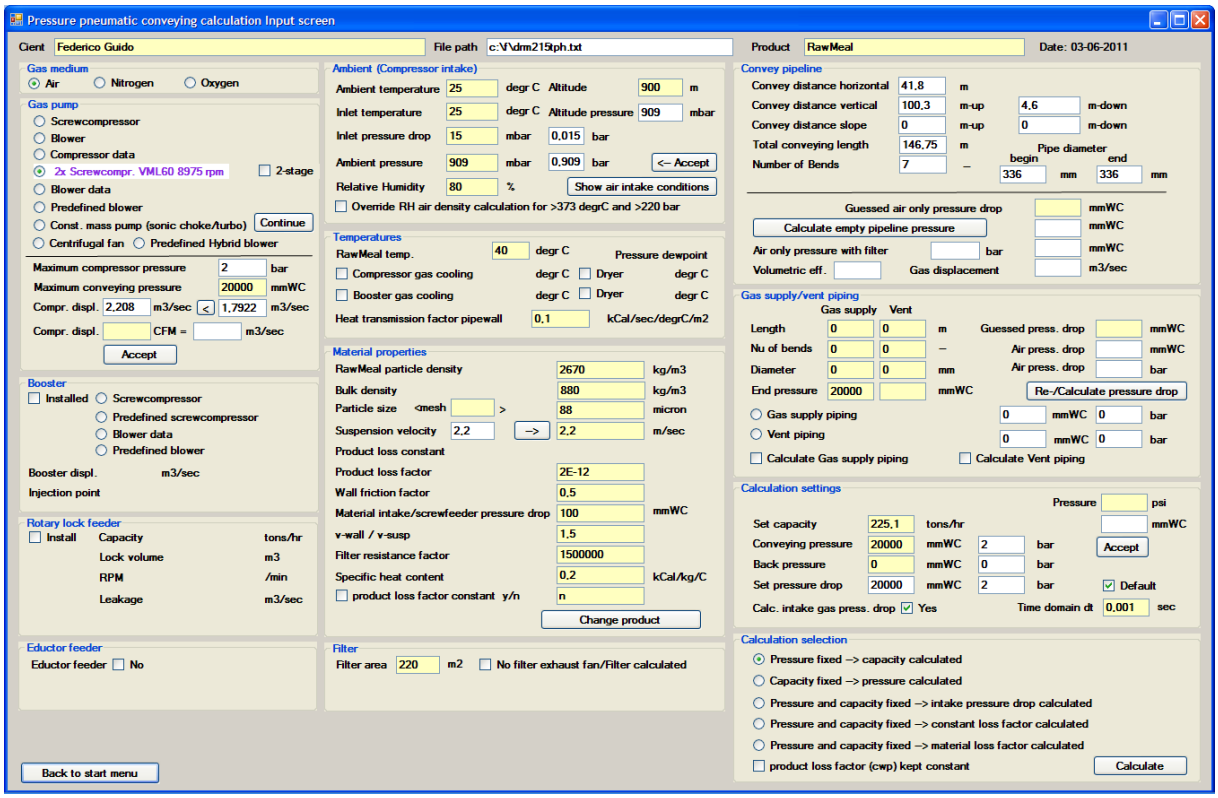
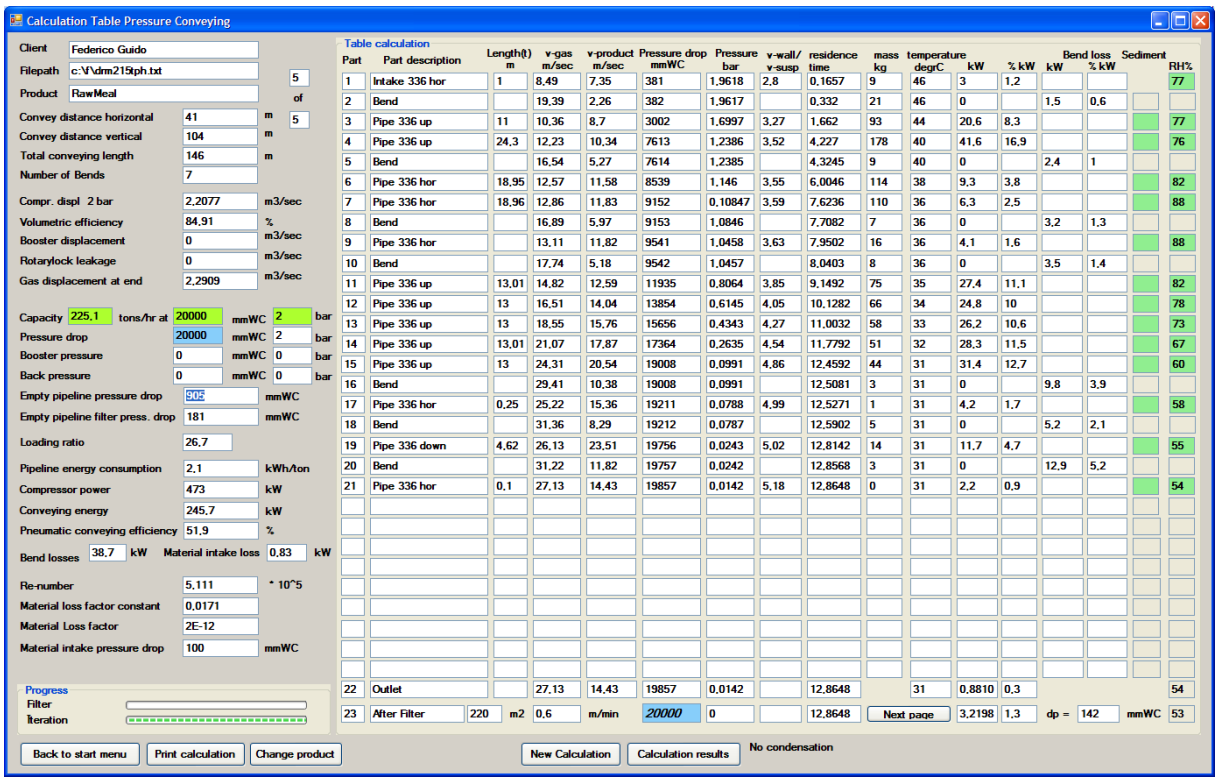
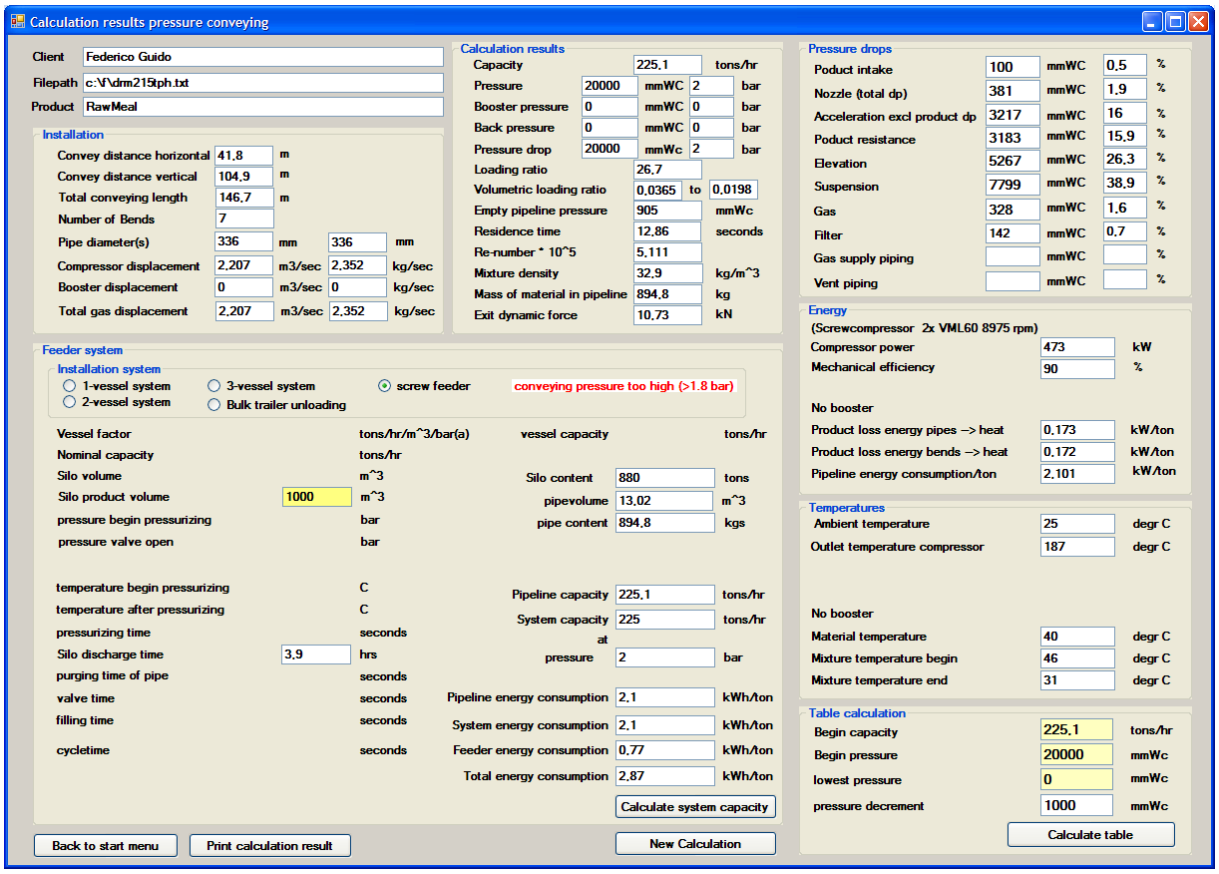

Pressure pneumatic conveying calculation Input screen
Client Federico Guido
File path c:\f\drm215tph.txt
Product RawMeal
Date: 03-06-2011
Gas medium
Air
Nitrogen
Oxygen
Gas pump
Screwcompressor
Blower
Compressor data
2x Screwcompr. VML60 8975 rpm
2-stage
Blower data
Predefined blower
Const. mass pump (sonic choke/turbo)
Continue
Centrifugal fan
Predefined Hybrid blower
Maximum compressor pressure 2 bar
Maximum conveying pressure 20000 mmWC
Compr. displ. 2,208 m3/sec < 1,7922 m3/sec
Compr. displ. CFM = m3/sec
Accept
Booster
Installed
Screwcompressor
Predefined screwcompressor
Blower data
Predefined blower
Booster displ. m3/sec
Injection point
Rotary lock feeder
Install
Capacity tons/hr
Lock volume m3
RPM /min
Leakage m3/sec
Eductor feeder
Eductor feeder No
Ambient (Compressor intake)
Ambient temperature 25 degr C
Altitude 900 m
Inlet temperature 25 degr C
Altitude pressure 909 mbar
Inlet pressure drop 15 mbar 0,015 bar
Ambient pressure 909 mbar 0,909 bar
<-- Accept
Relative Humidity 80 %
Show air intake conditions
Override RH air density calculation for >373 degrC and >220 bar
Temperatures
RawMeal temp. 40 degr C
Pressure dewpoint
Compressor gas cooling degr C
Dryer degr C
Booster gas cooling degr C
Dryer degr C
Heat transmission factor pipewall 0,1 kCal/sec/degrC/m2
Material properties
RawMeal particle density 2670 kg/m3
