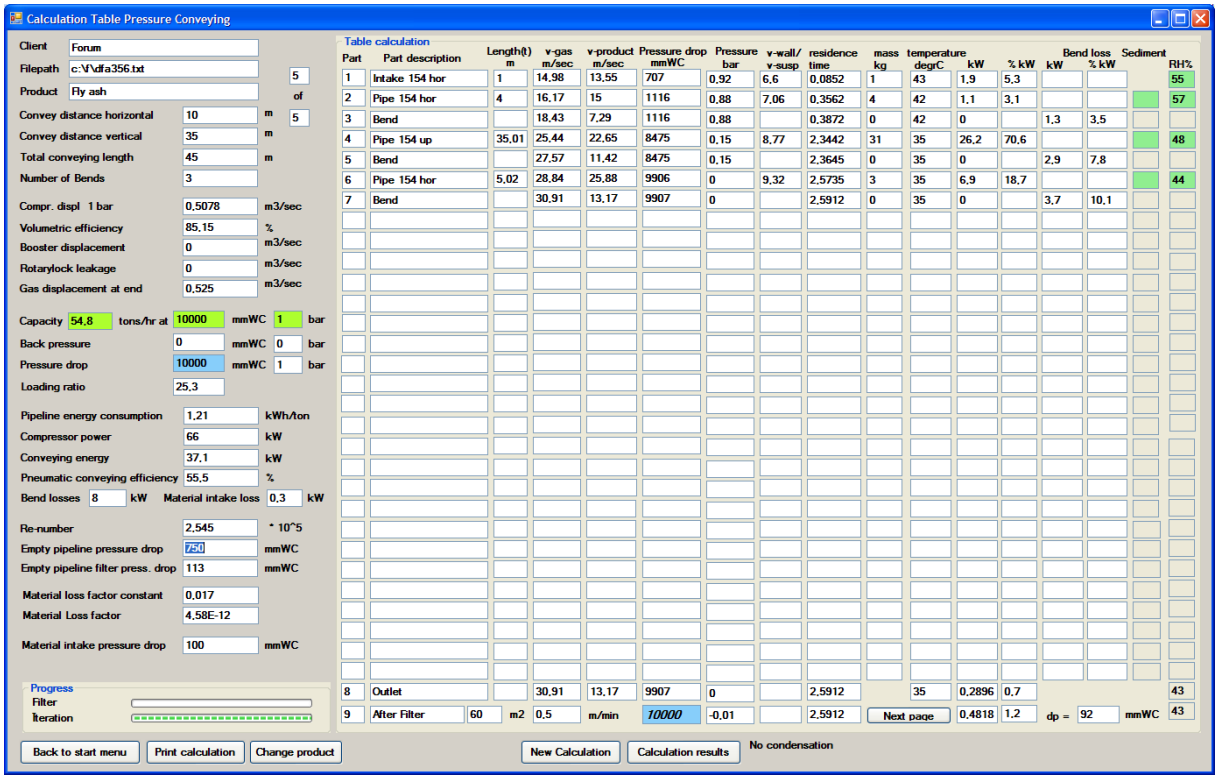
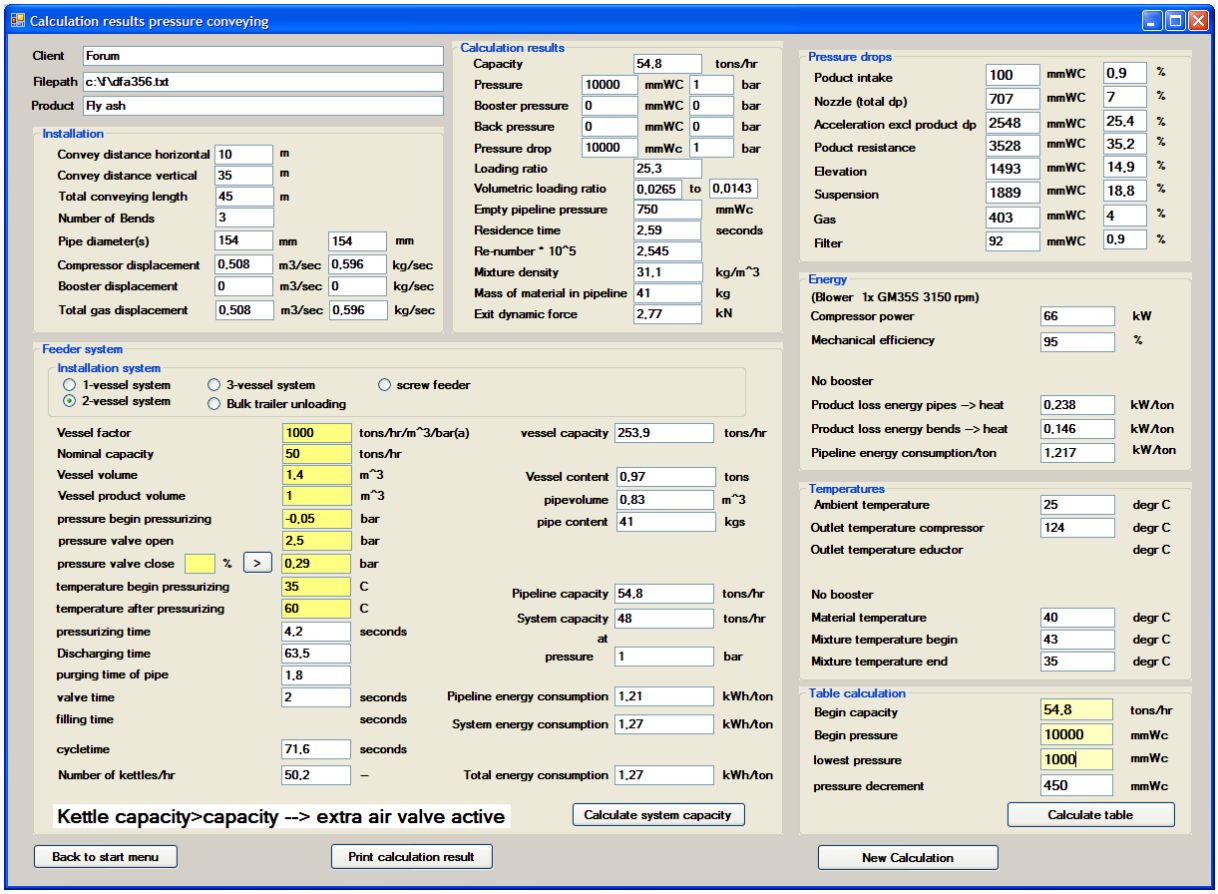


Table calculation
Client Forum
Filepath c:\f\dfa356.txt
Product Fly ash
MM-DD-YY
11-09-2010
Pressure conveying
Convey distance horizontal 10 m
Convey distance vertical 35 m-up m-down
Total conveying length 45 m
Number of Bends 3
Altitude 0 m
Pipe diameter begin 154 mm
Pipe diameter end 154 mm
Pump displacement 0,5 m3/sec (Screwcompressor)
Booster displacement 0 m3/sec
Gas volume end 0,5555 m3/sec 0,646 kg/sec at 0,2 bar
Two vessel installation
Table
Pressure bar | pipe line capacity tons/hr | system capacity tons/hr | Number of kettles/hr | < Kettle range> | Solid Loading Ratio SLR | gas velocity begin m/sec | gas velocity end m/sec | mass in pipeline kg | System energy consumption kWh/ton | residence time seconds | Sediment | Condensation
1,2 | 60,6 | 53 | 54,6 | >capacity | 27,2 | 14 | 32,1 | 47,4 | 1,29 | 2,68 | No sedimentation | No condensation
1,15 | 59,3 | 52 | 53,6 | >capacity | 26,5 | 14,3 | 32 | 45,4 | 1,29 | 2,63 | No sedimentation | No condensation
1,1 | 57,9 | 51 | 52,6 | >capacity | 25,9 | 14,7 | 32 | 43,5 | 1,3 | 2,59 | No sedimentation | No condensation
1,05 | 56,5 | 49,9 | 51,5 | >capacity | 25,2 | 15,1 | 31,9 | 41,5 | 1,3 | 2,54 | No sedimentation | No condensation
1 | 55,1 | 48,8 | 50,3 | >capacity | 24,5 | 15,5 | 31,9 | 39,6 | 1,31 | 2,49 | No sedimentation | No condensation
0,95 | 53,6 | 47,6 | 49,1 | >capacity | 23,8 | 16 | 31,8 | 37,7 | 1,32 | 2,44 | No sedimentation | No condensation
