

## รายการอ้างอิง

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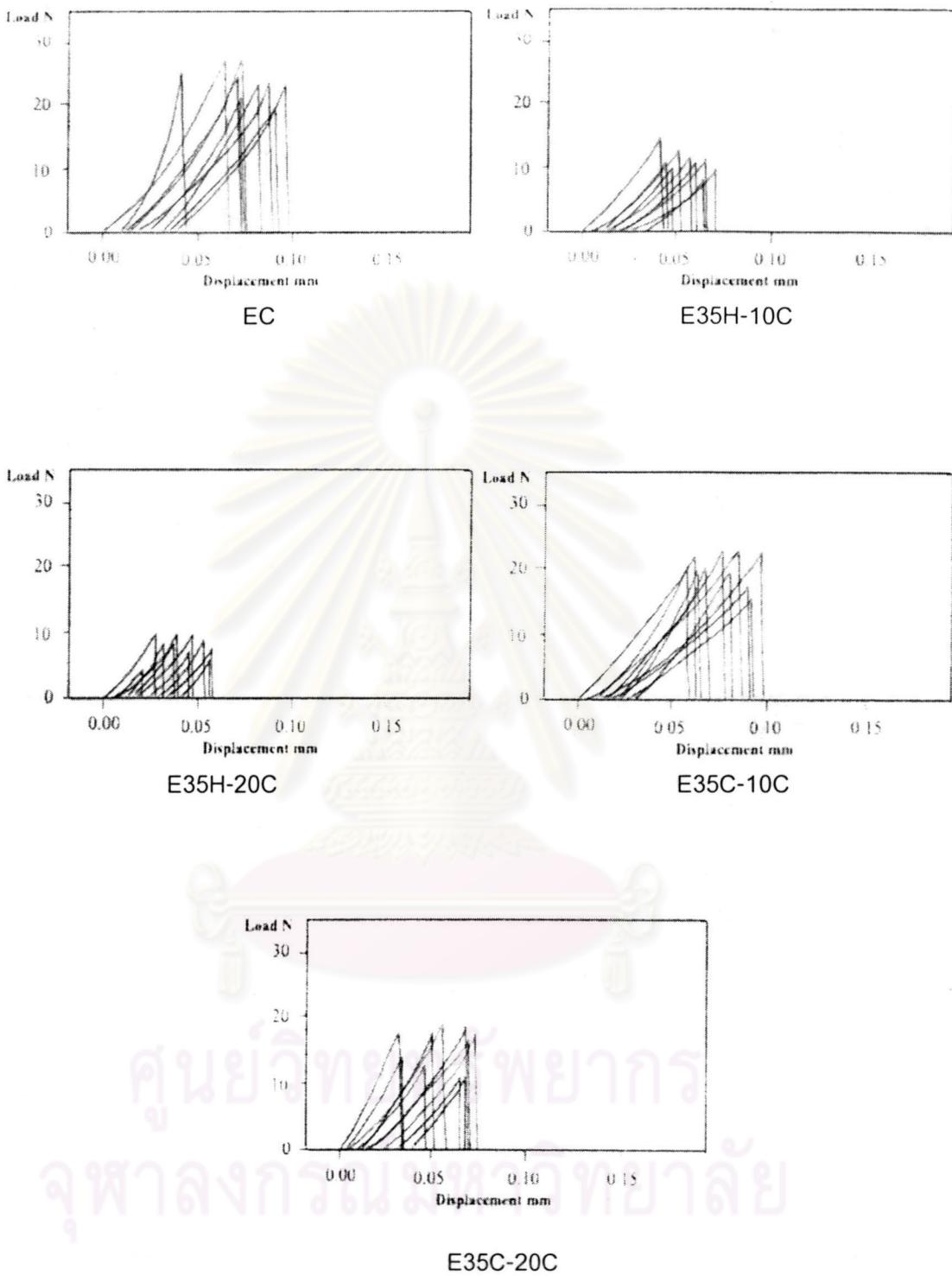
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ภาคผนวก