Bulk density 880 kg/m3
Particle size <mesh > 88 micron
Suspension velocity 2,2 --> 2,2 m/sec
Product loss constant
Product loss factor 2E-12
Wall friction factor 0,5
Material intake/screwfeeder pressure drop 100 mmWC
v-wall / v-susp 1,5
Filter resistance factor 1500000
Specific heat content 0,2 kCal/kg/C
product loss factor constant y/n n
Change product
Filter
Filter area 220 m2
No filter exhaust fan/Filter calculated
Convey pipeline
Convey distance horizontal 41,8 m
Convey distance vertical 100,3 m-up 4,6 m-down
Convey distance slope 0 m-up 0 m-down
Total conveying length 146,75 m
Number of Bends 7
Pipe diameter begin 336 mm end 336 mm
Guessed air only pressure drop mmWC
Calculate empty pipeline pressure mmWC
Air only pressure with filter bar mmWC
Volumetric eff. Gas displacement m3/sec
Gas supply/vent piping
Gas supply Vent
Length 0 0 m
Nu of bends 0 0 –
Diameter 0 0 mm
End pressure 20000 mmWC
Guessed press. drop mmWC
Air press. drop mmWC
Air press. drop bar
Re-/Calculate pressure drop
Gas supply piping 0 mmWC 0 bar
Vent piping 0 mmWC 0 bar
Calculate Gas supply piping
Calculate Vent piping
Calculation settings
Pressure psi
mmWC
Set capacity 225,1 tons/hr
Conveying pressure 20000 mmWC 2 bar
Accept
Back pressure 0 mmWC 0 bar
Set pressure drop 20000 mmWC 2 bar
Default
Calc. intake gas press. drop Yes
Time domain dt 0,001 sec
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
Back to start menu


Calculation Table Pressure Conveying
Client Federico Guido
