Resolution calculation investigation & March ’08 results

The Molloy Resolution Calculation

For $\mathbf{P_i = (diff_i / sum_i)*C_i + O_i}$

And $\mathbf{A = (P_2\ P_3)}$, $\mathbf{B = (P_1)}$

i = processor number
P_i = position measured by processor
C_i = calibration constant of processor
O_i = offset of processor

We solve for the set of linear equations $\mathbf{Ax = B}$ where $\mathbf{x = A^+B}$

Since A & B are not square and there may be no unique set of solutions for x we use the Moore-Penrose pseudoinverse matrix which gives the least squares solution for x.

$\mathbf{PP_1 = x(1)*P_2 + x(2)*P_3 + x(3)}$ = predicted position as given by P_2 & P_3

$\therefore$

$\mathbf{Res\ 1 = std(P_1 - PP_1)}$

The Kalinin Resolution Calculation

Using the same notation as for the Molloy method we get;

$\mathbf{PP_1 = 2*P_2 - P_3}$

$\mathbf{PP_2 = 0.5*P_1 + P_3}$

$\mathbf{PP_3 = 2*P_2 - P_1}$

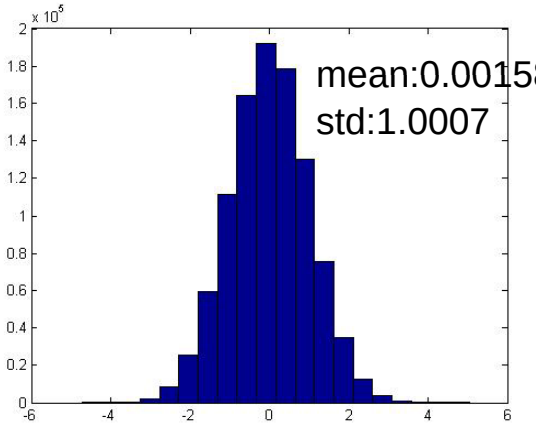
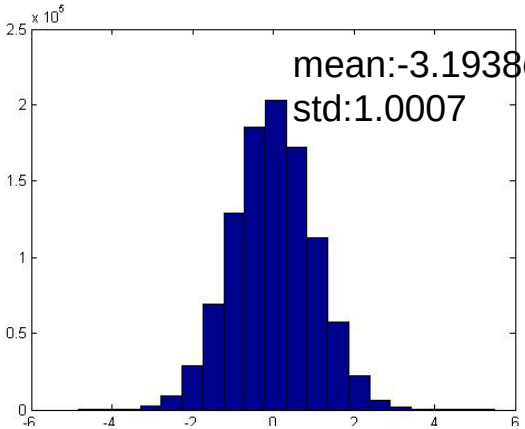
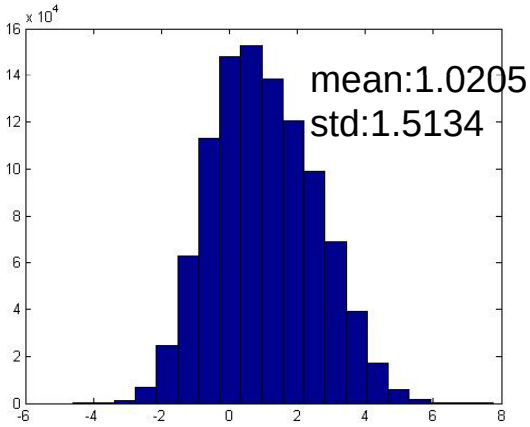
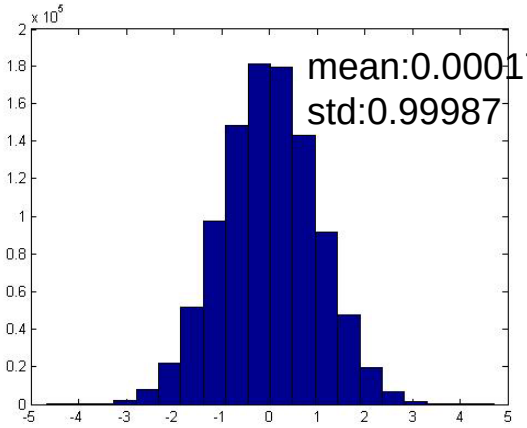
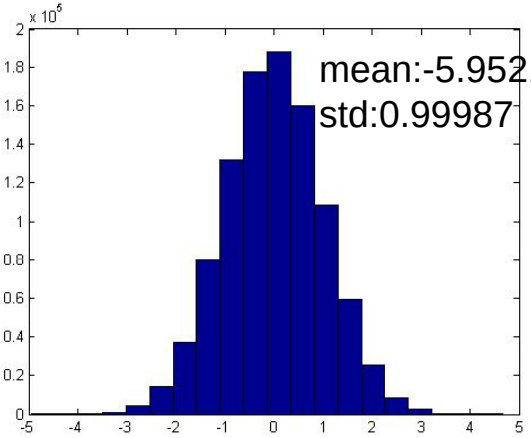
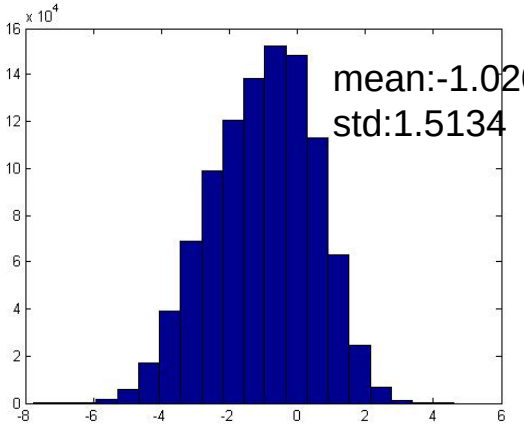
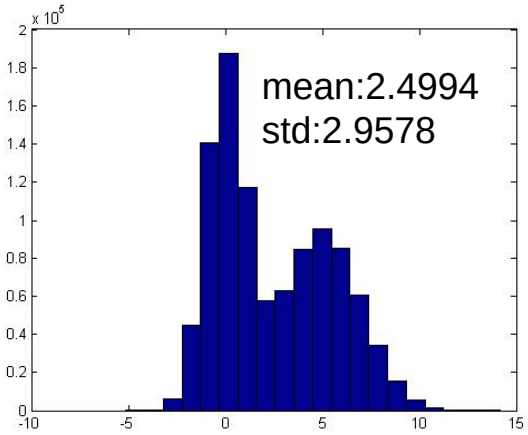
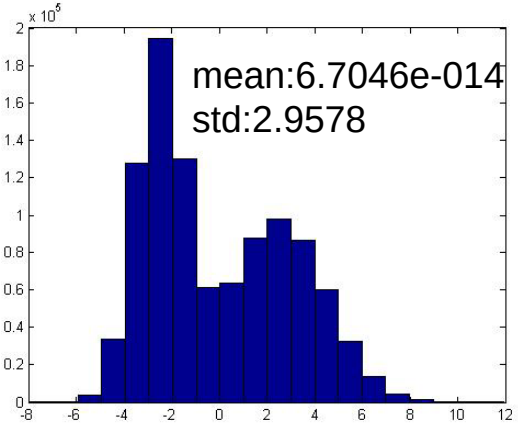
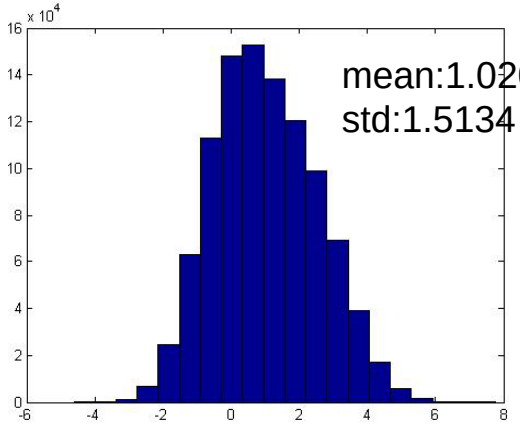
And

$\mathbf{Res_1 = std\ (P_1 - PP_1)\ /\ sqrt(6)}$

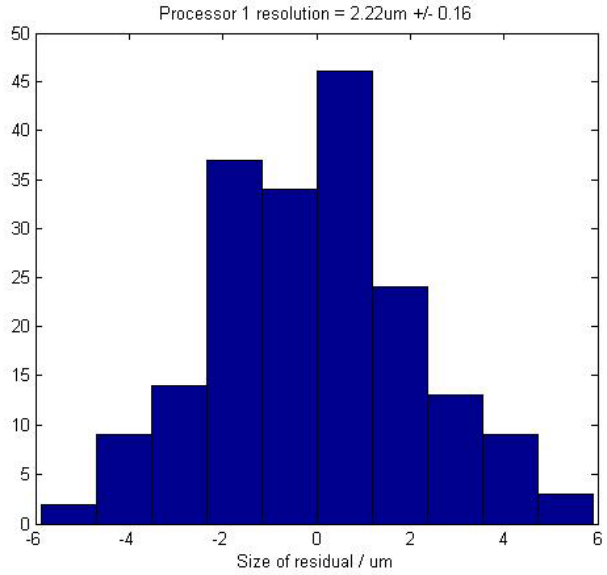
$\mathbf{Res_2 = std\ (P_2 - PP_2)\ *\ sqrt(2/3)}$