0,9 | 52 | 46,4 | 47,9 | >capacity | 23 | 16,4 | 31,8 | 35,8 | 1,33 | 2,39 | No sedimentation | No condensation
0,85 | 50,4 | 45,1 | 46,5 | >capacity | 22,3 | 16,9 | 31,7 | 33,9 | 1,35 | 2,35 | No sedimentation | No condensation
0,8 | 48,7 | 43,8 | 45,1 | >capacity | 21,5 | 17,5 | 31,7 | 32 | 1,36 | 2,3 | No sedimentation | No condensation
0,75 | 46,9 | 42,3 | 43,6 | >capacity | 20,6 | 18 | 31,6 | 30,1 | 1,39 | 2,25 | No sedimentation | No condensation
0,7 | 44,9 | 40,8 | 42 | >capacity | 19,7 | 18,6 | 31,5 | 28,2 | 1,41 | 2,2 | No sedimentation | No condensation
0,65 | 42,9 | 39,1 | 40,3 | >capacity | 18,8 | 19,3 | 31,5 | 26,2 | 1,45 | 2,15 | No sedimentation | No condensation
0,6 | 40,8 | 37,3 | 38,5 | >capacity | 17,8 | 19,9 | 31,4 | 24,3 | 1,49 | 2,1 | No sedimentation | No condensation
0,55 | 38,4 | 35,4 | 36,5 | >capacity | 16,7 | 20,6 | 31,3 | 22,3 | 1,54 | 2,06 | No sedimentation | No condensation
0,5 | 35,9 | 33,2 | 34,3 | >capacity | 15,6 | 21,4 | 31,2 | 20,3 | 1,61 | 2,01 | No sedimentation | No condensation
0,45 | 33,1 | 30,8 | 31,8 | >capacity | 14,3 | 22,2 | 31,1 | 18,3 | 1,7 | 1,96 | No sedimentation | No condensation
0,4 | 30 | 28,2 | 29 | >capacity | 12,9 | 23,1 | 30,9 | 16,1 | 1,82 | 1,92 | No sedimentation | No condensation
0,35 | 26,6 | 25,1 | 25,9 | >capacity | 11,4 | 24 | 30,8 | 13,9 | 2,01 | 1,87 | No sedimentation | No condensation
0,3 | 22,7 | 21,6 | 22,3 | >capacity | 9,7 | 25 | 30,6 | 11,6 | 2,29 | 1,83 | No sedimentation | No condensation
0,25 | 18,3 | 17,6 | 18,2 | >capacity | 7,8 | 26,1 | 30,4 | 9,1 | 2,75 | 1,79 | No sedimentation | No condensation
