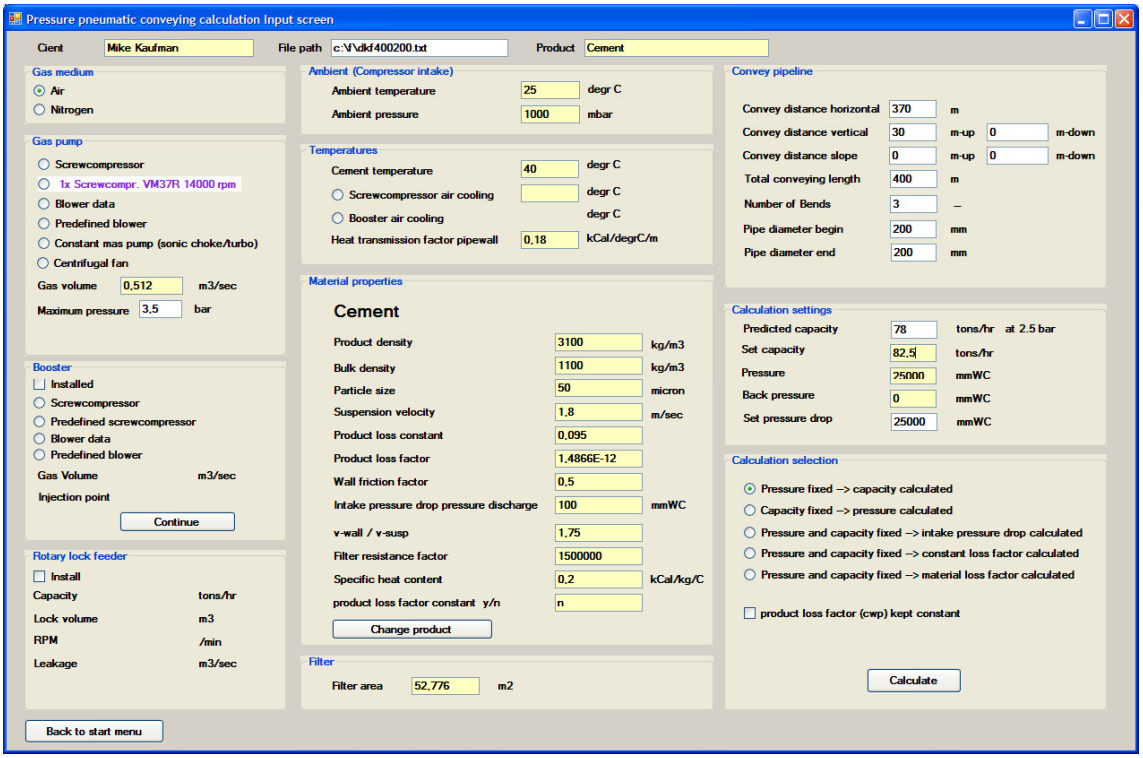
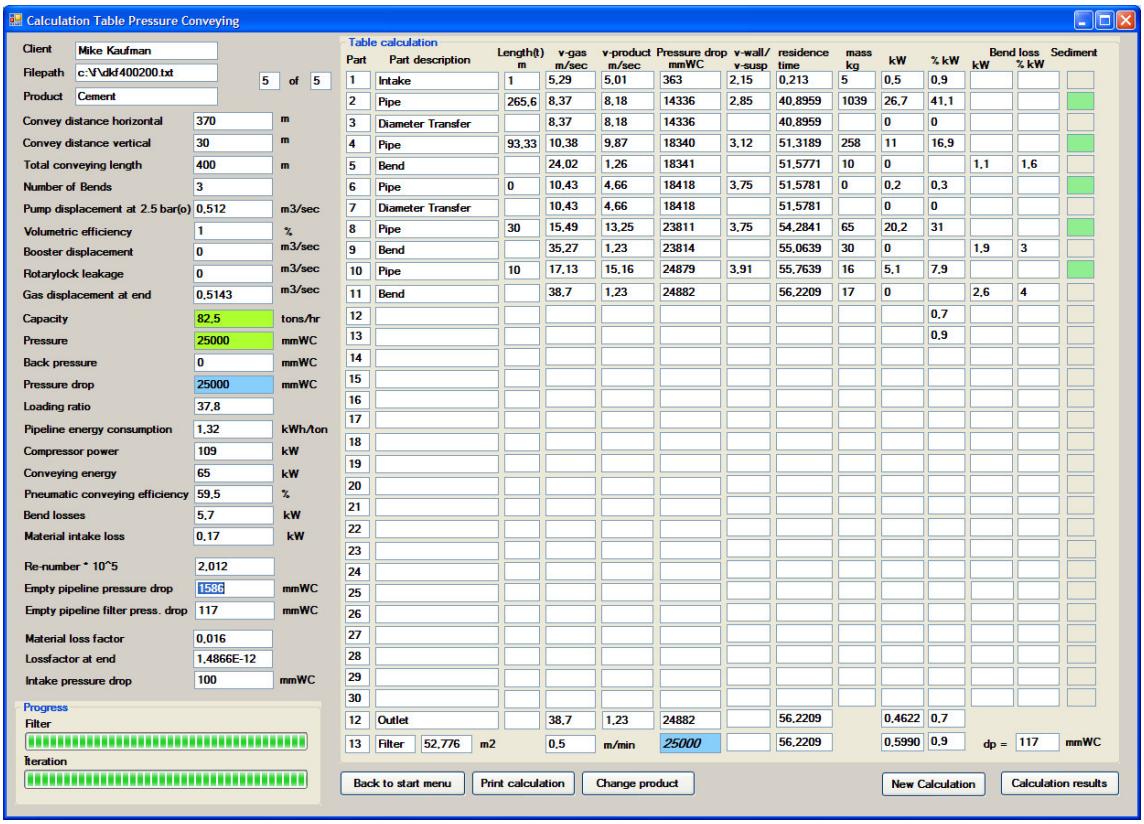
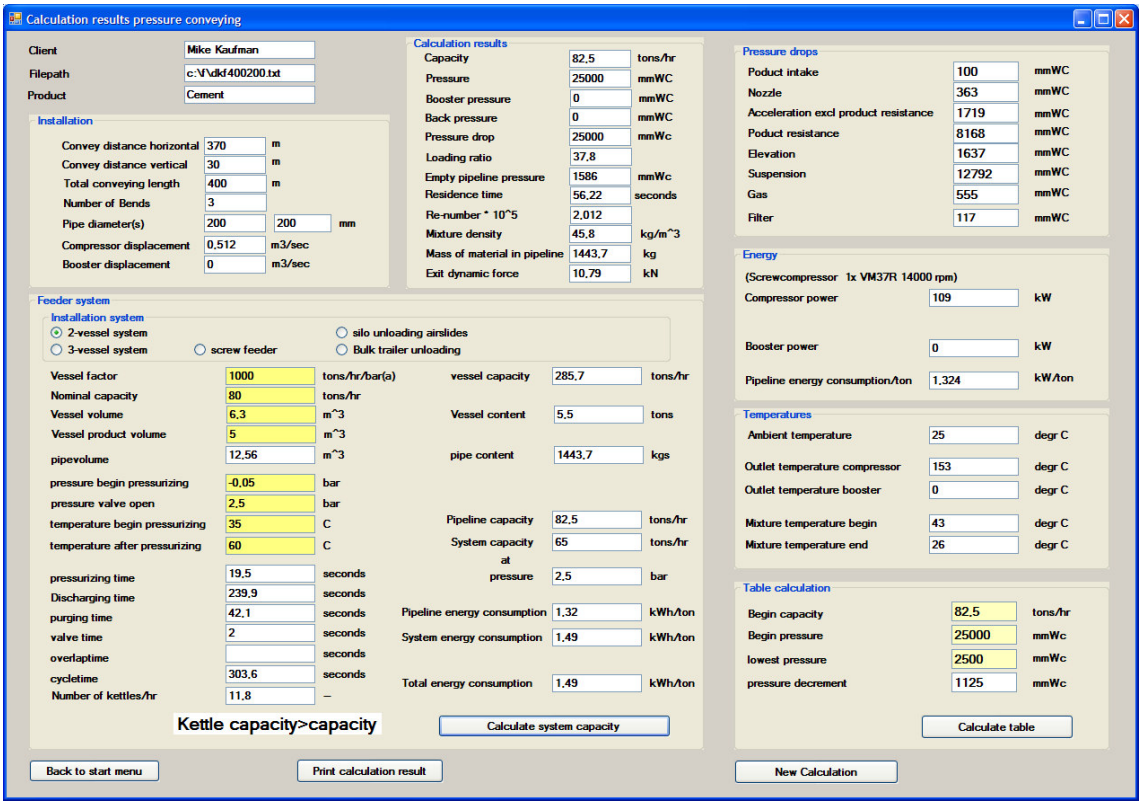

Pressure pneumatic conveying calculation Input screen
Client
Mike Kaufman
File path
c:\f\dkf400200.txt
Product
Cement
Gas medium
Air
Nitrogen
Gas pump
Screwcompressor
1x Screwcompr. VM37R 14000 rpm
Blower data
Predefined blower
Constant mas pump (sonic choke/turbo)
Centrifugal fan
Gas volume
0,512
m3/sec
Maximum pressure
3,5
bar
Booster
Installed
Screwcompressor
Predefined screwcompressor
Blower data
Predefined blower
Gas Volume
m3/sec
Injection point
Continue
Rotary lock feeder
Install
Capacity
tons/hr
Lock volume
m3
RPM
/min
Leakage
m3/sec
Back to start menu
Ambient (Compressor intake)
Ambient temperature
25
degr C
Ambient pressure
1000
mbar
Temperatures
Cement temperature
40
degr C
Screwcompressor air cooling
degr C
Booster air cooling
degr C
Heat transmission factor pipewall
0,18
kCal/degrC/m
Material properties
Cement
Product density
3100
kg/m3
Bulk density
1100
kg/m3
Particle size
50
micron
Suspension velocity
1,8
m/sec
Product loss constant
0,095
Product loss factor
1,4866E-12
Wall friction factor
0,5
Intake pressure drop pressure discharge
100
mmWC
v-wall / v-susp
1,75
Filter resistance factor
1500000
Specific heat content
0,2
kCal/kg/C
product loss factor constant y/n
n
Change product
Filter
Filter area
52,776
m2
Convey pipeline
Convey distance horizontal
370
m
Convey distance vertical
30
m-up
0
m-down
