CALCULATION COVER SHEET

Date: 2020-07-31

Author: Alex Doll

Revision 1

Project: OH_052

Calc No: n/a

Title: Tabulation of industrial mill data, best fit equations for PSDs

Purpose: Tabulate a summary of which Particle Size Distribution (PSD) models is the best fit for industrial data collected by AGD's customers.

Basis / Assumptions:

Industrial survey data has been fitted to three potential regression equations, and the best fitting of the three equations is tabulated.

The three potential regression equations are:

Abbreviation	Model	Equation
RR	Rosin-Rammler	%R = exp(-[x/D]^n)
GS	Gaudin-Shuhmann	%P = (x/K)^m
$\sqrt{2}$	Bond $\sqrt{2}$	%P = 0.5(x/P_{50})^(1/$\sqrt{2}$)

Nomenclature

D	fitting constant for the RR equation
K	fitting constant for the GS equation
m	fitting constant for the GS equation
n	fitting constant for the RR equation
P_{50}	50% passing size of a PSD
%P	cumulative percent passing
%R	cumulative percent retained
x	particle size (more specifically, the size of interest)

Method: Particle size distributions are plotted and assessed to determine which of the three potential equations is a "best fit" for the data between the 80% and 20% passing sizes. Models are not intended to describe the highly variable "tails" observed between 80% and 100% passing, and 0% to 20% passing.

The choice of "best fit" is done by a combination of residual sum of squares (R^2) of the logarithmic values, and visual interpretation of the operator. The criteria used by the operator is "which model would you use if you needed to predict the 'P_{XX}' of a curve?".

Data sometimes fits between two of the regression curves; in such a case the two curves it fits between are both presented prefixed with "½". Multiple results (Eg. parallel equipment) given by "×2". SAG feed from secondary or pre-crushing is prefixed with '*'.

	A	B	C	D	E	F	G	H	I
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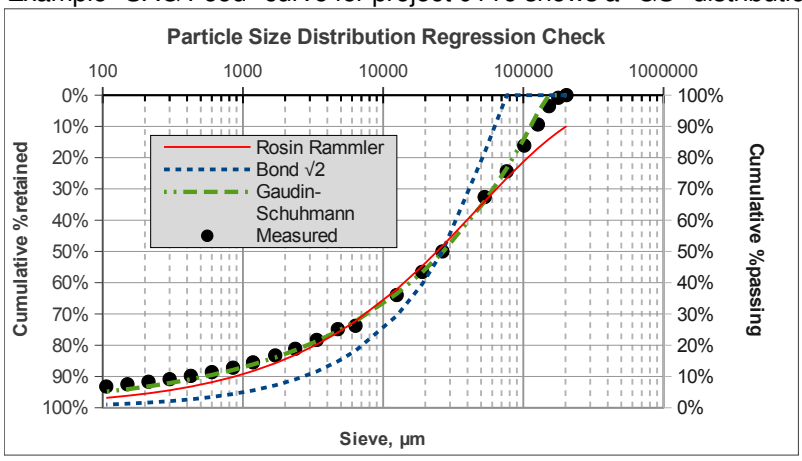
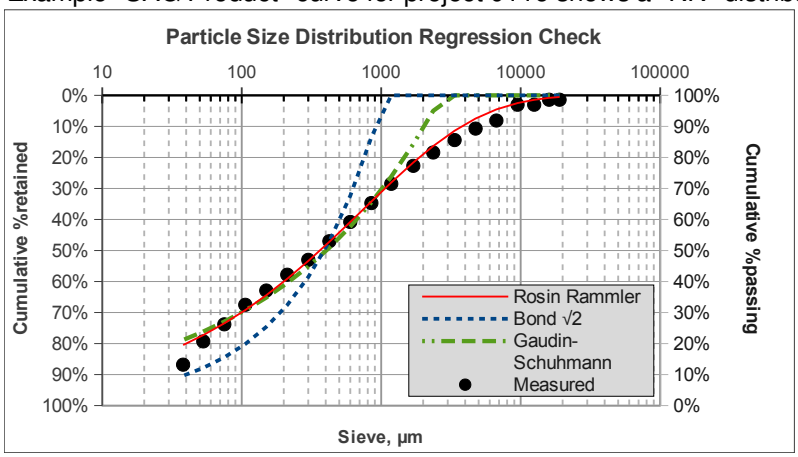
3	**Project:**	OH_052			**Calc No:**	n/a			
4	**Title:**	Tabulation of industrial mill data, best fit equations for PSDs							
5									
43	**Results:**								