0,2 | 13,4 | 13 | 13,4 | >capacity | 5,7 | 27,3 | 30,1 | 6,5 | 3,66 | 1,75 | No sedimentation | No condensation
Empty pipeline system pressure drop 716 mmWC
Filter without exhaust fan
Back to start menu
Print table
New Calculation

Calculation for Aerzen Blower






Calculation results pressure conveying
Client Forum
Filepath c:\f\dfa356.txt
Product Fly ash
Installation
Convey distance horizontal 10 m
Convey distance vertical 35 m
Total conveying length 45 m
Number of Bends 3
Pipe diameter(s) 154 mm 154 mm
Compressor displacement 0,508 m3/sec 0,596 kg/sec
Booster displacement 0 m3/sec 0 kg/sec
Total gas displacement 0,508 m3/sec 0,596 kg/sec
Calculation results
Capacity 54,8 tons/hr
Pressure 10000 mmWC 1 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Pressure drop 10000 mmWc 1 bar
Loading ratio 25,3
Volumetric loading ratio 0,0265 to 0,0143
Empty pipeline pressure 750 mmWc
Residence time 2,59 seconds
Re-number * 10^5 2,545
Mixture density 31,1 kg/m^3
Mass of material in pipeline 41 kg
Exit dynamic force 2,77 kN
Pressure drops
Poduct intake 100 mmWC 0,9 %
Nozzle (total dp) 707 mmWC 7 %
Acceleration excl product dp 2548 mmWC 25,4 %
Poduct resistance 3528 mmWC 35,2 %
Elevation 1493 mmWC 14,9 %
Suspension 1889 mmWC 18,8 %
Gas 403 mmWC 4 %
Filter 92 mmWC 0,9 %
Energy
(Blower 1x GM35S 3150 rpm)
Compressor power 66 kW
Mechanical efficiency 95 %
No booster
Product loss energy pipes --> heat 0,238 kW/ton
Product loss energy bends --> heat 0,146 kW/ton
Pipeline energy consumption/ton 1,217 kW/ton
Feeder system
Installation system