Convey distance slope
0
m-up
0
m-down
Total conveying length
400
m
Number of Bends
3
–
Pipe diameter begin
200
mm
Pipe diameter end
200
mm
Calculation settings
Predicted capacity
78
tons/hr at 2.5 bar
Set capacity
82,5
tons/hr
Pressure
25000
mmWC
Back pressure
0
mmWC
Set pressure drop
25000
mmWC
Calculation selection
Pressure fixed –> capacity calculated
Capacity fixed –> pressure calculated
Pressure and capacity fixed –> intake pressure drop calculated
Pressure and capacity fixed –> constant loss factor calculated
Pressure and capacity fixed –> material loss factor calculated
product loss factor (cwp) kept constant
Calculate


Calculation Table Pressure Conveying
Client
Mike Kaufman
Filepath
c:\f\dkf400200.txt
5
of
5
Product
Cement
Convey distance horizontal
370
m
Convey distance vertical
30
m
Total conveying length
400
m
Number of Bends
3
Pump displacement at 2.5 bar(o)
0,512
m3/sec
Volumetric efficiency
1
%
Booster displacement
0
m3/sec
Rotarylock leakage
0
m3/sec
Gas displacement at end
0,5143
m3/sec
Capacity
82,5
tons/hr
Pressure
25000
mmWC
Back pressure
0
mmWC
Pressure drop
25000
mmWC
Loading ratio
37,8
Pipeline energy consumption
1,32
kWh/ton
Compressor power
109
kW
Conveying energy
65
kW
Pneumatic conveying efficiency
59,5
%
Bend losses
5,7
kW
Material intake loss
0,17
kW
Re-number * 10^5
2,012
Empty pipeline pressure drop
1586
mmWC
Empty pipeline filter press. drop
117
mmWC
Material loss factor
0,016
Lossfactor at end
