

18<sup>th</sup> Annual  
Ohio Workplace Safety Conference  
*Workshop B*

**STOPPING INJURIES AT THE DOOR**  
**Overlooked Strategies for**  
**Reducing the Rate and Severity**  
**of Injuries**

# PRESENTERS

- **Daniel Averbeck, Ph.D.** - President,  
Applied Assessments, Inc
- **May Doyle** – Assessment Specialist,  
Applied Assessments, Inc.
- **Woodie Osteen** – Sr. Safety Engineer,  
Whirlpool Corp., Clyde Division



# Work Simulation Exercises

- **Gear Assembly Task**
- **Finger Dexterity**
- **Isometric Strength**
  - **Grip**
  - **Arm**
  - **Back**

## GEAR ASSEMBLY

### Top 25% of Applicants

N = 72

- produced 1064 assemblies
- Average = 14.77 assemblies

### Bottom 25% of Applicants

N = 72

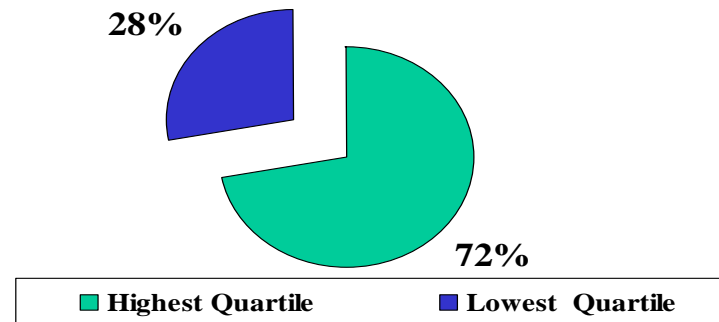
- produced 426 assemblies
- Average = 5.96 assemblies

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•Produced 72% of the combined assemblies of highest and lowest quartile

•Produced 28% of the combined assemblies of highest and lowest quartile

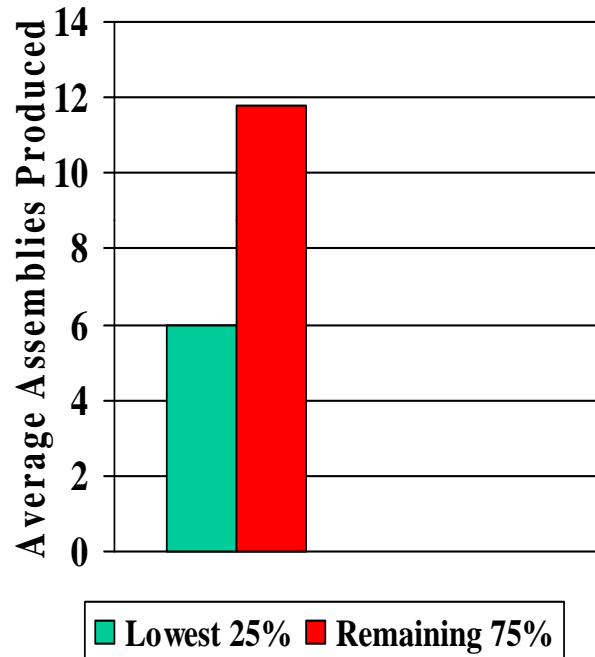
### Top Vs. Bottom Quartile



**Conclusion:** On average, top quartile applicants produced about 2 1/2 assemblies for every 1 assembly delivered by the bottom quartile.

## GEAR ASSEMBLY

### Bottom Quartile Vs. Remaining 75%



### Top 75% of Applicants

$N = 217$

- Total Assemblies = 2553
- Average = 11.76

### Bottom 25% of Applicants

$N = 72$

- Total Assemblies = 426
- Average = 5.96

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>44</u>	<u>35</u>	<u>37</u>	<u>37</u>	<u>39</u>	<u>38</u>
Left =	<u>40</u>	<u>33</u>	<u>32</u>	<u>29</u>	<u>39</u>	<u>34</u>
Back =	<u>30</u>	<u>31</u>	<u>26</u>	<u>32</u>	<u>33</u>	<u>30</u>
Arm =	<u>22</u>	<u>24</u>	<u>21</u>	<u>19</u>	<u>26</u>	<u>22</u>

=====  
Manual Dexterity

Test #1	<u>80</u>
Test #2	<u>76</u>
Total	<u>156</u>

=====  
**SPATIAL GEAR ASSEMBLY**

**TRIAL 1** 4                      **TRIAL 2** 1

=====  
Finger Dexterity

Trial 1 19                      Trial 2 22

=====  
Behavioral Observations/Comments: Became slightly confused on the dexterity board. Struggled with gear assembly, lost her confidence.