Example “SAG Feed” curve for project 0116 shows a “GS” distribution.



Example “SAG Product” curve for project 0116 shows a “RR” distribution.



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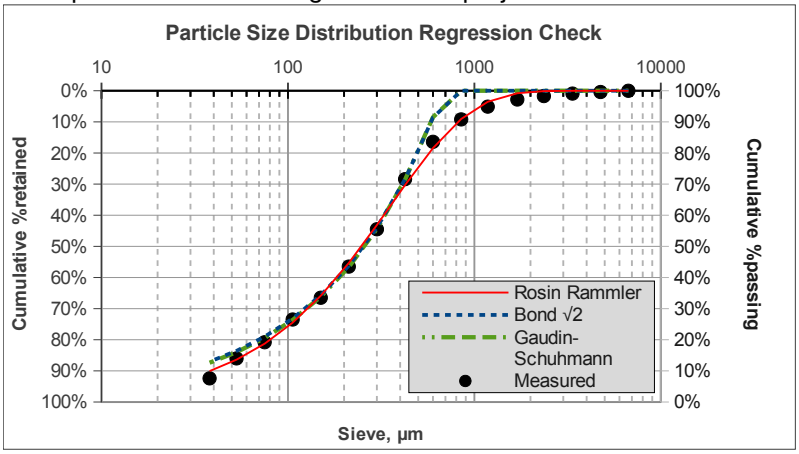
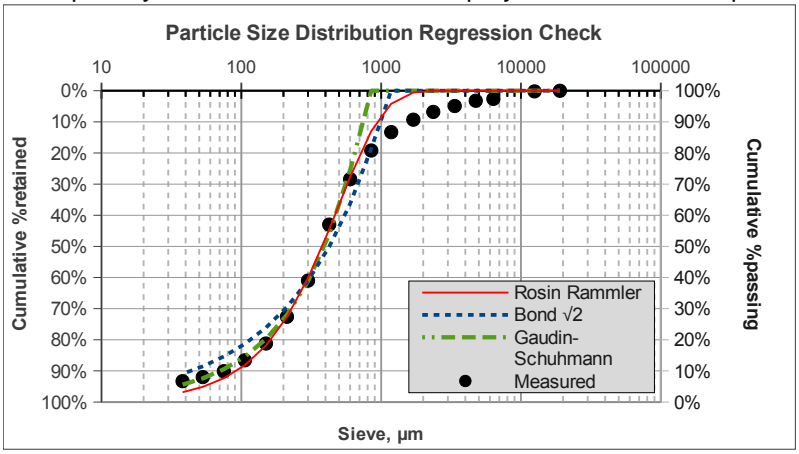
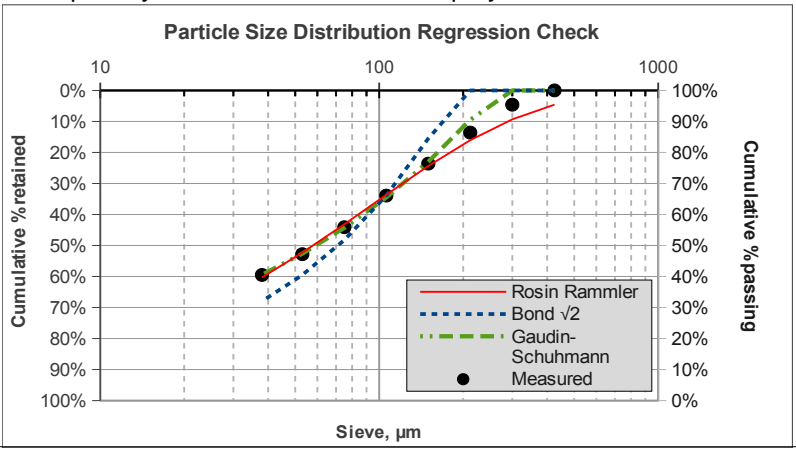
Example “Ball Mill Discharge” curve for project 0116 shows a “RR” distribution.