1,4866E-12
Intake pressure drop
100
mmWC
Progress
Filter
Iteration
Table calculation
Part
Part description
Length(t) m
v-gas m/sec
v-product m/sec
Pressure drop mmWC
v-wall/ v-susp
residence time
mass kg
kW
% kW
Bend loss kW
Bend loss % kW
Sediment
1 Intake 1 5,29 5,01 363 2,15 0,213 5 0,5 0,9
2 Pipe 265,6 8,37 8,18 14336 2,85 40,8959 1039 26,7 41,1
3 Diameter Transfer 8,37 8,18 14336 40,8959 0 0
4 Pipe 93,33 10,38 9,87 18340 3,12 51,3189 258 11 16,9
5 Bend 24,02 1,26 18341 51,5771 10 0 1,1 1,6
6 Pipe 0 10,43 4,66 18418 3,75 51,5781 0 0,2 0,3
7 Diameter Transfer 10,43 4,66 18418 51,5781 0 0
8 Pipe 30 15,49 13,25 23811 3,75 54,2841 65 20,2 31
9 Bend 35,27 1,23 23814 55,0639 30 0 1,9 3
10 Pipe 10 17,13 15,16 24879 3,91 55,7639 16 5,1 7,9
11 Bend 38,7 1,23 24882 56,2209 17 0 2,6 4
12 0,7
13 0,9
12 Outlet 38,7 1,23 24882 56,2209 0,4622 0,7
13 Filter 52,776 m2 0,5 m/min 25000 56,2209 0,5990 0,9 dp = 117 mmWC
Back to start menu
Print calculation
Change product
New Calculation
Calculation results


Calculation results pressure conveying
Client
Mike Kaufman
Filepath
c:\f\dkf400200.txt
Product
Cement
Installation
Convey distance horizontal 370 m
Convey distance vertical 30 m
Total conveying length 400 m
Number of Bends 3
Pipe diameter(s) 200 200 mm
Compressor displacement 0,512 m3/sec
Booster displacement 0 m3/sec
Calculation results
Capacity 82,5 tons/hr
Pressure 25000 mmWC
Booster pressure 0 mmWC
Back pressure 0 mmWC
Pressure drop 25000 mmWc