Filepath c:\f\drm215tph.txt
Product RawMeal
Convey distance horizontal 41 m
Convey distance vertical 104 m
Total conveying length 146 m
Number of Bends 7
Compr. displ 2 bar 2,2077 m3/sec
Volumetric efficiency 84,91 %
Booster displacement 0 m3/sec
Rotarylock leakage 0 m3/sec
Gas displacement at end 2,2909 m3/sec
Capacity 225,1 tons/hr at 20000 mmWC 2 bar
Pressure drop 20000 mmWC 2 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Empty pipeline pressure drop 905 mmWC
Empty pipeline filter press. drop 181 mmWC
Loading ratio 26,7
Pipeline energy consumption 2,1 kWh/ton
Compressor power 473 kW
Conveying energy 245,7 kW
Pneumatic conveying efficiency 51,9 %
Bend losses 38,7 kW Material intake loss 0,83 kW
Re-number 5,111 * 10^5
Material loss factor constant 0,0171
Material Loss factor 2E-12
Material intake pressure drop 100 mmWC
Progress
Filter
Iteration
Table calculation
Part | Part description | Length(l) m | v-gas m/sec | v-product m/sec | Pressure drop mmWC | Pressure bar | v-wall/ v-susp | residence time | mass kg | temperature degrC | kW | % kW | Bend loss kW | Bend loss % kW | Sediment | RH%
1 | Intake 336 hor | 1 | 8,49 | 7,35 | 381 | 1,9618 | 2,8 | 0,1657 | 9 | 46 | 3 | 1,2 | | | | 77
2 | Bend | | 19,39 | 2,26 | 382 | 1,9617 | | 0,332 | 21 | 46 | 0 | | 1,5 | 0,6 | |
3 | Pipe 336 up | 11 | 10,36 | 8,7 | 3002 | 1,6997 | 3,27 | 1,662 | 93 | 44 | 20,6 | 8,3 | | | | 77
4 | Pipe 336 up | 24,3 | 12,23 | 10,34 | 7613 | 1,2386 | 3,52 | 4,227 | 178 | 40 | 41,6 | 16,9 | | | | 76