# ศูนย์วิทยทรัพยากร จุฬาลงกรณ์มหาวิทยาลัย



ภาพที่ 24 กราฟแสดงค่าความหน่วงดึงของเคลือบพื้นในการฟอกสีพื้นภายในอก

ตารางที่ 14 แสดงค่าความหนาแรงดึงของเคลือบพื้นในการฟอกสีพื้นภายนอก

| Number   |    | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |
|----------|----|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|
| EC       | 1  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 27          | 35.2941           |
|          | 2  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 27          | 35.0604           |
|          | 3  | 1.52               | .51                 | 1.52               | .51                 | .7752                          | 25          | 32.2497           |
|          | 4  | 1.52               | .49                 | 1.51               | .49                 | .7424                          | 24          | 32.3298           |
|          | 5  | 1.52               | .51                 | 1.51               | .51                 | .7727                          | 23          | 29.7677           |
|          | 6  | 1.52               | .51                 | 1.52               | .51                 | .7752                          | 23          | 29.6698           |
|          | 7  | 1.51               | .49                 | 1.52               | .49                 | .7424                          | 23          | 30.9827           |
|          | 8  | 1.50               | .52                 | 1.50               | .52                 | .7800                          | 21          | 26.9231           |
|          | 9  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 21          | 27.8146           |
|          | 10 | 1.52               | .50                 | 1.51               | .50                 | .7575                          | 19          | 25.0825           |
| E35H-10C | 1  | 1.51               | .52                 | 1.51               | .52                 | .7852                          | 15          | 19.1034           |
|          | 2  | 1.51               | .52                 | 1.51               | .52                 | .7852                          | 13          | 16.5563           |
|          | 3  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 12          | 15.8940           |
|          | 4  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 12          | 15.5824           |
|          | 5  | 1.52               | .51                 | 1.52               | .51                 | .7752                          | 12          | 15.4799           |
|          | 6  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 11          | 14.6667           |
|          | 7  | 1.51               | .52                 | 1.51               | .52                 | .7852                          | 11          | 14.0092           |
|          | 8  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 10          | 13.2450           |
|          | 9  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 10          | 13.2450           |
|          | 10 | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 8           | 10.3883           |
| E35H-20C | 1  | 1.52               | .51                 | 1.51               | .51                 | .7727                          | 10          | 12.9425           |
|          | 2  | 1.50               | .52                 | 1.50               | .52                 | .7800                          | 8           | 10.2564           |
|          | 3  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 7           | 9.3333            |
|          | 4  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 10          | 13.1579           |
|          | 5  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 10          | 13.1579           |
|          | 6  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 9           | 11.8421           |
|          | 7  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 4           | 5.3333            |
|          | 8  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 9           | 12.0000           |
|          | 9  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 8           | 10.5960           |
|          | 10 | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 6           | 7.7912            |
| E35C-10C | 1  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 22          | 28.9474           |
|          | 2  | 1.53               | .50                 | 1.52               | .50                 | .7625                          | 22          | 28.8525           |
|          | 3  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 22          | 28.7582           |
|          | 4  | 1.52               | .51                 | 1.52               | .51                 | .7752                          | 21          | 27.0898           |
|          | 5  | 1.52               | .52                 | 1.51               | .52                 | .7878                          | 20          | 25.3872           |
|          | 6  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 20          | 26.6667           |
|          | 7  | 1.51               | .52                 | 1.51               | .52                 | .7852                          | 19          | 24.1977           |
|          | 8  | 1.52               | .50                 | 1.51               | .50                 | .7575                          | 18          | 23.7624           |
|          | 9  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 16          | 20.7765           |
|          | 10 | 1.50               | .52                 | 1.50               | .52                 | .7800                          | 15          | 19.2308           |

| Number     | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |
|------------|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|
| E35C-20C 1 | 1.52               | .49                 | 1.52               | .49                 | .7448                          | 18          | 24.1676           |
| 2          | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 18          | 23.8411           |
| 3          | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 11          | 14.6667           |
| 4          | 1.51               | .52                 | 1.51               | .52                 | .7852                          | 19          | 24.1977           |
| 5          | 1.52               | .52                 | 1.51               | .52                 | .7878                          | 19          | 24.1178           |
| 6          | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 17          | 22.2222           |
| 7          | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 16          | 20.9150           |
| 8          | 1.50               | .52                 | 1.50               | .52                 | .7800                          | 14          | 17.9487           |
| 9          | 1.52               | .51                 | 1.51               | .51                 | .7727                          | 13          | 16.8252           |
| 10         | 1.53               | .51                 | 1.52               | .51                 | .7777                          | 11          | 14.1434           |

$$\text{โดยที่ Strength} = \frac{\text{Load}}{\text{Surface}}$$

$$\text{Surface} = \frac{(\text{Diameter1} \times \text{Thickness1}) + (\text{Diameter2} \times \text{Thickness2})}{2}$$


**ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย**

ตารางที่ 15 แสดงการวิเคราะห์ค่าสถิติของเคลื่อนพื้นเมื่อฟอกสีพื้นภายนอก

*Tests of Normality*

| GROUP    | Kolmogorov-Smirnov |    |      | Shapiro-Wilk |    |      |
|----------|--------------------|----|------|--------------|----|------|
|          | Statistic          | df | Sig. | Statistic    | df | Sig. |
| STRENGTH | .112               | 10 | .200 | .967         | 10 | .838 |
|          | .150               | 10 | .200 | .968         | 10 | .849 |
|          | .180               | 10 | .200 | .879         | 10 | .260 |
|          | .149               | 10 | .200 | .911         | 10 | .345 |
|          | .208               | 10 | .200 | .855         | 10 | .074 |

\* This is a lower bound of the true significance.

*Test of Homogeneity of Variances*

STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 1.821            | 4   | 45  | .141 |

*ANOVA*

|          | Sum of Squares | df       | Mean Square | F       | Sig.   |
|----------|----------------|----------|-------------|---------|--------|
| STRENGTH | Between Groups | 2534.231 | 4           | 633.558 | 61.764 |
|          | Within Groups  | 461.596  | 45          | 10.258  |        |
|          | Total          | 2995.827 | 49          |         | .000   |