Loading ratio 37,8
Empty pipeline pressure 1586 mmWc
Residence time 56,22 seconds
Re-number * 10^5 2,012
Mixture density 45,8 kg/m^3
Mass of material in pipeline 1443,7 kg
Exit dynamic force 10,79 kN
Pressure drops
Poduct intake 100 mmWC
Nozzle 363 mmWC
Acceleration excl product resistance 1719 mmWC
Poduct resistance 8168 mmWC
Elevation 1637 mmWC
Suspension 12792 mmWC
Gas 555 mmWC
Filter 117 mmWC
Energy
(Screwcompressor 1x VM37R 14000 rpm)
Compressor power 109 kW
Booster power 0 kW
Pipeline energy consumption/ton 1,324 kW/ton
Temperatures
Ambient temperature 25 degr C
Outlet temperature compressor 153 degr C
Outlet temperature booster 0 degr C
Mixture temperature begin 43 degr C
Mixture temperature end 26 degr C
Table calculation
Begin capacity 82,5 tons/hr
Begin pressure 25000 mmWc
lowest pressure 2500 mmWc
pressure decrement 1125 mmWc
Calculate table
Feeder system
Installation system
2-vessel system
3-vessel system
screw feeder
silo unloading airslides
Bulk trailer unloading
Vessel factor 1000 tons/hr/bar(a)
Nominal capacity 80 tons/hr
Vessel volume 6,3 m^3
Vessel product volume 5 m^3
pipevolume 12,56 m^3
pressure begin pressurizing -0,05 bar
pressure valve open 2,5 bar
temperature begin pressurizing 35 C
temperature after pressurizing 60 C
pressurizing time 19,5 seconds
Discharging time 239,9 seconds
purging time 42,1 seconds
valve time 2 seconds
overlaptime seconds
cycletime 303,6 seconds
Number of kettles/hr 11,8