5 | Bend | | 16,54 | 5,27 | 7614 | 1,2385 | | 4,3245 | 9 | 40 | 0 | | 2,4 | 1 | |
6 | Pipe 336 hor | 18,95 | 12,57 | 11,58 | 8539 | 1,146 | 3,55 | 6,0046 | 114 | 38 | 9,3 | 3,8 | | | | 82
7 | Pipe 336 hor | 18,96 | 12,86 | 11,83 | 9152 | 0,10847 | 3,59 | 7,6236 | 110 | 36 | 6,3 | 2,5 | | | | 88
8 | Bend | | 16,89 | 5,97 | 9153 | 1,0846 | | 7,7082 | 7 | 36 | 0 | | 3,2 | 1,3 | |
9 | Pipe 336 hor | | 13,11 | 11,82 | 9541 | 1,0458 | 3,63 | 7,9502 | 16 | 36 | 4,1 | 1,6 | | | | 88
10 | Bend | | 17,74 | 5,18 | 9542 | 1,0457 | | 8,0403 | 8 | 36 | 0 | | 3,5 | 1,4 | |
11 | Pipe 336 up | 13,01 | 14,82 | 12,59 | 11935 | 0,8064 | 3,85 | 9,1492 | 75 | 35 | 27,4 | 11,1 | | | | 82
12 | Pipe 336 up | 13 | 16,51 | 14,04 | 13854 | 0,6145 | 4,05 | 10,1282 | 66 | 34 | 24,8 | 10 | | | | 78
13 | Pipe 336 up | 13 | 18,55 | 15,76 | 15656 | 0,4343 | 4,27 | 11,0032 | 58 | 33 | 26,2 | 10,6 | | | | 73
14 | Pipe 336 up | 13,01 | 21,07 | 17,87 | 17364 | 0,2635 | 4,54 | 11,7792 | 51 | 32 | 28,3 | 11,5 | | | | 67
15 | Pipe 336 up | 13 | 24,31 | 20,54 | 19008 | 0,0991 | 4,86 | 12,4592 | 44 | 31 | 31,4 | 12,7 | | | | 60
16 | Bend | | 29,41 | 10,38 | 19008 | 0,0991 | | 12,5081 | 3 | 31 | 0 | | 9,8 | 3,9 | |
17 | Pipe 336 hor | 0,25 | 25,22 | 15,36 | 19211 | 0,0788 | 4,99 | 12,5271 | 1 | 31 | 4,2 | 1,7 | | | | 58
18 | Bend | | 31,36 | 8,29 | 19212 | 0,0787 | | 12,5902 | 5 | 31 | 0 | | 5,2 | 2,1 | |
19 | Pipe 336 down | 4,62 | 26,13 | 23,51 | 19756 | 0,0243 | 5,02 | 12,8142 | 14 | 31 | 11,7 | 4,7 | | | | 55