Score Recording Sheet

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>105</u>	<u>81</u>	<u>106</u>	<u>87</u>	<u>86</u>	<u>93</u>
Left =	<u>97</u>	<u>78</u>	<u>99</u>	<u>101</u>	<u>94</u>	<u>93.8</u>
Back =	<u>207</u>	<u>211</u>	<u>219</u>	<u>228</u>	<u>212</u>	<u>215.4</u>
Arm =	<u>91</u>	<u>98</u>	<u>99</u>	<u>92</u>	<u>87</u>	<u>93.4</u>

=====  
Manual Dexterity

Test #1	<u>63</u>
Test #2	<u>66</u>
Total	<u>129</u>

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**SPATIAL GEAR ASSEMBLY**

<b>TRIAL 1</b>	<b><u>11</u></b>	<b>TRIAL 2</b>	<b><u>19</u></b>
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=====  
Finger Dexterity

Trial 1	<u>24</u>	Trial 2	<u>27</u>
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=====  
Behavioral Observations/Comments: stated dexterity board was fun - enjoyed challenge of spatial assembly - very proficient.

# FINGER DEXTERITY

## Top 25% of Applicants

N = 72

- produced 1738 assemblies
- Average = 24.13 assemblies

## Bottom 25% of Applicants

N = 72

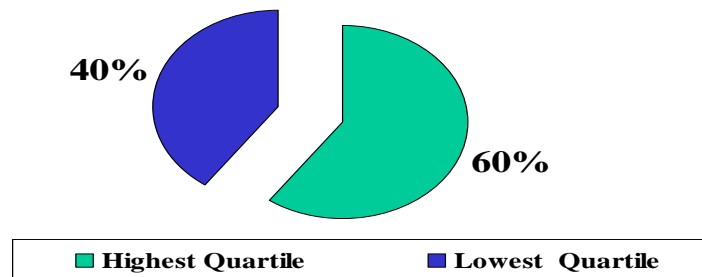
- produced 1140 assemblies
- Average = 15.83 assemblies

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•Produced 60% of the combined assemblies of highest and lowest quartile

•Produced 40% of the combined assemblies of highest and lowest quartile

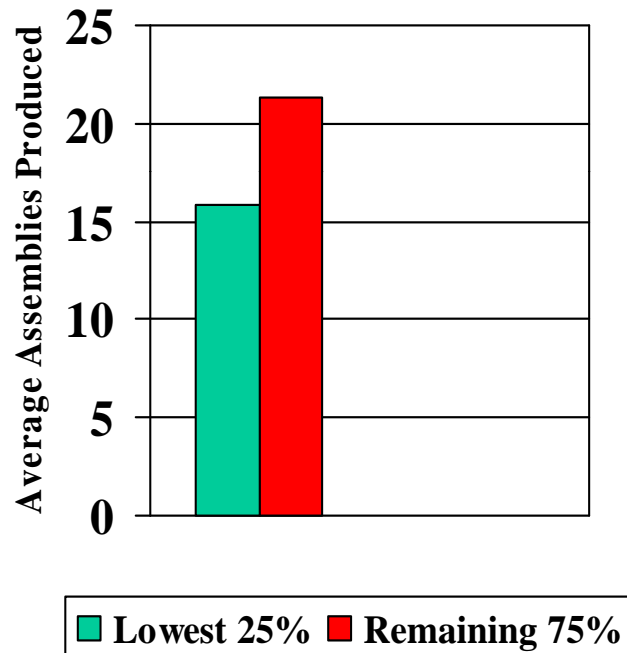
### Top Vs. Bottom Quartile



**Conclusion:** On average, top quartile applicants produced about 1 1/2 assemblies for every 1 assembly delivered by the bottom quartile.