1-vessel system
2-vessel system
3-vessel system
Bulk trailer unloading
screw feeder
Vessel factor 1000 tons/hr/m^3/bar(a)
Nominal capacity 50 tons/hr
Vessel volume 1,4 m^3
Vessel product volume 1 m^3
pressure begin pressurizing -0,05 bar
pressure valve open 2,5 bar
pressure valve close % > 0,29 bar
temperature begin pressurizing 35 C
temperature after pressurizing 60 C
pressurizing time 4,2 seconds
Discharging time 63,5
purging time of pipe 1,8
valve time 2 seconds
filling time seconds
cycletime 71,6 seconds
Number of kettles/hr 50,2 --
vessel capacity 253,9 tons/hr
Vessel content 0,97 tons
pipevolume 0,83 m^3
pipe content 41 kgs
Pipeline capacity 54,8 tons/hr
System capacity 48 tons/hr
at
pressure 1 bar
Pipeline energy consumption 1,21 kWh/ton
System energy consumption 1,27 kWh/ton
Total energy consumption 1,27 kWh/ton
Kettle capacity>capacity --> extra air valve active
Calculate system capacity
Temperatures
Ambient temperature 25 degr C
Outlet temperature compressor 124 degr C
Outlet temperature eductor degr C
No booster
Material temperature 40 degr C
Mixture temperature begin 43 degr C
Mixture temperature end 35 degr C
Table calculation
Begin capacity 54,8 tons/hr
Begin pressure 10000 mmWc
lowest pressure 1000 mmWc
pressure decrement 450 mmWc
Calculate table
Back to start menu
Print calculation result
New Calculation

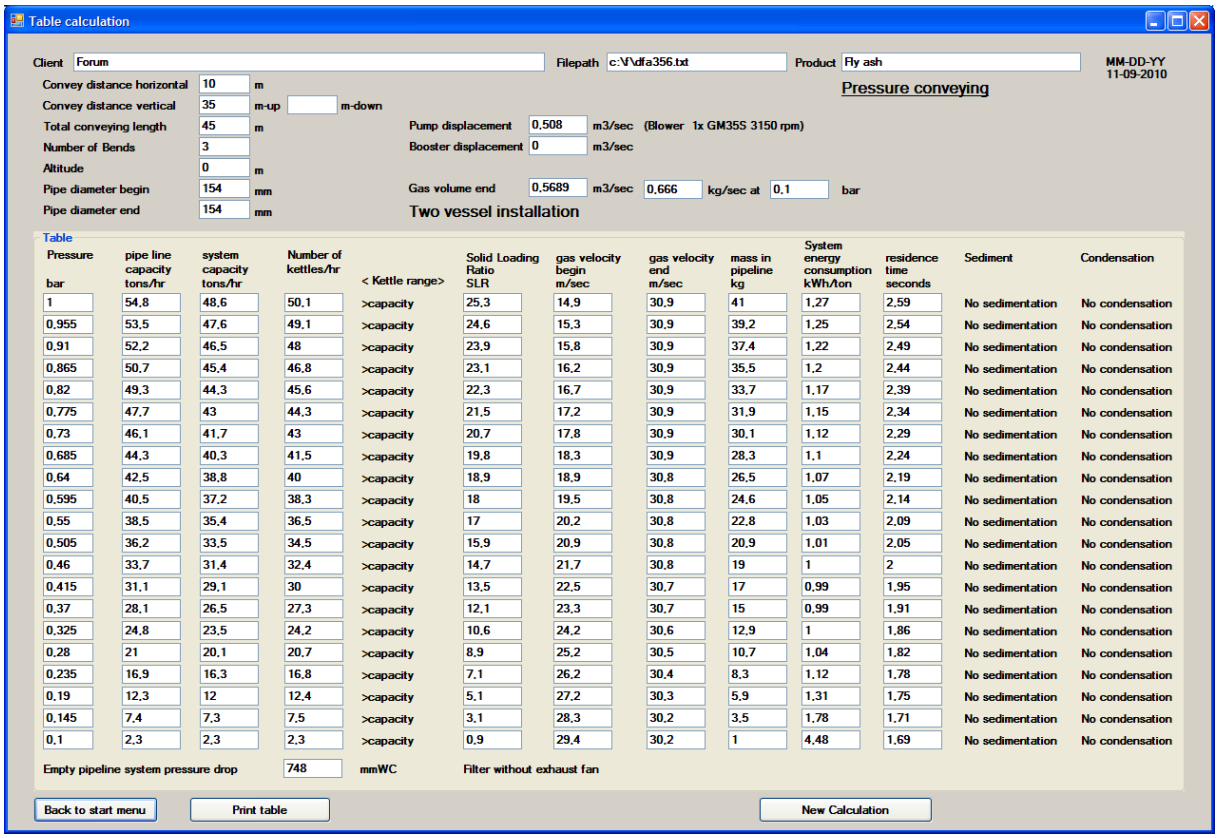


Table calculation
Client Forum
Filepath c:\f\dfa356.txt
Product Fly ash
MM-DD-YY
11-09-2010
Pressure conveying
Convey distance horizontal 10 m
Convey distance vertical 35 m-up m-down