20 | Bend | | 31,22 | 11,82 | 19757 | 0,0242 | | 12,8568 | 3 | 31 | 0 | | 12,9 | 5,2 | |
21 | Pipe 336 hor | 0,1 | 27,13 | 14,43 | 19857 | 0,0142 | 5,18 | 12,8648 | 0 | 31 | 2,2 | 0,9 | | | | 54
22 | Outlet | | 27,13 | 14,43 | 19857 | 0,0142 | | 12,8648 | | 31 | 0,8810 | 0,3 | | | | 54
23 | After Filter | 220 m2 | 0,6 m/min | 20000 | 0 | | 12,8648 | Next page | 3,2198 | 1,3 | dp = 142 mmWC | | | | | 53
Back to start menu
Print calculation
Change product
New Calculation
Calculation results
No condensation


Calculation results pressure conveying
Client Federico Guido
Filepath c:\f\drm215tph.txt
Product RawMeal
Installation
Convey distance horizontal 41,8 m
Convey distance vertical 104,9 m
Total conveying length 146,7 m
Number of Bends 7
Pipe diameter(s) 336 mm 336 mm
Compressor displacement 2,207 m3/sec 2,352 kg/sec
Booster displacement 0 m3/sec 0 kg/sec
Total gas displacement 2,207 m3/sec 2,352 kg/sec
Calculation results
Capacity 225,1 tons/hr
Pressure 20000 mmWC 2 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Pressure drop 20000 mmWc 2 bar
Loading ratio 26,7
Volumetric loading ratio 0,0365 to 0,0198
Empty pipeline pressure 905 mmWc
Residence time 12,86 seconds
Re-number * 10^5 5,111
Mixture density 32,9 kg/m^3
Mass of material in pipeline 894,8 kg
Exit dynamic force 10,73 kN
Pressure drops
Poduct intake 100 mmWC 0,5 %
Nozzle (total dp) 381 mmWC 1,9 %
Acceleration excl product dp 3217 mmWC 16 %