*Multiple Comparisons*

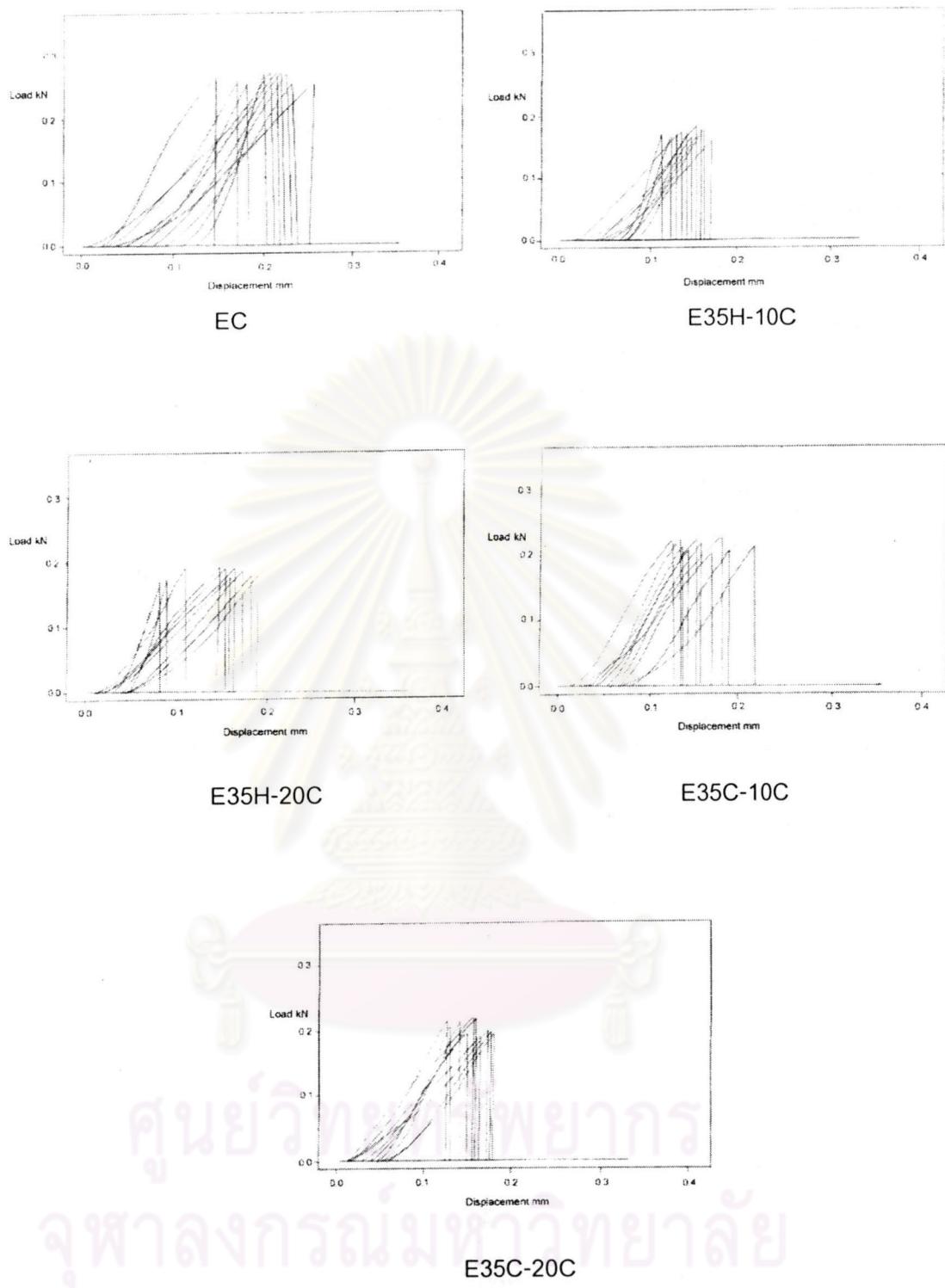
Dependent Variable: STRENGTH

Tukey HSD

| (I)<br>GROUP | (J)<br>GROUP | Mean<br>Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |             |
|--------------|--------------|--------------------------|------------|------|-------------------------|-------------|
|              |              |                          |            |      | Lower Bound             | Upper Bound |
| EC           | E35H-10C     | 15.700412                | 1.432319   | .000 | 11.630509               | 19.770314   |
|              | E35H-20C     | 19.876363                | 1.432319   | .000 | 15.806460               | 23.946266   |
|              | E35C-10C     | 5.150537                 | 1.432319   | .007 | 1.080634                | 9.220439    |
|              | E35C-20C     | 10.212901                | 1.432319   | .000 | 6.142998                | 14.282803   |
| E35H-10C     | EC           | -15.700412               | 1.432319   | .000 | -19.770314              | -11.630509  |
|              | E35H-20C     | 4.175951                 | 1.432319   | .042 | .106049                 | 8.245854    |
|              | E35C-10C     | -10.549875               | 1.432319   | .000 | -14.619778              | -6.479972   |
|              | E35C-20C     | -5.487511                | 1.432319   | .003 | -9.557414               | -1.417609   |
| E35H-20C     | EC           | -19.876363               | 1.432319   | .000 | -23.946266              | -15.806460  |
|              | E35H-10C     | -4.175951                | 1.432319   | .042 | -8.245854               | -.106049    |
|              | E35C-10C     | -14.725826               | 1.432319   | .000 | -18.795729              | -10.655924  |
|              | E35C-20C     | -9.663462                | 1.432319   | .000 | -13.733365              | -5.593560   |
| E35C-10C     | EC           | -5.150537                | 1.432319   | .007 | -9.220439               | -1.080634   |
|              | E35H-10C     | 10.549875                | 1.432319   | .000 | 6.479972                | 14.619778   |
|              | E35H-20C     | 14.725826                | 1.432319   | .000 | 10.655924               | 18.795729   |
|              | E35C-20C     | 5.062364                 | 1.432319   | .008 | .992461                 | 9.132266    |
| E35C-20C     | EC           | -10.212901               | 1.432319   | .000 | -14.282803              | -6.142998   |
|              | E35H-10C     | 5.487511                 | 1.432319   | .003 | 1.417609                | 9.557414    |
|              | E35H-20C     | 9.663462                 | 1.432319   | .000 | 5.593560                | 13.733365   |
|              | E35C-10C     | -5.062364                | 1.432319   | .008 | -9.132266               | -.992461    |

\* The mean difference is significant at the .05 level.

