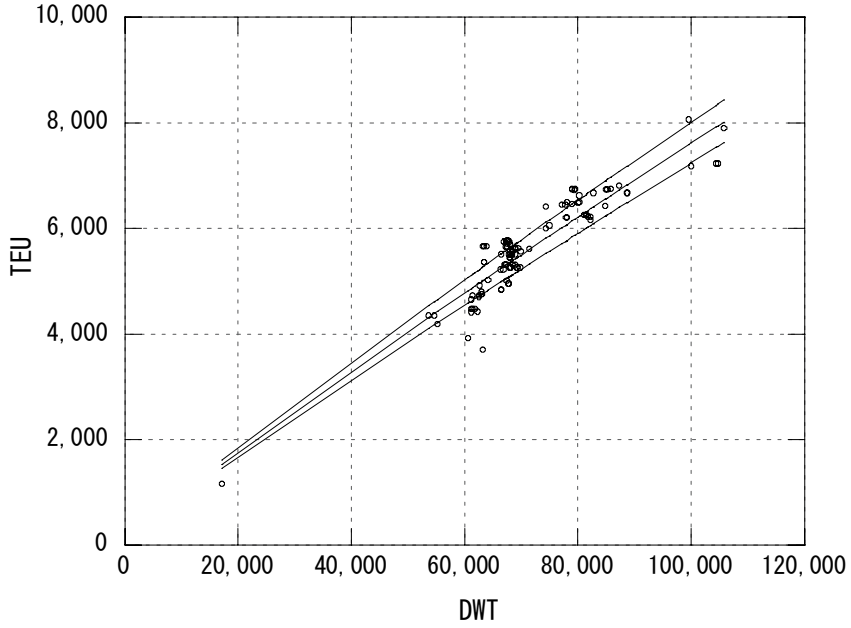
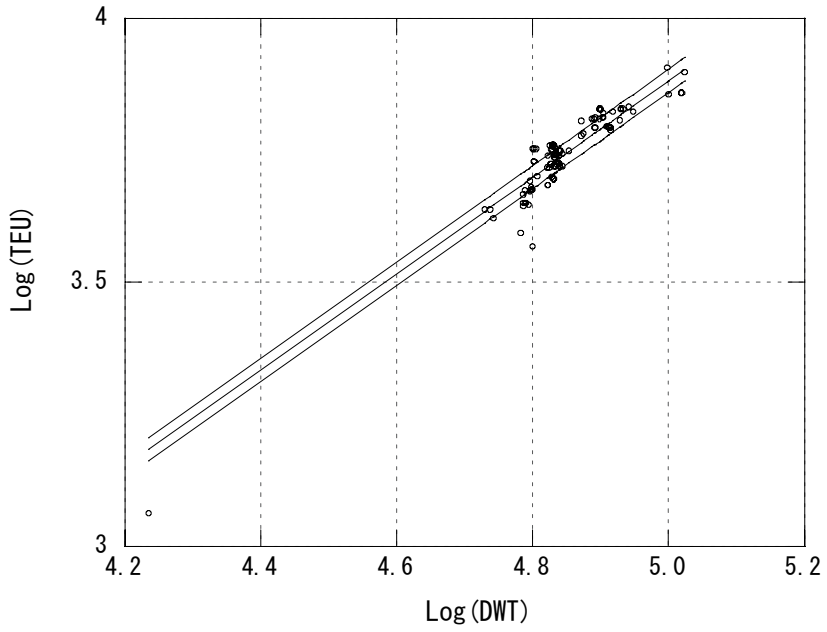