Poduct resistance 3183 mmWC 15,9 %
Elevation 5267 mmWC 26,3 %
Suspension 7799 mmWC 38,9 %
Gas 328 mmWC 1,6 %
Filter 142 mmWC 0,7 %
Gas supply piping mmWC %
Vent piping mmWC %
Energy
(Screwcompressor 2x VML60 8975 rpm)
Compressor power 473 kW
Mechanical efficiency 90 %
No booster
Product loss energy pipes –> heat 0,173 kW/ton
Product loss energy bends –> heat 0,172 kW/ton
Pipeline energy consumption/ton 2,101 kW/ton
Temperatures
Ambient temperature 25 degr C
Outlet temperature compressor 187 degr C
No booster
Material temperature 40 degr C
Mixture temperature begin 46 degr C
Mixture temperature end 31 degr C
Table calculation
Begin capacity 225,1 tons/hr
Begin pressure 20000 mmWc
lowest pressure 0 mmWc
pressure decrement 1000 mmWc
Calculate table
Feeder system
Installation system
1-vessel system
2-vessel system
3-vessel system
Bulk trailer unloading
screw feeder
conveying pressure too high (>1.8 bar)
Vessel factor tons/hr/m^3/bar(a)
Nominal capacity tons/hr
Silo volume m^3
Silo product volume 1000 m^3
pressure begin pressurizing bar
pressure valve open bar
temperature begin pressurizing C
temperature after pressurizing C
pressurizing time seconds
Silo discharge time 3,9 hrs
purging time of pipe seconds
valve time seconds
filling time seconds
cycletime seconds
vessel capacity tons/hr
Silo content 880 tons
pipevolume 13,02 m^3
pipe content 894,8 kgs
Pipeline capacity 225,1 tons/hr
System capacity 225 tons/hr
at
pressure 2 bar
Pipeline energy consumption 2,1 kWh/ton