ศูนย์วิทยาหัตถกรรม  
จุฬาลงกรณ์มหาวิทยาลัย



ภาพที่ 25 กราฟแสดงค่าความหน่วงดึงของเนื้อพื้นในการฟอกสีพื้นภายนอก

ตารางที่ 16 แสดงค่าความหนาแรงดึงของเนื้อพื้นในการฟอกสีพื้นภายนอก

| Number   |    | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |
|----------|----|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|
| EC       | 1  | 3.03               | 1.01                | 3.02               | 1.01                | 3.0553                         | 274.00      | 89.6817           |
|          | 2  | 3.07               | 1.00                | 3.08               | 1.00                | 3.0750                         | 272.00      | 88.4553           |
|          | 3  | 3.05               | 1.02                | 3.04               | 1.02                | 3.1059                         | 273.00      | 87.8972           |
|          | 4  | 3.05               | 1.00                | 3.04               | 1.00                | 3.0450                         | 255.00      | 83.7438           |
|          | 5  | 3.05               | 1.00                | 3.06               | 1.00                | 3.0550                         | 266.00      | 87.0704           |
|          | 6  | 3.19               | 1.02                | 3.10               | 1.02                | 3.1569                         | 251.00      | 79.5084           |
|          | 7  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 261.00      | 85.7143           |
|          | 8  | 3.10               | .98                 | 3.11               | .98                 | 3.0429                         | 257.00      | 84.4589           |
|          | 9  | 3.03               | 1.01                | 3.40               | 1.01                | 3.2471                         | 272.00      | 83.7658           |
|          | 10 | 3.09               | 1.01                | 3.10               | 1.01                | 3.1260                         | 260.00      | 83.1747           |
| E35H-10C | 1  | 3.05               | 1.00                | 3.06               | 1.00                | 3.0553                         | 188.00      | 61.5385           |
|          | 2  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 185.00      | 60.7553           |
|          | 3  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 185.00      | 60.7553           |
|          | 4  | 3.04               | .99                 | 3.05               | .99                 | 3.1460                         | 168.00      | 55.7297           |
|          | 5  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 183.00      | 60.0985           |
|          | 6  | 3.01               | .99                 | 3.02               | .99                 | 3.9848                         | 171.00      | 57.2893           |
|          | 7  | 3.03               | 1.01                | 3.04               | 1.01                | 3.0650                         | 181.00      | 59.0471           |
|          | 8  | 3.01               | 1.00                | 3.02               | 1.00                | 3.0150                         | 178.00      | 59.0381           |
|          | 9  | 3.02               | 1.01                | 3.03               | 1.01                | 3.0553                         | 173.00      | 56.6238           |
|          | 10 | 3.02               | 1.00                | 3.03               | 1.00                | 3.0250                         | 175.00      | 57.8512           |
| E35C-20C | 1  | 3.04               | .98                 | 3.05               | .98                 | 2.9841                         | 223.00      | 74.7294           |
|          | 2  | 3.06               | .99                 | 3.06               | .99                 | 3.0294                         | 221.00      | 72.9517           |
|          | 3  | 3.02               | .97                 | 3.03               | .97                 | 2.9342                         | 203.00      | 69.1829           |
|          | 4  | 3.02               | 1.01                | 3.02               | 1.01                | 3.0502                         | 221.00      | 72.4543           |
|          | 5  | 3.04               | .99                 | 3.05               | .99                 | 3.0146                         | 218.00      | 72.3159           |
|          | 6  | 3.10               | 1.01                | 3.09               | 1.01                | 3.1260                         | 226.00      | 72.2980           |
|          | 7  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 205.00      | 67.3235           |
|          | 8  | 3.10               | 1.00                | 3.09               | 1.00                | 3.0950                         | 208.00      | 67.2052           |
|          | 9  | 3.01               | 1.00                | 3.02               | 1.00                | 3.0150                         | 211.00      | 69.9834           |
|          | 10 | 3.07               | 1.00                | 3.06               | 1.00                | 3.0650                         | 213.00      | 69.4943           |
| E35C-10C | 1  | 3.04               | .98                 | 3.05               | .98                 | 2.9841                         | 223.00      | 74.7294           |
|          | 2  | 3.06               | .99                 | 3.06               | .99                 | 3.0294                         | 221.00      | 72.9517           |
|          | 3  | 3.02               | .97                 | 3.03               | .97                 | 2.9342                         | 203.00      | 69.1829           |
|          | 4  | 3.02               | 1.01                | 3.02               | 1.01                | 3.0502                         | 221.00      | 72.4543           |
|          | 5  | 3.04               | .99                 | 3.05               | .99                 | 3.0146                         | 218.00      | 72.3159           |
|          | 6  | 3.10               | 1.01                | 3.09               | 1.01                | 3.1260                         | 226.00      | 72.2980           |
|          | 7  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 205.00      | 67.3235           |
|          | 8  | 3.10               | 1.00                | 3.09               | 1.00                | 3.0950                         | 208.00      | 67.2052           |
|          | 9  | 3.01               | 1.00                | 3.02               | 1.00                | 3.0150                         | 211.00      | 69.9834           |
|          | 10 | 3.07               | 1.00                | 3.06               | 1.00                | 3.0650                         | 213.00      | 69.4943           |

| Number  | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |         |
|---------|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|---------|
| 35C-20C | 1                  | 3.05                | 1.00               | 3.06                | 1.00                           | 3.0550      | 215.00            | 70.3764 |
|         | 2                  | 3.02                | .99                | 3.03                | .99                            | 2.9947      | 207.00            | 69.1210 |
|         | 3                  | 3.06                | 1.01               | 3.07                | 1.01                           | 3.0957      | 213.00            | 68.8062 |
|         | 4                  | 3.03                | 1.01               | 3.04                | 1.01                           | 3.0654      | 220.00            | 71.7699 |
|         | 5                  | 3.05                | 1.02               | 3.06                | 1.02                           | 3.1161      | 219.00            | 70.2802 |
|         | 6                  | 3.02                | 1.02               | 3.03                | 1.02                           | 3.0855      | 194.00            | 62.8747 |
|         | 7                  | 3.01                | 1.00               | 3.02                | 1.00                           | 3.0150      | 190.00            | 63.0182 |
|         | 8                  | 3.03                | 1.00               | 3.04                | 1.00                           | 3.0350      | 197.00            | 64.9094 |
|         | 9                  | 3.04                | .99                | 3.05                | .99                            | 3.0146      | 199.00            | 66.0132 |
|         | 10                 | 3.02                | 1.00               | 3.03                | 1.00                           | 3.0250      | 196.00            | 64.7934 |

ตารางที่ 17 แสดงการวิเคราะห์ค่าสถิติของเนื้อพื้นเมื่อพอกสีพื้นภายนอก

#### Tests of Normality

| GROUP       | Kolmogorov-Smirnov |    |      | Shapiro-Wilk |    |      |
|-------------|--------------------|----|------|--------------|----|------|
|             | Statistic          | df | Sig. | Statistic    | df | Sig. |
| STRENGTH EC | .137               | 10 | .200 | .962         | 10 | .784 |
| E35H-10C    | .135               | 10 | .200 | .956         | 10 | .709 |
| E35H-20C    | .184               | 10 | .200 | .963         | 10 | .792 |
| E35C-10C    | .224               | 10 | .166 | .934         | 10 | .478 |
| E35C-20C    | .190               | 10 | .200 | .917         | 10 | .379 |

\* This is a lower bound of the true significance.