## FINGER DEXTERITY

### Bottom Quartile Vs. Remaining 75%



### Top 75% of Applicants

$N = 217$

- Total Assemblies = 4586
- Average = 21.13

### Bottom 25% of Applicants

$N = 72$

- Total Assemblies = 1140 assemblies
- Average = 15.83 assemblies

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>100.7</u>	<u>86.3</u>	<u>109.2</u>	<u>102.8</u>	<u>92.1</u>	<u>98.2</u>
Left =	<u>100.3</u>	<u>107.7</u>	<u>92.1</u>	<u>94.9</u>	<u>87.9</u>	<u>96.5</u>
Back =	<u>103.2</u>	<u>127.1</u>	<u>153.1</u>	<u>151.7</u>	<u>184</u>	<u>144</u>
Arm =	<u>84.4</u>	<u>71.1</u>	<u>68.2</u>	<u>79.2</u>	<u>82.5</u>	<u>77</u>

=====  
Manual Dexterity

Test #1	<u>82</u>
Test #2	<u>89</u>
Total	<u>171</u>

=====  
Spatial Gear Assembly

Trial 1 8                      Trial 2 8

=====  
**FINGER DEXTERITY**

**TRIAL 1 11                      TRIAL 2 13**

=====  
Behavioral Observations/Comments: very good listener -  
tries very hard To follow instructions.

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>93</u>	<u>115</u>	<u>111</u>	<u>105</u>	<u>101</u>	<u>105</u>
Left =	<u>98</u>	<u>89</u>	<u>98</u>	<u>78</u>	<u>84</u>	<u>89</u>
Back =	<u>195</u>	<u>227</u>	<u>228</u>	<u>194</u>	<u>226</u>	<u>214</u>
Arm =	<u>79</u>	<u>78</u>	<u>67</u>	<u>66</u>	<u>65</u>	<u>71</u>

=====  
Manual Dexterity

Test #1	<u>65</u>
Test #2	<u>67</u>
Total	<u>132</u>

=====  
Spatial Gear Assembly

Trial 1	<u>9</u>	Trial 2	<u>5</u>
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=====  
**FINGER DEXTERITY**

<b>TRIAL 1</b>	<b><u>21</u></b>	<b>TRIAL 2</b>	<b><u>25</u></b>
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=====  
Behavioral Observations/Comments: has all abilities to be a good employee.

## GRIP STRENGTH (RIGHT)

### Top 25% of Applicants

N = 72

- total lbs. = 6255
- Average = 86.875

### Bottom 25% of Applicants

N = 72

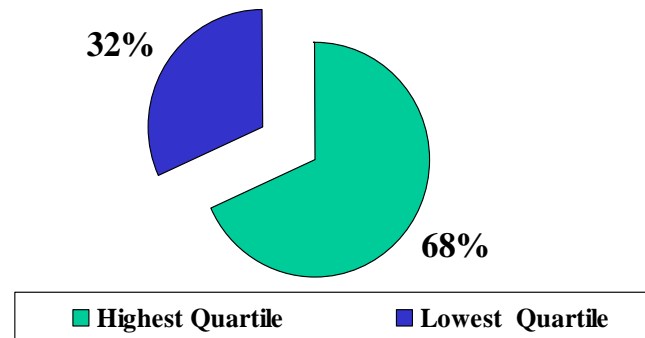
- total lbs. = 2911
- Average = 40.43

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•Exerted over 68% of the combined grip force.

•Exerted only 32% of the combined grip force.

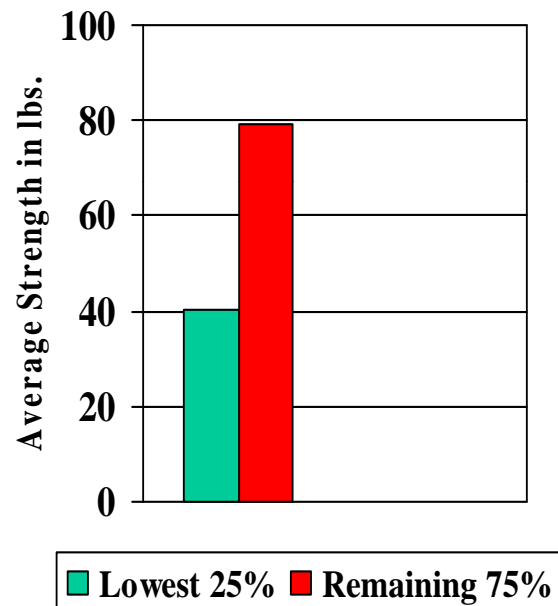
### Top Vs. Bottom Quartile



**Conclusion:** On average, top quartile applicants exerted more than 2 times or 53% the grip strength of applicants in the bottom quartile.