Total conveying length 45 m
Number of Bends 3
Altitude 0 m
Pipe diameter begin 154 mm
Pipe diameter end 154 mm
Pump displacement 0,508 m3/sec (Blower 1x GM35S 3150 rpm)
Booster displacement 0 m3/sec
Gas volume end 0,5689 m3/sec 0,666 kg/sec at 0,1 bar
Two vessel installation
Table
Pressure bar | pipe line capacity tons/hr | system capacity tons/hr | Number of kettles/hr | < Kettle range> | Solid Loading Ratio SLR | gas velocity begin m/sec | gas velocity end m/sec | mass in pipeline kg | System energy consumption kWh/ton | residence time seconds | Sediment | Condensation
1 | 54,8 | 48,6 | 50,1 | >capacity | 25,3 | 14,9 | 30,9 | 41 | 1,27 | 2,59 | No sedimentation | No condensation
0,955 | 53,5 | 47,6 | 49,1 | >capacity | 24,6 | 15,3 | 30,9 | 39,2 | 1,25 | 2,54 | No sedimentation | No condensation
0,91 | 52,2 | 46,5 | 48 | >capacity | 23,9 | 15,8 | 30,9 | 37,4 | 1,22 | 2,49 | No sedimentation | No condensation
0,865 | 50,7 | 45,4 | 46,8 | >capacity | 23,1 | 16,2 | 30,9 | 35,5 | 1,2 | 2,44 | No sedimentation | No condensation
0,82 | 49,3 | 44,3 | 45,6 | >capacity | 22,3 | 16,7 | 30,9 | 33,7 | 1,17 | 2,39 | No sedimentation | No condensation
0,775 | 47,7 | 43 | 44,3 | >capacity | 21,5 | 17,2 | 30,9 | 31,9 | 1,15 | 2,34 | No sedimentation | No condensation
0,73 | 46,1 | 41,7 | 43 | >capacity | 20,7 | 17,8 | 30,9 | 30,1 | 1,12 | 2,29 | No sedimentation | No condensation
0,685 | 44,3 | 40,3 | 41,5 | >capacity | 19,8 | 18,3 | 30,9 | 28,3 | 1,1 | 2,24 | No sedimentation | No condensation