$Y=\alpha \cdot X^{\beta}$

| | 50% | 75% | 25% |
|---|---|---|---|
| α | 0.2070 | 0.2178 | 0.1968 |
| β | 0.9131 | 0.9131 | 0.9131 |




logY=a+blogX

( $R^2$= 0.825 , σ= 0.033 )

| | 50% | 75% | 25% |
|---|---|---|---|
| a | -0.6840 | -0.6620 | -0.7060 |
| b | 0.9131 | 0.9131 | 0.9131 |

| DWT | TEU | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 60,000 | 4539 | 4774 | 5023 |
| 70,000 | 5225 | 5496 | 5783 |
| 80,000 | 5903 | 6208 | 6532 |
| 100,000 | 7236 | 7612 | 8009 |

**Figure 3-56** Container Ship (Over-Panamax) TEU-DWT

### 3.3 Oil Tanker

**Figure 3-57** to **Figure 3-59** show the results of analysis of Loa, B, and d for DWT. And the following are the analysis method applied to each main dimension and the range of the ship classes to which each method was applied. And **Table 3-9** shows the results of analysis of the main dimension according to the ship class that was set.

(1) Loa, Lpp (**Figure 3-60** to **Figure 3-65**)

The ships were divided into three classes with 8,000DWT and 200,000DWT as the boundaries. Less than 8,000DWT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.855 for Loa and $R^2$ = 0.938 for Lpp. 8,000DWT or more and less than 200,000DWT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.871 for Loa and $R^2$ = 0.915 for Lpp. 200,000DWT or more and less than 400,000DWT was analyzed by the average value analysis method.

(2) B (**Figure 3-66** to **Figure 3-68**)

The ships were divided into three classes with 8,000DWT and 200,000DWT as the boundaries. Less than 8,000DWT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.695. 8,000DWT or more and less than 200,000DWT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.807. 200,000DWT or more and less than 400,000DWT was analyzed by the average value analysis method.

(3) d (**Figure 3-69**, **70**)

The ship were divided into two classes with 50,000DWT as the boundary and the logarithmic regression analysis method was applied to each class, obtaining $R^2$ = 0.830 for less than 50,000DWT and $R^2$ = 0.870 for 50,000DWT or more.

**Table 3-9** The results of analysis of main dimensions (Oil Tanker)

| Dead Weigth Tonnage (t) | Length Overall (m) | Length P.P. (m) | Breadth Molded (m) | Full Load Draft (m) |
|---|---|---|---|---|
| 1,000 | 63 | 57 | 11.0 | 4.0 |
| 2,000 | 77 | 72 | 13.2 | 4.9 |
| 3,000 | 86 | 82 | 14.7 | 5.5 |
| 5,000 | 100 | 97 | 16.7 | 6.4 |
| 10,000 | 139 | 131 | 20.6 | 7.6 |
| 15,000 | 154 | 146 | 23.4 | 8.6 |
| 20,000 | 166 | 157 | 25.6 | 9.3 |
| 30,000 | 184 | 175 | 29.1 | 10.4 |
| 50,000 | 209 | 199 | 34.3 | 12.0 |
| 70,000 | 228 | 217 | 38.1 | 12.9 |
| 90,000 | 243 | 232 | 41.3 | 14.2 |
| 100,000 | 250 | 238 | 42.7 | 14.8 |
| 150,000 | 277 | 265 | 48.6 | 17.2 |
| 300,000 | 334 | 321 | 59.4 | 22.4 |