## GRIP STRENGTH (RIGHT)

### Bottom Quartile Vs. Remaining 75%



### Top 75% of Applicants

N = 217

- Total lbs. = 17,224
- Average = 79.37

### Bottom 25% of Applicants

N = 72

- Total lbs. = 2911
- Average = 40.43

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
<b>RIGHT =</b>	<u>35</u>	<u>37</u>	<u>43</u>	<u>33</u>	<u>36</u>	<u>35.8</u>
<b>LEFT =</b>	<u>32</u>	<u>27</u>	<u>29</u>	<u>28</u>	<u>25</u>	<u>28.2</u>

Back = 51 63 56 65 68 60.6

Arm = 40 34 33 30 34 34.2

=====  
Manual Dexterity

Test #1 73

Test #2 73

Total 146

=====  
Spatial Gear Assembly

Trial 1 9 Trial 2 11

=====  
Finger Dexterity

Trial 1 13 Trial 2 18

=====  
Behavioral Observations/Comments: followed directions - had fun - pleasant

Score Recording Sheet

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
<b>RIGHT =</b>	<u>127</u>	<u>137</u>	<u>137</u>	<u>115</u>	<u>147</u>	<u>133</u>
<b>LEFT =</b>	<u>135</u>	<u>140</u>	<u>130</u>	<u>128</u>	<u>121</u>	<u>131</u>
Back =	<u>138</u>	<u>127</u>	<u>148</u>	<u>112</u>	<u>138</u>	<u>133</u>
Arm =	<u>65</u>	<u>78</u>	<u>81</u>	<u>82</u>	<u>70</u>	<u>75</u>

=====  
Manual Dexterity

Test #1 72  
Test #2 73  
Total 145

=====  
Spatial Gear Assembly

Trial 1 7 Trial 2 5

=====  
Finger Dexterity

Trial 1 19 Trial 2 20

=====  
Behavioral Observations/Comments: would be very good.

## ARM STRENGTH

### Top 25% of Applicants

N = 72

- total lbs. = 6118
- Average = 84.97

### Bottom 25% of Applicants

N = 72

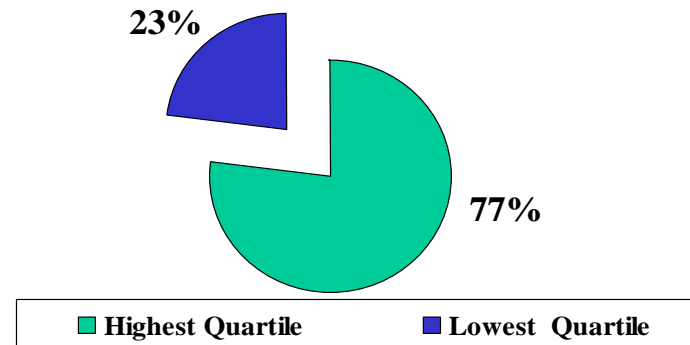
- total lbs. = 1780
- Average = 24.72

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•Exerted over 77% of the combined arm strength.

•Exerted less than 23% of the combined arm strength

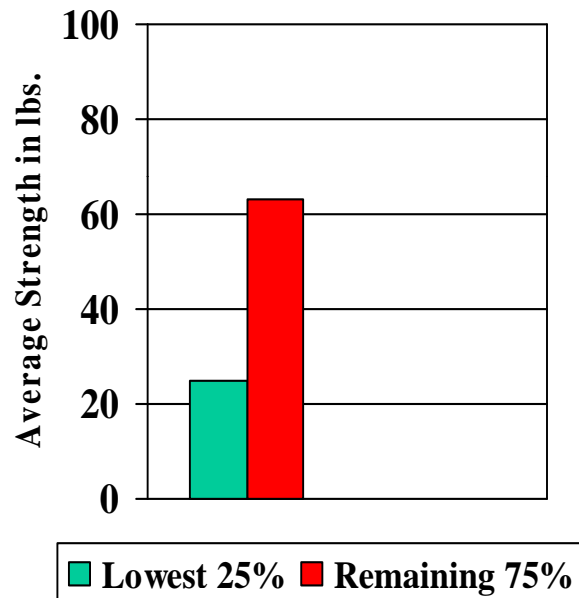
### Top Vs. Bottom Quartile



**Conclusion:** On average, top quartile applicants exerted almost 3 1/2 times or almost 71% more the arm strength of applicants in the bottom quartile.