vessel capacity 285,7 tons/hr
Vessel content 5,5 tons
pipe content 1443,7 kgs
Pipeline capacity 82,5 tons/hr
System capacity at pressure 65 tons/hr 2,5 bar
Pipeline energy consumption 1,32 kWh/ton
System energy consumption 1,49 kWh/ton
Total energy consumption 1,49 kWh/ton
Kettle capacity>capacity
Calculate system capacity
Back to start menu
Print calculation result
New Calculation

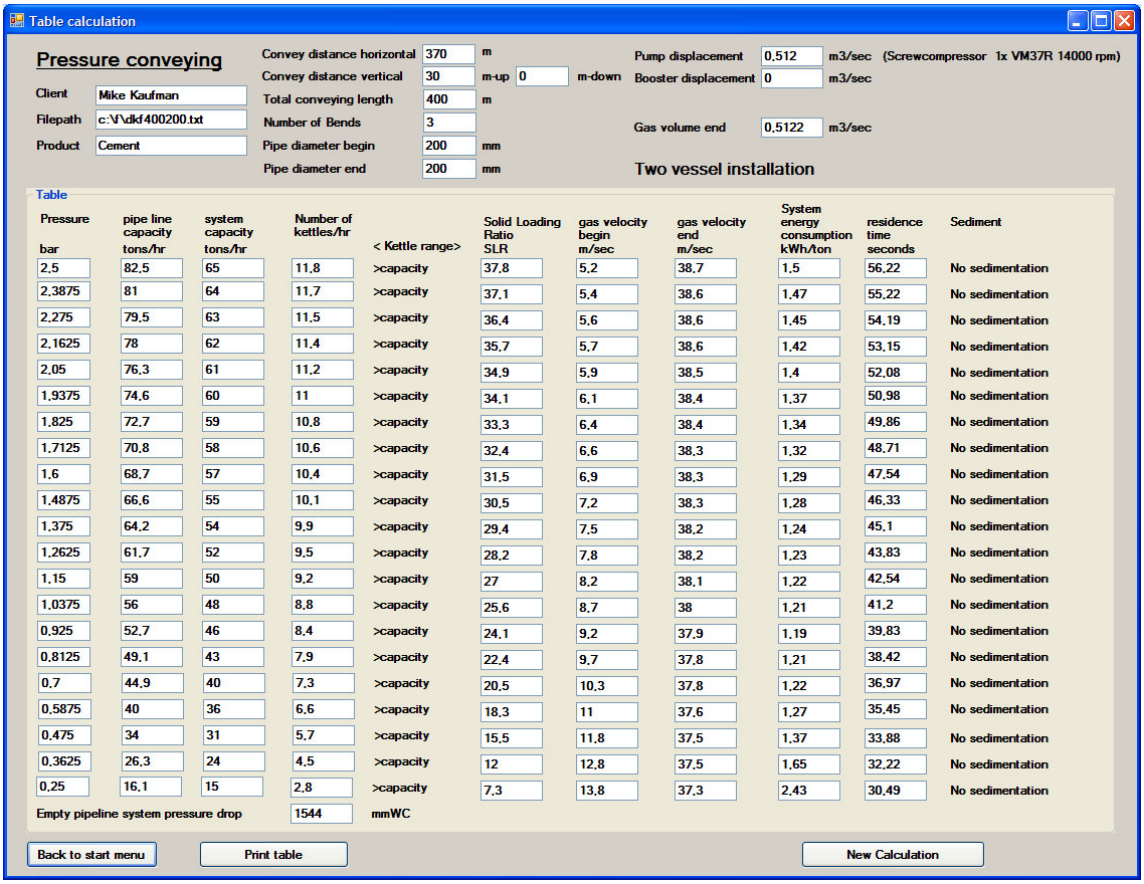


Table calculation
Pressure conveying
Client Mike Kaufman
Filepath c:\f\dkf400200.txt
Product Cement
Convey distance horizontal 370 m
Convey distance vertical 30 m-up 0 m-down
Total conveying length 400 m
Number of Bends 3
Pipe diameter begin 200 mm
Pipe diameter end 200 mm
Pump displacement 0,512 m3/sec (Screwcompressor 1x VM37R 14000 rpm)
Booster displacement 0 m3/sec
Gas volume end 0,5122 m3/sec
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 | System energy consumption kWh/ton | residence time seconds | Sediment
2,5 | 82,5 | 65 | 11,8 | >capacity | 37,8 | 5,2 | 38,7 | 1,5 | 56,22 | No sedimentation
2,3875 | 81 | 64 | 11,7 | >capacity | 37,1 | 5,4 | 38,6 | 1,47 | 55,22 | No sedimentation
2,275 | 79,5 | 63 | 11,5 | >capacity | 36,4 | 5,6 | 38,6 | 1,45 | 54,19 | No sedimentation
2,1625 | 78 | 62 | 11,4 | >capacity | 35,7 | 5,7 | 38,6 | 1,42 | 53,15 | No sedimentation
2,05 | 76,3 | 61 | 11,2 | >capacity | 34,9 | 5,9 | 38,5 | 1,4 | 52,08 | No sedimentation
1,9375 | 74,6 | 60 | 11 | >capacity | 34,1 | 6,1 | 38,4 | 1,37 | 50,98 | No sedimentation