0,64 | 42,5 | 38,8 | 40 | >capacity | 18,9 | 18,9 | 30,8 | 26,5 | 1,07 | 2,19 | No sedimentation | No condensation
0,595 | 40,5 | 37,2 | 38,3 | >capacity | 18 | 19,5 | 30,8 | 24,6 | 1,05 | 2,14 | No sedimentation | No condensation
0,55 | 38,5 | 35,4 | 36,5 | >capacity | 17 | 20,2 | 30,8 | 22,8 | 1,03 | 2,09 | No sedimentation | No condensation
0,505 | 36,2 | 33,5 | 34,5 | >capacity | 15,9 | 20,9 | 30,8 | 20,9 | 1,01 | 2,05 | No sedimentation | No condensation
0,46 | 33,7 | 31,4 | 32,4 | >capacity | 14,7 | 21,7 | 30,8 | 19 | 1 | 2 | No sedimentation | No condensation
0,415 | 31,1 | 29,1 | 30 | >capacity | 13,5 | 22,5 | 30,7 | 17 | 0,99 | 1,95 | No sedimentation | No condensation
0,37 | 28,1 | 26,5 | 27,3 | >capacity | 12,1 | 23,3 | 30,7 | 15 | 0,99 | 1,91 | No sedimentation | No condensation
0,325 | 24,8 | 23,5 | 24,2 | >capacity | 10,6 | 24,2 | 30,6 | 12,9 | 1 | 1,86 | No sedimentation | No condensation
0,28 | 21 | 20,1 | 20,7 | >capacity | 8,9 | 25,2 | 30,5 | 10,7 | 1,04 | 1,82 | No sedimentation | No condensation
0,235 | 16,9 | 16,3 | 16,8 | >capacity | 7,1 | 26,2 | 30,4 | 8,3 | 1,12 | 1,78 | No sedimentation | No condensation
0,19 | 12,3 | 12 | 12,4 | >capacity | 5,1 | 27,2 | 30,3 | 5,9 | 1,31 | 1,75 | No sedimentation | No condensation
0,145 | 7,4 | 7,3 | 7,5 | >capacity | 3,1 | 28,3 | 30,2 | 3,5 | 1,78 | 1,71 | No sedimentation | No condensation
0,1 | 2,3 | 2,3 | 2,3 | >capacity | 0,9 | 29,4 | 30,2 | 1 | 4,48 | 1,69 | No sedimentation | No condensation
Empty pipeline system pressure drop 748 mmWC
Filter without exhaust fan
Back to start menu
Print table
New Calculation