Example “Cyclone Underflow” curve for project 0116 shows a “poor RR” distribution.



Example “Cyclone Overflow” curve for project 0116 is “½GS,½RR”



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118									
119	**Conclusions & Recommendations:**								
120		PSD of a	SAG Feed		use a	GS model			
121		PSD of a	SAG Screen U/S		use a	RR model			
122		PSD of a	Cyclone O/F		use a	GS model			
123		PSD of a	BM Discharge		use a	RR model			
124		Cyclone U/F is undetermined, partially because it often doesn't fit these standard models.							

	A	B	C	D	E	F	G
1	**Project**	**Description**	**SAG Feed**	**SAG Screen U/S**	**Cyclone U/F**	**Cyclone O/F**	**BM Discharge**
2	102	Skarn polymetallic	GS	RR		√2	
3	88	Labrador Trough Fe	none	RR			
4	120	African diamond (Pri cr prod)	GS				
5	120	African diamond (Pri cr prod)	GS				
6	117	Canadian Shield greenstone				GS (× 6)	
7	117	Canadian Shield greenstone				RR×3, (½RR,½GS)	
8	117	Canadian Shield greenstone	*GS or √2	RR or GS	RR×2	RR×2	RR×2
9	117	Canadian Shield greenstone		RR	RR	GS	
10	138	Canadian Shield greenstone	*GS		RR	GS	RR
11	116	Cordilleran Cu porphyry	GS	RR	bad RR	½RR,½GS	RR
12	116	Cordilleran Cu porphyry	GS	bad RR	bad RR	GS×2	RR×2
13	104	Cordilleran Cu porphyry	*GS	RR	none (bimodal)	RR	
14	104	Cordilleran Cu porphyry	*√2	GS	none (bimodal)	GS	RR
15	104	Cordilleran Cu porphyry	*GS or √2	RR	GS	GS	RR
16	97	Andean Cu porphyry	(GS, RR, ½GS+½RR, RR, GS)				
17	mc-01	Andean Cu porphyry		none		GS	
18	mc-02	Andean Cu porphyry		RR		GS	
19	mc-03	Andean Cu porphyry		GS		GS	
20	mc-04	Andean Cu porphyry	GS	RR		RR	
21	mc-05	Andean Cu porphyry	GS	RR		½RR,½GS	
22	mc-06	Andean Cu porphyry	GS	RR			
23	mc-07	Andean Cu porphyry	GS	RR			
24	mc-08	other Cu porphyry	poor GS/RR	RR		½RR,½GS	
25	mc-09	Andean skarn	RR,GS	RR×4		RR×4	
26	mc-10	Andean polymetalic	RR (GS close)	RR		RR	
27	mc-11	Andean Cu porphyry	RR	RR		GS×2	
28	mc-12	Andean Cu porphyry	none	(bad RR)×2		GS×2	
29	mc-13	Andean Cu porphyry	RR×2	RR×2		GS×2	
30	96	Andean Cu porphyry	*GS or √2	RR		GS,RR	RR×2
31							
32		In general, best models are:	GS	RR	undetermined	GS	RR