#### Test of Homogeneity of Variances

#### STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 1.698            | 4   | 45  | .167 |

## ANOVA

## STRENGTH

|          |                | Sum of Squares | df | Mean Square | F       | Sig. |
|----------|----------------|----------------|----|-------------|---------|------|
| STRENGTH | Between Groups | 5487.4061      | 4  | 1371.8514   | 197.101 | .000 |
|          | Within Groups  | 313.206        | 45 | 6.960       |         |      |
|          | Total          | 5800.612       | 49 |             |         |      |

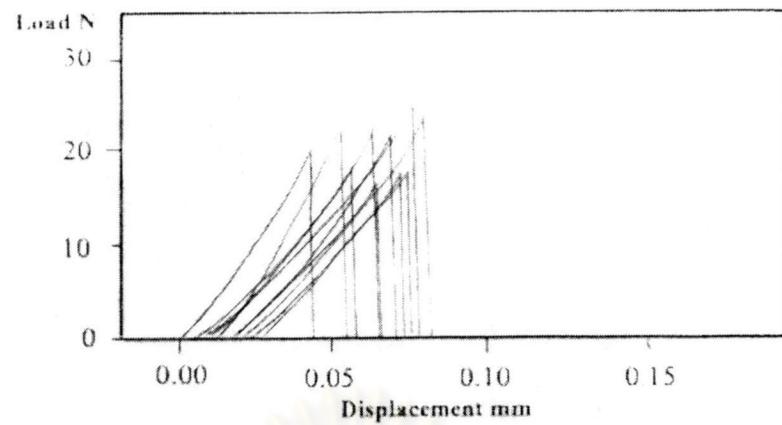
*Multiple Comparisons*

Dependent Variable: STRENGTH

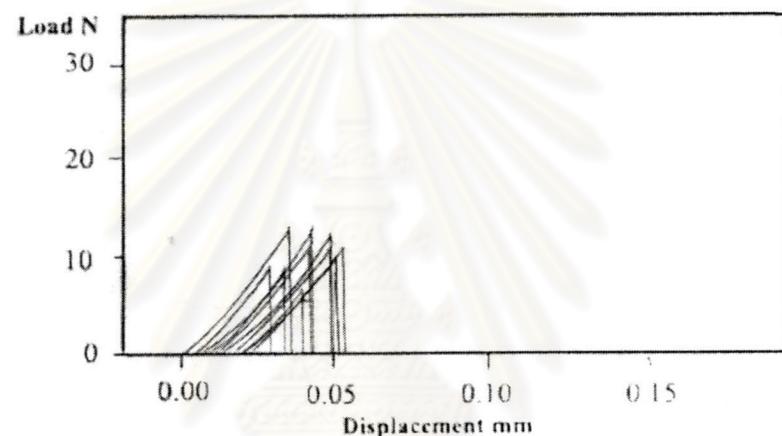
## Tukey HSD

| (I)<br>GROUP | (J)<br>GROUP | Mean<br>Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |             |
|--------------|--------------|--------------------------|------------|------|-------------------------|-------------|
|              |              |                          |            |      | Lower Bound             | Upper Bound |
| EC           | E35H-10C     | 26.474348                | 1.179842   | .000 | 23.121852               | 29.826844   |
|              | E35H-20C     | 29.882721                | 1.179842   | .000 | 26.530225               | 33.235217   |
|              | E35C-10C     | 14.553183                | 1.179842   | .000 | 11.200687               | 17.905679   |
|              | E35C-20C     | 18.150782                | 1.179842   | .000 | 14.798286               | 21.503278   |
| E35H-10C     | EC           | -26.474348               | 1.179842   | .000 | -29.826844              | -23.121852  |
|              | E35H-20C     | 3.408373                 | 1.179842   | .045 | 5.58770E-02             | 6.760869    |
|              | E35C-10C     | -11.921165               | 1.179842   | .000 | -15.273661              | -8.568669   |
|              | E35C-20C     | -8.323566                | 1.179842   | .000 | -11.676062              | -4.971070   |
| E35H-20C     | EC           | -29.882721               | 1.179842   | .000 | -33.235217              | -26.530225  |
|              | E35H-10C     | -3.408373                | 1.179842   | .045 | -6.760869               | -5.587704   |
|              | E35C-10C     | -15.329538               | 1.179842   | .000 | -18.682034              | -11.977042  |
|              | E35C-20C     | -11.731939               | 1.179842   | .000 | -15.084435              | -8.379443   |
| E35C-10C     | EC           | -14.553183               | 1.179842   | .000 | -17.905679              | -11.200687  |
|              | E35H-10C     | 11.921165                | 1.179842   | .000 | 8.568669                | 15.273661   |
|              | E35H-20C     | 15.329538                | 1.179842   | .000 | 11.977042               | 18.682034   |
|              | E35C-20C     | 3.597599                 | 1.179842   | .030 | .245103                 | 6.950095    |
| E35C-20C     | EC           | -18.150782               | 1.179842   | .000 | -21.503278              | -14.798286  |
|              | E35H-10C     | 8.323566                 | 1.179842   | .000 | 4.971070                | 11.676062   |
|              | E35H-20C     | 11.731939                | 1.179842   | .000 | 8.379443                | 15.084435   |
|              | E35C-10C     | -3.597599                | 1.179842   | .030 | -6.950095               | -245103     |