## ARM STRENGTH

### Bottom Quartile Vs. Remaining 75%



### Top 75% of Applicants

N = 217

• Total lbs. = 13,672

• Average = 63.0

### Bottom 25% of Applicants

N = 72

• Total lbs. = 1780

• Average = 24.72

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>25</u>	<u>29.4</u>	<u>23.3</u>	<u>28.6</u>	<u>30</u>	<u>27.3</u>
Left =	<u>21.9</u>	<u>15.7</u>	<u>29.5</u>	<u>18.1</u>	<u>26.3</u>	<u>18.9</u>
Back =	<u>28.8</u>	<u>28.6</u>	<u>30.1</u>	<u>31.2</u>	<u>27.4</u>	<u>29.2</u>
<b>ARM =</b>	<b><u>3.6</u></b>	<b><u>5.5</u></b>	<b><u>3.6</u></b>	<b><u>5.6</u></b>	<b><u>7.5</u></b>	<b><u>5.2</u></b>

=====  
Manual Dexterity

Test #1 67  
Test #2 66  
Total 133

=====  
Spatial Gear Assembly

Trial 1 10 Trial 2 8

=====  
Finger Dexterity

Trial 1 19 Trial 2 23

=====  
Behavioral Observations/Comments: did not concentrate  
entirely on instructions being read. Once started, did  
very well at putting things together.

Score Recording Sheet

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>153</u>	<u>152</u>	<u>108</u>	<u>144</u>	<u>138</u>	<u>139</u>
Left =	<u>164</u>	<u>151</u>	<u>134</u>	<u>117</u>	<u>132</u>	<u>139</u>
Back =	<u>246</u>	<u>236</u>	<u>212</u>	<u>226</u>	<u>228</u>	<u>229</u>
<b>ARM =</b>	<b><u>117</u></b>	<b><u>109</u></b>	<b><u>112</u></b>	<b><u>105</u></b>	<b><u>99</u></b>	<b><u>108</u></b>

=====  
Manual Dexterity

Test #1 70  
Test #2 70  
Total 140

=====  
Spatial Gear Assembly

Trial 1 4 Trial 2 10

=====  
Finger Dexterity

Trial 1 20 Trial 2 22

=====  
Behavioral Observations/Comments: slightly frustrated  
with gear assembly--dropped very few on dexterity board.

## BACK STRENGTH

### Top 25% of Applicants

N = 72

- total lbs. = 15,447
- Average = 214.54

•Exerted over 77% of the combined back strength.