1,825 | 72,7 | 59 | 10,8 | >capacity | 33,3 | 6,4 | 38,4 | 1,34 | 49,86 | No sedimentation
1,7125 | 70,8 | 58 | 10,6 | >capacity | 32,4 | 6,6 | 38,3 | 1,32 | 48,71 | No sedimentation
1,6 | 68,7 | 57 | 10,4 | >capacity | 31,5 | 6,9 | 38,3 | 1,29 | 47,54 | No sedimentation
1,4875 | 66,6 | 55 | 10,1 | >capacity | 30,5 | 7,2 | 38,3 | 1,28 | 46,33 | No sedimentation
1,375 | 64,2 | 54 | 9,9 | >capacity | 29,4 | 7,5 | 38,2 | 1,24 | 45,1 | No sedimentation
1,2625 | 61,7 | 52 | 9,5 | >capacity | 28,2 | 7,8 | 38,2 | 1,23 | 43,83 | No sedimentation
1,15 | 59 | 50 | 9,2 | >capacity | 27 | 8,2 | 38,1 | 1,22 | 42,54 | No sedimentation
1,0375 | 56 | 48 | 8,8 | >capacity | 25,6 | 8,7 | 38 | 1,21 | 41,2 | No sedimentation
0,925 | 52,7 | 46 | 8,4 | >capacity | 24,1 | 9,2 | 37,9 | 1,19 | 39,83 | No sedimentation
0,8125 | 49,1 | 43 | 7,9 | >capacity | 22,4 | 9,7 | 37,8 | 1,21 | 38,42 | No sedimentation
0,7 | 44,9 | 40 | 7,3 | >capacity | 20,5 | 10,3 | 37,8 | 1,22 | 36,97 | No sedimentation
0,5875 | 40 | 36 | 6,6 | >capacity | 18,3 | 11 | 37,6 | 1,27 | 35,45 | No sedimentation
0,475 | 34 | 31 | 5,7 | >capacity | 15,5 | 11,8 | 37,5 | 1,37 | 33,88 | No sedimentation
0,3625 | 26,3 | 24 | 4,5 | >capacity | 12 | 12,8 | 37,5 | 1,65 | 32,22 | No sedimentation
0,25 | 16,1 | 15 | 2,8 | >capacity | 7,3 | 13,8 | 37,3 | 2,43 | 30,49 | No sedimentation
Empty pipeline system pressure drop 1544 mmWC
Back to start menu
Print table
New Calculation