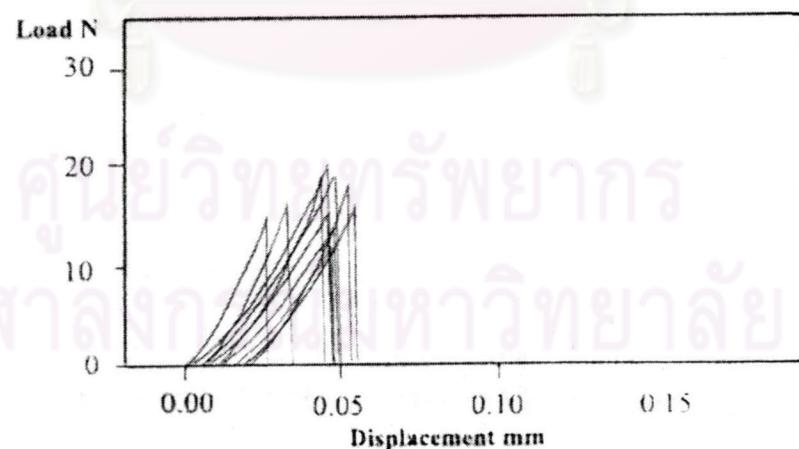
The mean difference is significant at the .05 level.



IC



ISP-35H



ISP-W

ภาพที่ 26 กราฟแสดงค่าความหนาแนงดึงของเคลือบพื้นในการฟอกสีพื้นผ่านคลองรากพื้น

ตารางที่ 18 แสดงค่าความหน่วงดึงของเคลือบฟันในการทดสอบสีฟันผ่านคลองรากฟัน

| Number  |    | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |
|---------|----|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|
| IC      | 1  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 20          | 26.6667           |
|         | 2  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 22          | 29.3333           |
|         | 3  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 22          | 29.1391           |
|         | 4  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 25          | 32.8947           |
|         | 5  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 18          | 23.3736           |
|         | 6  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 16          | 21.1921           |
|         | 7  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 23          | 30.6667           |
|         | 8  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 17          | 22.2222           |
|         | 9  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 17          | 22.0751           |
|         | 10 | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 21          | 27.2692           |
| ISP-35H | 1  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 13          | 17.3333           |
|         | 2  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 13          | 16.9935           |
|         | 3  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 12          | 16.0000           |
|         | 4  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 11          | 14.6667           |
|         | 5  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 11          | 14.3791           |
|         | 6  | 1.50               | .51                 | 1.50               | .51                 | .7650                          | 11          | 14.3791           |
|         | 7  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 10          | 13.1579           |
|         | 8  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 8           | 10.5960           |
|         | 9  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 8           | 10.5960           |
|         | 10 | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 6           | 7.8947            |
| ISP-W   | 1  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 15          | 20.0000           |
|         | 2  | 1.52               | .50                 | 1.52               | .50                 | .7600                          | 20          | 26.3158           |
|         | 3  | 1.51               | .51                 | 1.51               | .51                 | .7701                          | 15          | 19.4780           |
|         | 4  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 14          | 18.6667           |
|         | 5  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 12          | 16.0000           |
|         | 6  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 19          | 25.1656           |
|         | 7  | 1.50               | .50                 | 1.50               | .50                 | .7500                          | 19          | 25.3333           |
|         | 8  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 16          | 21.1921           |
|         | 9  | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 18          | 23.8411           |
|         | 10 | 1.51               | .50                 | 1.51               | .50                 | .7550                          | 16          | 21.1921           |

ตารางที่ 19 แสดงการวิเคราะห์ค่าสถิติของเคลื่อนพันที่ฟอกสีฟันผ่านคลองรากฟัน

*Tests of Normality*

| GROUP    | Kolmogorov-Smirnov |    |      | Shapiro-Wilk |    |      |
|----------|--------------------|----|------|--------------|----|------|
|          | Statistic          | df | Sig. | Statistic    | df | Sig. |
| STRENGTH | .177               | 10 | .200 | .934         | 10 | .474 |
|          | .200               | 10 | .200 | .933         | 10 | .472 |
|          | .162               | 10 | .200 | .953         | 10 | .671 |

\* This is a lower bound of the true significance.

*Test of Homogeneity of Variances*

STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| .811             | 2   | 27  | .455 |

ANOVA

|          |                | Sum of Squares | df | Mean Square | F      | Sig. |
|----------|----------------|----------------|----|-------------|--------|------|
| STRENGTH | Between Groups | 848.688        | 2  | 424.344     | 34.182 | .000 |
|          | Within Groups  | 335.181        | 27 | 12.414      |        |      |
|          | Total          | 1183.869       | 29 |             |        |      |