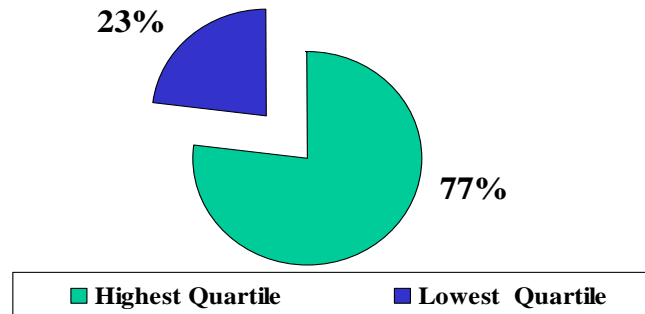
### Bottom 25% of Applicants

N = 72

- total lbs. = 4361
- Average = 60.56

•Exerted 23% of the combined back strength

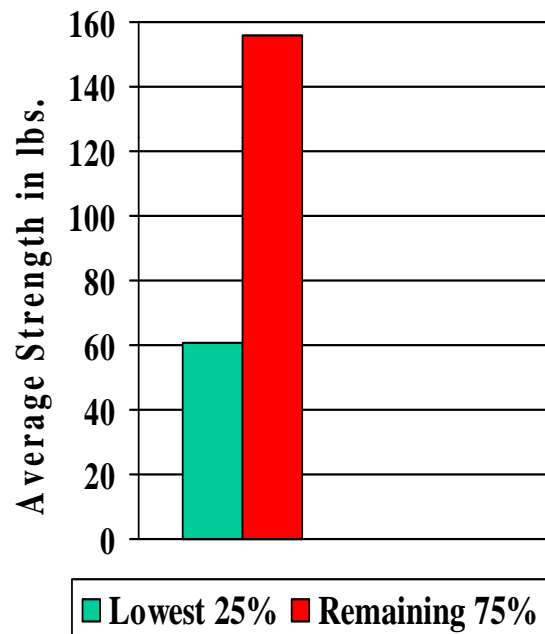
### Top Vs. Bottom Quartile



**Conclusion:** On average, top quartile applicants exerted almost 3 1/2 times or nearly 72% beyond the back strength of applicants in the bottom quartile.

# BACK STRENGTH

## Bottom Quartile Vs. Remaining 75%



## Top 75% of Applicants

N = 217

- Total lbs. = 33,770
- Average = 155.62

## Bottom 25% of Applicants

N = 72

- Total lbs. = 4361
- Average = 60.56

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>35</u>	<u>39</u>	<u>41</u>	<u>42</u>	<u>35</u>	<u>38</u>
Left =	<u>49</u>	<u>41</u>	<u>41</u>	<u>35</u>	<u>28</u>	<u>39</u>

**BACK = 63 56 51 52 55 55**

Arm = 26 29 23 22 22 24

=====  
Manual Dexterity

Test #1 66

Test #2 65

Total 131

=====  
Spatial Gear Assembly

Trial 1 11

Trial 2 10

=====  
Finger Dexterity

Trial 1 20

Trial 2 22

=====  
Behavioral Observations/Comments: open minded with good work habits.

**Score Recording Sheet**

Strength Evaluation System

	#1	#2	#3	#4	#5	Avg.
Right =	<u>84</u>	<u>80</u>	<u>77</u>	<u>68</u>	<u>55</u>	<u>72.8</u>
Left =	<u>87</u>	<u>64</u>	<u>69</u>	<u>50</u>	<u>52</u>	<u>64.4</u>
<b>BACK=</b>	<b><u>246</u></b>	<b><u>239</u></b>	<b><u>229</u></b>	<b><u>202</u></b>	<b><u>237</u></b>	<b><u>230.6</u></b>
Arm =	<u>69</u>	<u>69</u>	<u>66</u>	<u>54</u>	<u>56</u>	<u>62.8</u>

=====  
Manual Dexterity

Test #1 78

Test #2 73

Total 151

=====  
Spatial Gear Assembly

Trial 1 6 Trial 2 9

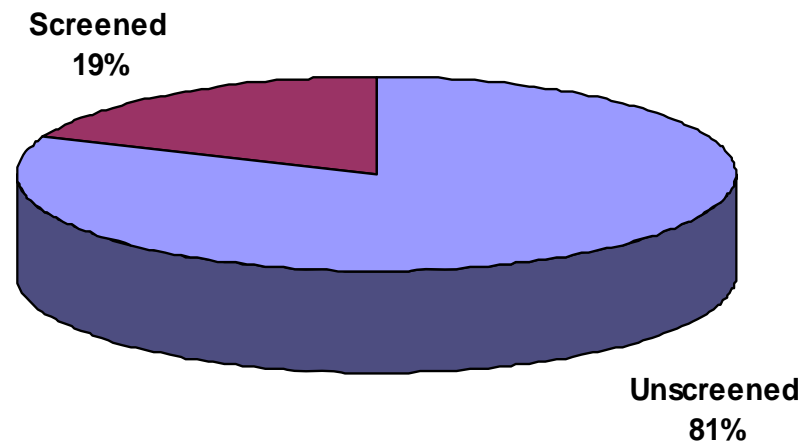
=====  
Finger Dexterity

Trial 1 17 Trial 2 19

=====  
Behavioral Observations/Comments: followed instructions  
well - arrived early - good attitude.