System energy consumption 2,1 kWh/ton
Feeder energy consumption 0,77 kWh/ton
Total energy consumption 2,87 kWh/ton
Calculate system capacity
Back to start menu
Print calculation result
New Calculation

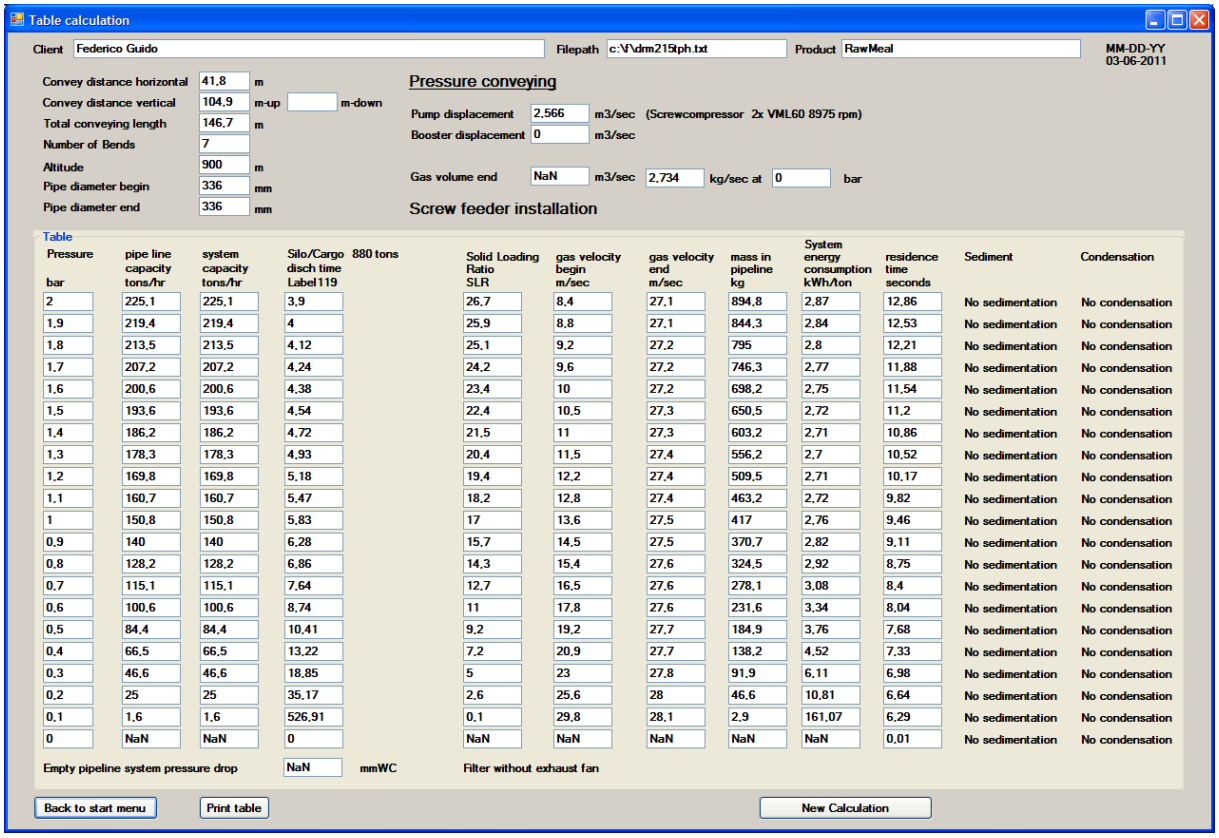
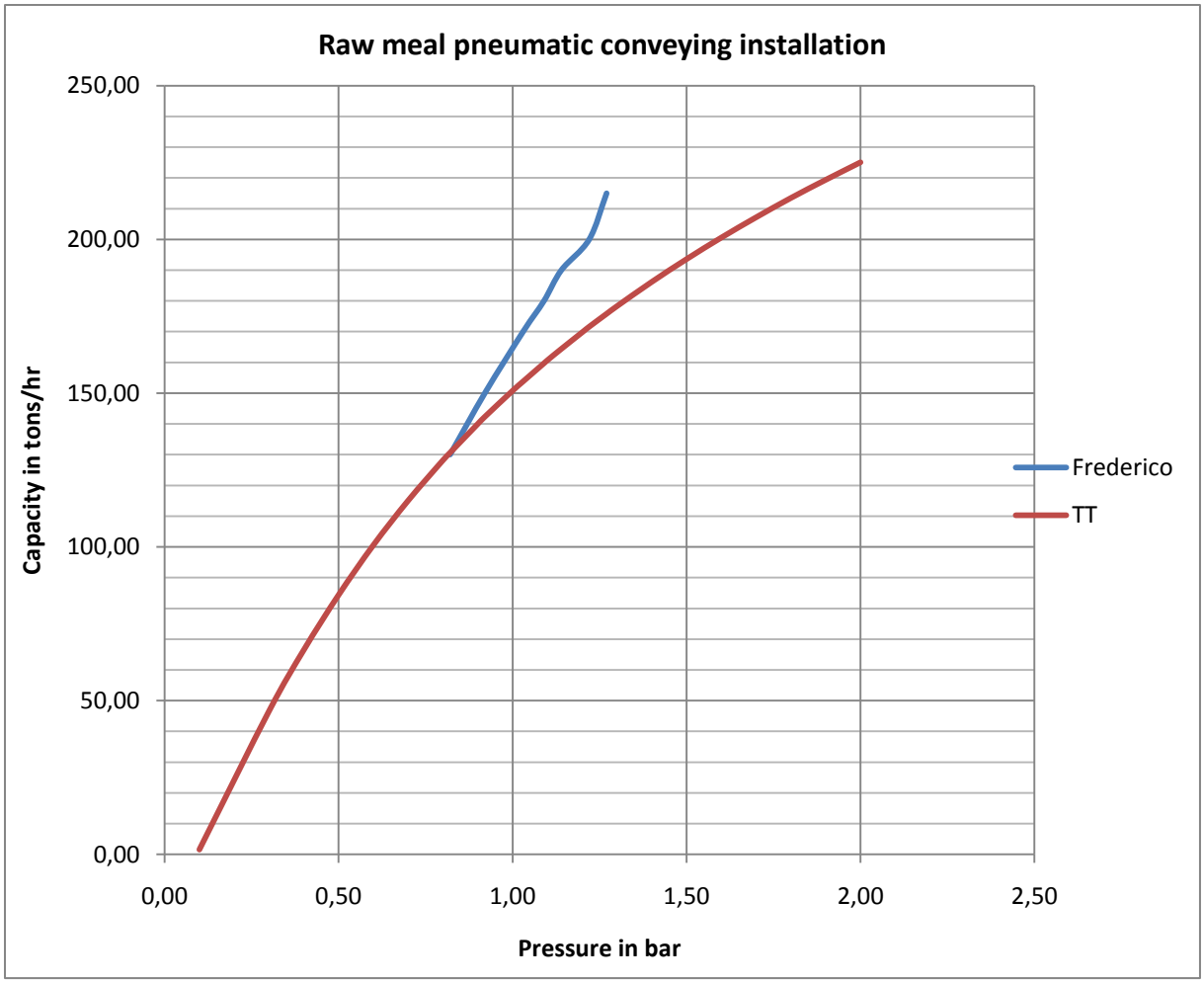


Table calculation
Client Federico Guido
Filepath c:\f\drm215tph.txt
Product RawMeal
MM-DD-YY
03-06-2011
Convey distance horizontal 41,8 m
Convey distance vertical 104,9 m-up m-down
Total conveying length 146,7 m
Number of Bends 7
Altitude 900 m
Pipe diameter begin 336 mm
Pipe diameter end 336 mm
Pressure conveying
Pump displacement 2,566 m3/sec (Screwcompressor 2x VML60 8975 rpm)
Booster displacement 0 m3/sec
Gas volume end NaN m3/sec 2,734 kg/sec at 0 bar
Screw feeder installation
Table
Pressure bar
pipe line capacity tons/hr
system capacity tons/hr
Silo/Cargo disch time 880 tons Label119
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
2 225,1 225,1 3,9 26,7 8,4 27,1 894,8 2,87 12,86 No sedimentation No condensation
1,9 219,4 219,4 4 25,9 8,8 27,1 844,3 2,84 12,53 No sedimentation No condensation
1,8 213,5 213,5 4,12 25,1 9,2 27,2 795 2,8 12,21 No sedimentation No condensation
1,7 207,2 207,2 4,24 24,2 9,6 27,2 746,3 2,77 11,88 No sedimentation No condensation
1,6 200,6 200,6 4,38 23,4 10 27,2 698,2 2,75 11,54 No sedimentation No condensation
1,5 193,6 193,6 4,54 22,4 10,5 27,3 650,5 2,72 11,2 No sedimentation No condensation