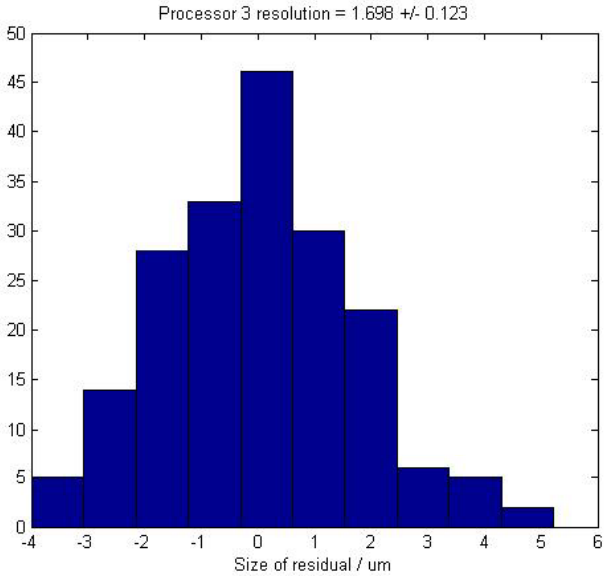
$\mathbf{Res_3 = std\ (P_3 - PP_3)\ /\ sqrt(6)}$

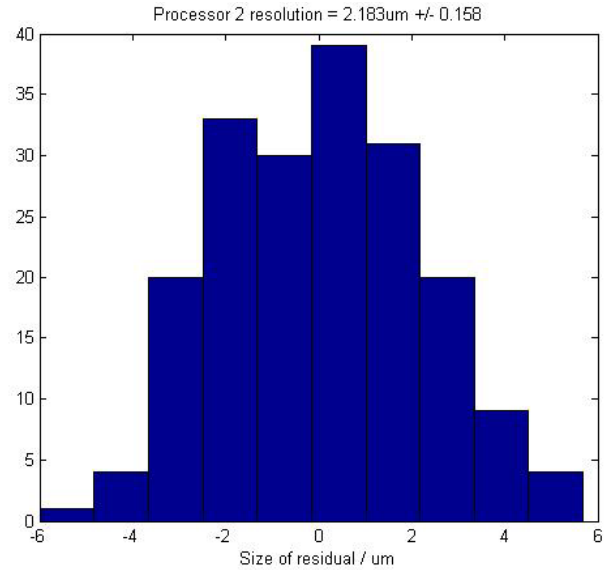
These two methods were then tested using simulated data sets to give the results displayed on the next slide.

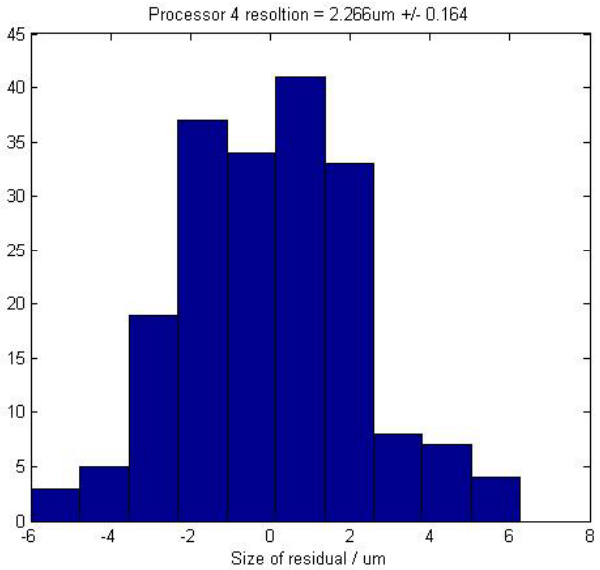
Input	Output (Molloy)	Output (Kalinin)
 mean:0.0015872 std:1.0007	 mean:-3.1938e-017 std:1.0007	 mean:1.0205 std:1.5134
 mean:0.00017819 std:0.99987	 mean:-5.9521e-018 std:0.99987	 mean:-1.0205 std:1.5134
 mean:2.4994 std:2.9578	 mean:6.7046e-014 std:2.9578	 mean:1.0205 std:1.5134

May ’08 results for 4 processors on 1 pickup









Resolution vs position for 4 processors on 1 pickup