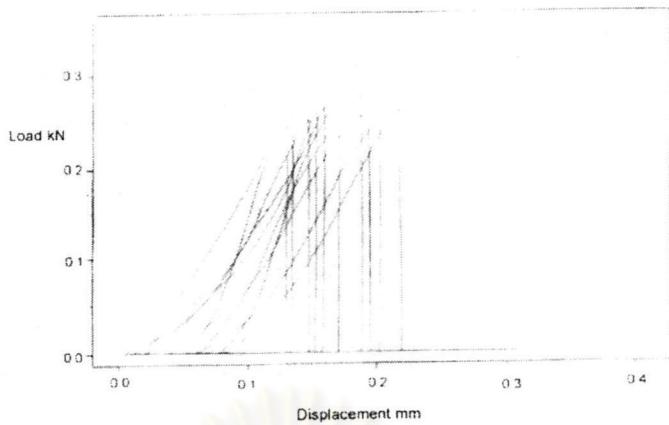
*Multiple Comparisons*

Dependent Variable: STRENGTH

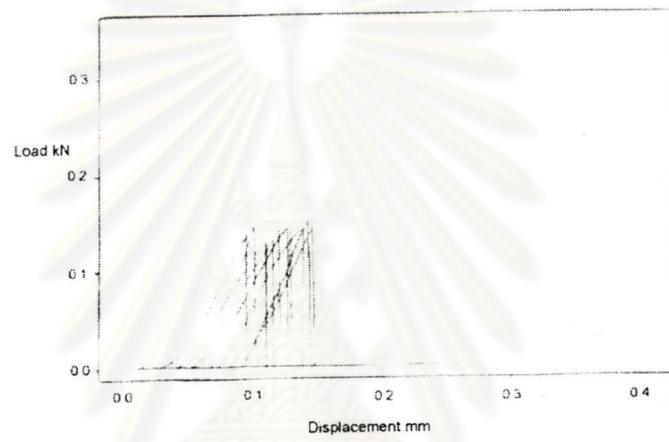
Tukey HSD

| (I)<br>GROUP | (J)<br>GROUP | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |             |
|--------------|--------------|-----------------------|------------|------|-------------------------|-------------|
|              |              |                       |            |      | Lower Bound             | Upper Bound |
| IC           | ISP-35H      | 12.883626             | 1.575689   | .000 | 8.976804                | 16.790448   |
|              | ISP-W        | 4.764807              | 1.575689   | .000 | .857985                 | 8.671629    |
| ISP-35H      | IC           | -12.883626            | 1.575689   | .000 | -16.790448              | -8.976804   |
|              | ISP-W        | -8.118819             | 1.575689   | .000 | -12.025641              | -4.211997   |
| ISP-W        | IC           | -4.764807             | 1.575689   | .000 | -8.671629               | -8.57985    |
|              | ISP-35H      | 8.118819              | 1.575689   | .000 | 4.211997                | 12.025641   |

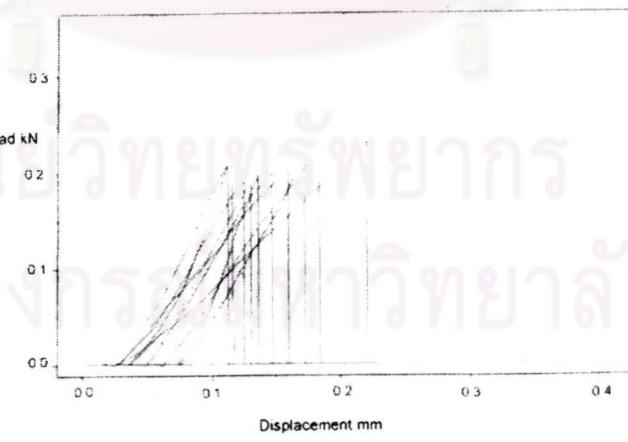
\* The mean difference is significant at the .05 level.



IC



ISP-35H



ISP-W

ภาพที่ 27 กราฟแสดงค่าความหน่วงดึงของเนื้อพื้นในการฟอกสีพื้นผ่านคลองรากพื้น

ตารางที่ 20 แสดงค่าความทนแรงดึงของเนื้อพื้นในการฟอกสีพื้นผ่านคลองรากพื้น

| Number  |    | Diameter1<br>(mm.) | Thickness1<br>(mm.) | Diameter2<br>(mm.) | Thickness2<br>(mm.) | Surface<br>(mm. <sup>2</sup> ) | Load<br>(N) | Strength<br>(MPa) |
|---------|----|--------------------|---------------------|--------------------|---------------------|--------------------------------|-------------|-------------------|
| IC      | 1  | 3.07               | 1.00                | 3.12               | 1.00                | 3.0950                         | 278         | 89.8223           |
|         | 2  | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 273         | 89.6552           |
|         | 3  | 3.01               | 1.02                | 3.02               | 1.02                | 3.0753                         | 257         | 83.5691           |
|         | 4  | 3.08               | 1.01                | 3.09               | 1.01                | 3.1159                         | 254         | 81.5187           |
|         | 5  | 3.02               | 1.00                | 3.03               | 1.00                | 3.0250                         | 259         | 85.6198           |
|         | 6  | 3.02               | 1.00                | 3.03               | 1.00                | 3.0250                         | 260         | 85.9504           |
|         | 7  | 3.09               | 1.00                | 3.10               | 1.00                | 3.0950                         | 266         | 85.9451           |
|         | 8  | 3.06               | .99                 | 3.07               | .99                 | 3.0344                         | 260         | 85.6856           |
|         | 9  | 3.03               | 1.02                | 3.04               | 1.02                | 3.0957                         | 265         | 85.6026           |
|         | 10 | 3.07               | .99                 | 3.08               | .99                 | 3.0443                         | 260         | 85.4069           |
| ISP-35H | 1  | 3.09               | 1.00                | 3.08               | 1.00                | 3.0850                         | 154         | 49.9190           |
|         | 2  | 3.07               | 1.00                | 3.08               | 1.00                | 3.0750                         | 150         | 48.7805           |
|         | 3  | 3.03               | 1.00                | 3.04               | 1.00                | 3.0350                         | 148         | 48.7644           |
|         | 4  | 3.01               | .99                 | 3.01               | .99                 | 2.9799                         | 142         | 47.6526           |
|         | 5  | 3.04               | .99                 | 3.05               | .99                 | 3.0146                         | 143         | 47.4366           |
|         | 6  | 3.03               | 1.00                | 3.04               | 1.00                | 3.0350                         | 142         | 46.7875           |
|         | 7  | 3.03               | 1.01                | 3.04               | 1.01                | 3.0654                         | 143         | 46.6505           |
|         | 8  | 3.03               | 1.00                | 3.04               | 1.00                | 3.0350                         | 133         | 43.8221           |
|         | 9  | 3.04               | .99                 | 3.05               | .99                 | 3.0146                         | 132         | 43.7876           |
|         | 10 | 3.04               | 1.00                | 3.05               | 1.00                | 3.0450                         | 133         | 43.6782           |
| ISP-W   | 1  | 3.01               | 1.00                | 3.01               | 1.00                | 3.0100                         | 230         | 76.4120           |
|         | 2  | 3.02               | 1.00                | 3.02               | 1.00                | 3.0200                         | 221         | 73.1788           |
|         | 3  | 3.03               | 1.00                | 3.04               | 1.00                | 3.0350                         | 201         | 66.2273           |
|         | 4  | 3.06               | 1.00                | 3.07               | 1.00                | 3.0650                         | 192         | 62.6427           |
|         | 5  | 3.02               | 1.01                | 3.03               | 1.01                | 3.0553                         | 191         | 62.5153           |
|         | 6  | 3.02               | 1.00                | 3.03               | 1.00                | 3.0250                         | 200         | 66.1157           |
|         | 7  | 3.03               | 1.01                | 3.04               | 1.01                | 3.0654                         | 209         | 68.1814           |
|         | 8  | 3.04               | 1.01                | 3.05               | 1.01                | 3.0755                         | 217         | 70.5588           |
|         | 9  | 3.05               | 1.00                | 3.06               | 1.00                | 3.0550                         | 204         | 66.7758           |
|         | 10 | 3.05               | 1.00                | 3.06               | 1.00                | 3.0550                         | 215         | 70.3764           |