1,4 186,2 186,2 4,72 21,5 11 27,3 603,2 2,71 10,86 No sedimentation No condensation
1,3 178,3 178,3 4,93 20,4 11,5 27,4 556,2 2,7 10,52 No sedimentation No condensation
1,2 169,8 169,8 5,18 19,4 12,2 27,4 509,5 2,71 10,17 No sedimentation No condensation
1,1 160,7 160,7 5,47 18,2 12,8 27,4 463,2 2,72 9,82 No sedimentation No condensation
1 150,8 150,8 5,83 17 13,6 27,5 417 2,76 9,46 No sedimentation No condensation
0,9 140 140 6,28 15,7 14,5 27,5 370,7 2,82 9,11 No sedimentation No condensation
0,8 128,2 128,2 6,86 14,3 15,4 27,6 324,5 2,92 8,75 No sedimentation No condensation
0,7 115,1 115,1 7,64 12,7 16,5 27,6 278,1 3,08 8,4 No sedimentation No condensation
0,6 100,6 100,6 8,74 11 17,8 27,6 231,6 3,34 8,04 No sedimentation No condensation
0,5 84,4 84,4 10,41 9,2 19,2 27,7 184,9 3,76 7,68 No sedimentation No condensation
0,4 66,5 66,5 13,22 7,2 20,9 27,7 138,2 4,52 7,33 No sedimentation No condensation
0,3 46,6 46,6 18,85 5 23 27,8 91,9 6,11 6,98 No sedimentation No condensation
0,2 25 25 35,17 2,6 25,6 28 46,6 10,81 6,64 No sedimentation No condensation
0,1 1,6 1,6 526,91 0,1 29,8 28,1 2,9 161,07 6,29 No sedimentation No condensation
0 NaN NaN 0 NaN NaN NaN NaN NaN 0,01 No sedimentation No condensation
Empty pipeline system pressure drop NaN mmWC
Filter without exhaust fan
Back to start menu
Print table
New Calculation


Raw meal pneumatic conveying installation
250,00
200,00
150,00
100,00
50,00
0,00
Capacity in tons/hr
0,00
0,50
1,00
1,50
2,00
2,50
Pressure in bar
Frederico
TT