Population	No. of Accidents	Percent of Accidents	Cost	Percent of Cost	Cost Per Injury
Unscreened	151	81%	\$ 2,205,529	97%	\$ 14,606
Screened	36	19%	\$ 69,611	3%	\$ 1,934
<b>Total</b>	<b>187</b>		<b>\$ 2,275,140</b>		

**Percent of Accidents of Screened Vs. Unscreened Applicants**

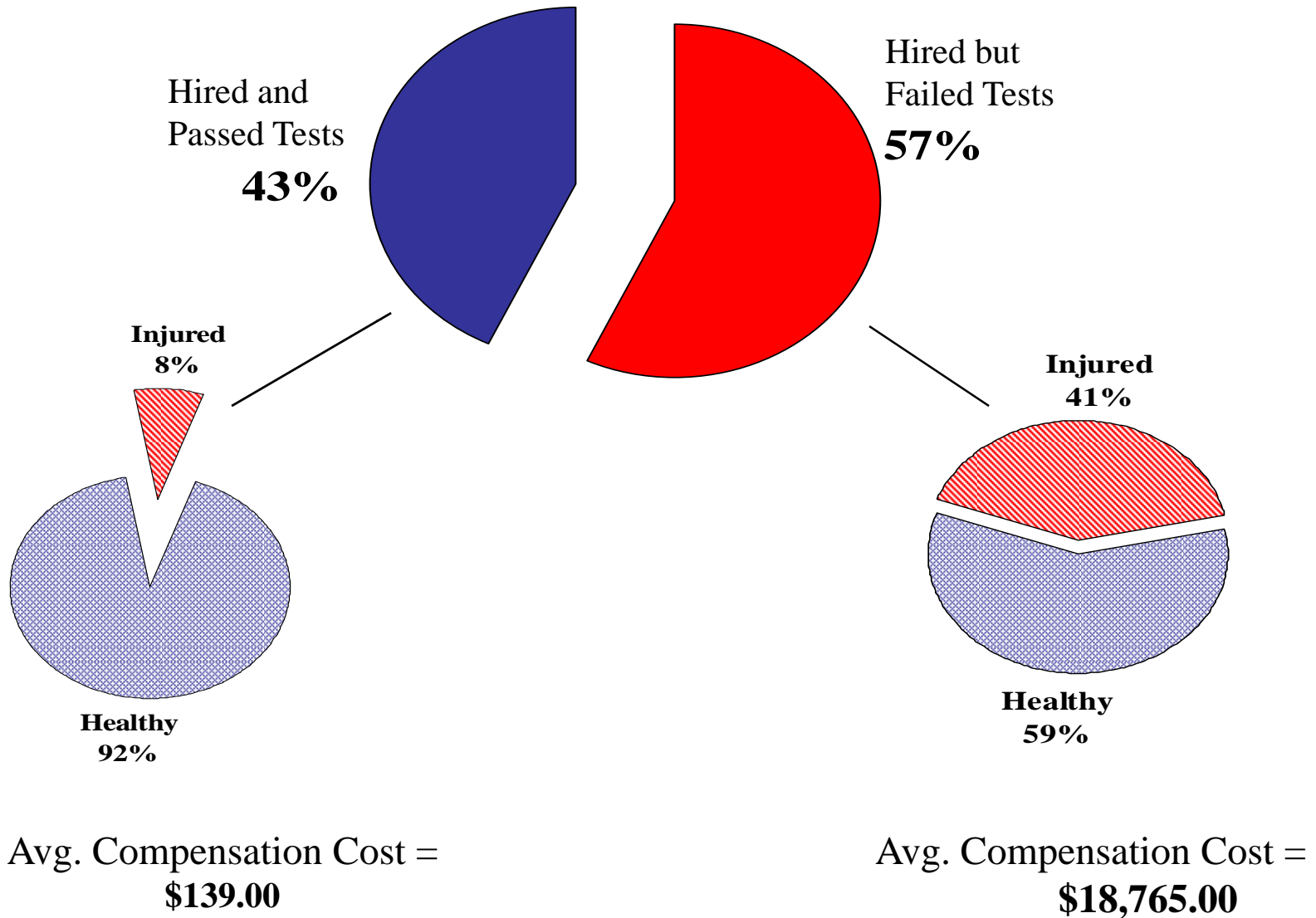


N = 423 UNSCREENED  
602 SCREENED

**APPLIED ASSESSMENTS, INC.**

# JOB APPLICANTS

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**APPLIED ASSESSMENTS, INC.**