จุฬาลงกรณ์มหาวิทยาลัย

ตารางที่ 21 แสดงการวิเคราะห์ค่าสถิติของเมื่อพื้นที่ฟอกสีพื้นผ่านคลองราชพัน

*Tests of Normality*

| GROUP    | Kolmogorov-Smirnov |    |      | Shapiro-Wilk |    |      |
|----------|--------------------|----|------|--------------|----|------|
|          | Statistic          | df | Sig. | Statistic    | df | Sig. |
| STRENGTH | .288               | 10 | .018 | .877         | 10 | .147 |
|          | .200               | 10 | .200 | .897         | 10 | .265 |
|          | .135               | 10 | .200 | .956         | 10 | .710 |

\* This is a lower bound of the true significance.

*Test of Homogeneity of Variances*

STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 2.904            | 2   | 27  | .072 |

ANOVA

|          |                | Sum of Squares | df | Mean Square | F       | Sig. |
|----------|----------------|----------------|----|-------------|---------|------|
| STRENGTH | Between Groups | 7690.038       | 2  | 3845.107    | 375.107 | .000 |
|          | Within Groups  | 276.762        | 27 | 10.250      |         |      |
|          | Total          | 7966.800       | 29 |             |         |      |

*Multiple Comparisons*

Dependent Variable: STRENGTH

Tukey HSD

| (I)<br>GROUP | (J)<br>GROUP | Mean<br>Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |             |
|--------------|--------------|--------------------------|------------|------|-------------------------|-------------|
|              |              |                          |            |      | Lower Bound             | Upper Bound |
| IC           | ISP-35H      | 39.149677                | 1.431813   | .000 | 35.599606               | 42.699747   |
|              | ISP-W        | 17.579131                | 1.431813   | .000 | 14.029016               | 21.129201   |
| ISP-35H      | IC           | -39.149677               | 1.431813   | .000 | -42.699747              | -35.599606  |
|              | ISP-W        | -21.570546               | 1.431813   | .000 | -25.120616              | -18.020475  |
| ISP-W        | IC           | -17.579131               | 1.431813   | .000 | -21.129201              | -14.029061  |
|              | ISP-35H      | 21.570546                | 1.431813   | .000 | 18.020475               | 25.120616   |

\* The mean difference is significant at the .05 level.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

ตารางที่ 22 แสดงการวิเคราะห์ค่าสถิติของการเปรียบกลุ่มควบคุมในฟันที่ผ่านและไม่ผ่านการรักษาคลองรากฟัน

### เคลือบฟัน

*Test of Homogeneity of Variances*

STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 5.102            | 1   | 38  | .030 |

ANOVA

|                         | Sum of Squares | df | Mean Square | F    | Sig. |
|-------------------------|----------------|----|-------------|------|------|
| STRENGTH Between Groups | 30.689         | 1  | 30.689      | .035 | .852 |
| Within Groups           | 33057.843      | 38 | 869.943     |      |      |
| Total                   | 33088.532      | 39 |             |      |      |

### เนื้อฟัน

*Test of Homogeneity of Variances*

STRENGTH

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 5.102            | 1   | 38  | .030 |

ANOVA

|                         | Sum of Squares | df | Mean Square | F    | Sig. |
|-------------------------|----------------|----|-------------|------|------|
| STRENGTH Between Groups | 30.689         | 1  | 30.689      | .035 | .852 |
| Within Groups           | 33057.843      | 38 | 869.943     |      |      |
| Total                   | 33088.532      | 39 |             |      |      |

คุณวิทยารพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

## ประวัติผู้เขียนวิทยานิพนธ์

นางสาว จรรยา สุระกำพลธร เกิดที่จังหวัดสมุทรปราการ เมื่อวันที่ 22 ธันวาคม 2513 สัญชาติไทย เชื้อชาติไทย อายุบ้านเลขที่ 66/23 ถนนศรีสมุทร ตำบลปากน้ำ อำเภอเมือง จังหวัดสมุทรปราการ จบการศึกษาปริญญาตรีทั้นตแพทยศาสตร์บัณฑิต พศ. 2540 จากคณะทันตแพทยศาสตร์ มหาวิทยาลัยมหิดล เป็นสมาชิกสมาคมทันตแพทย์แห่งประเทศไทย ทำงานเป็นอาจารย์ระดับ 5 ภาควิชาทันตกรรมประดิษฐ์ มหาวิทยาลัยสงขลานครินทร์ พศ. 2540-ปัจจุบัน

**ศูนย์วิทยทรัพยากร  
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