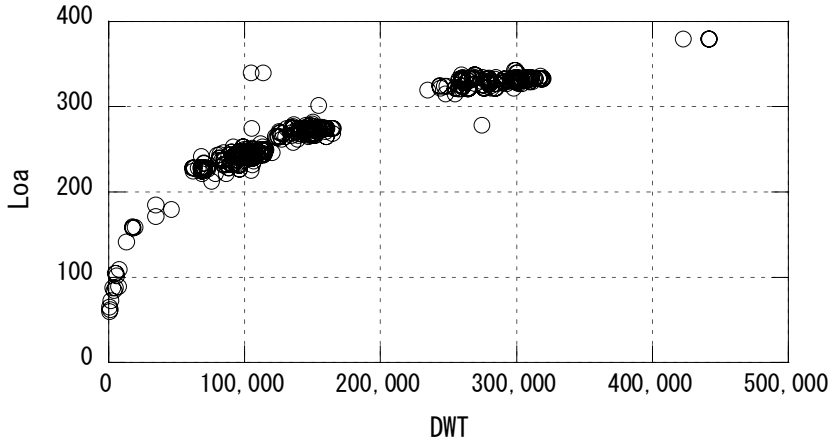



**Figure 3-57** Oil Tanker Loa-DWT

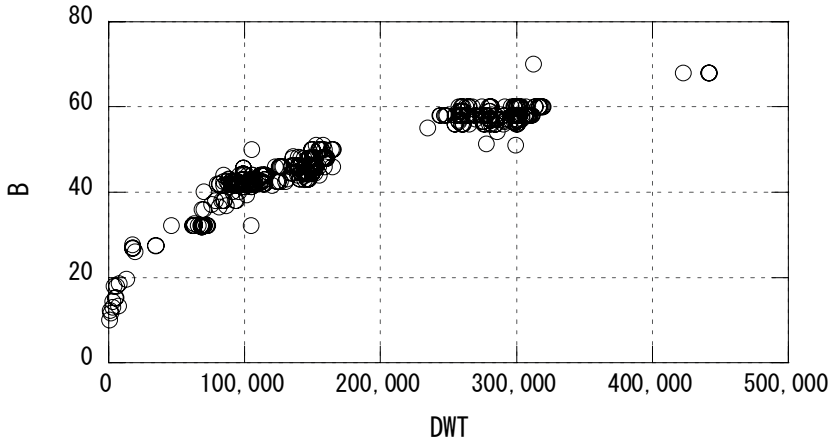



**Figure 3-58** Oil Tanker B-DWT

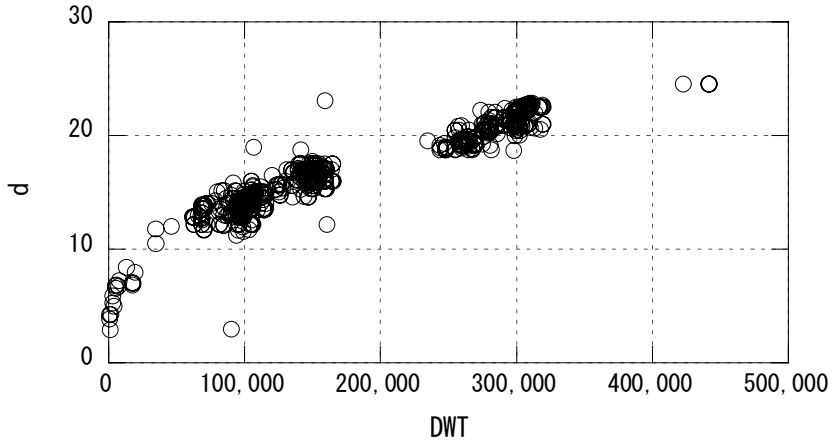
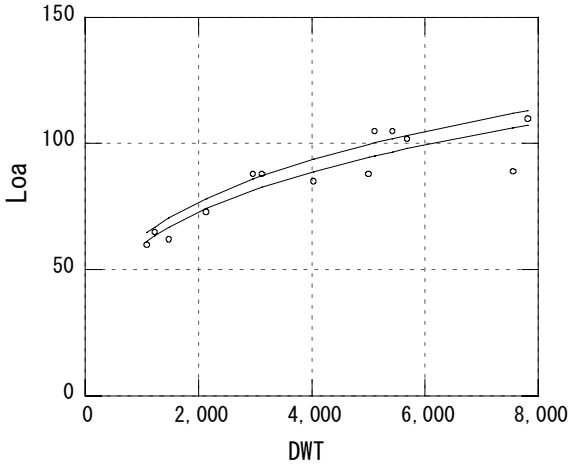
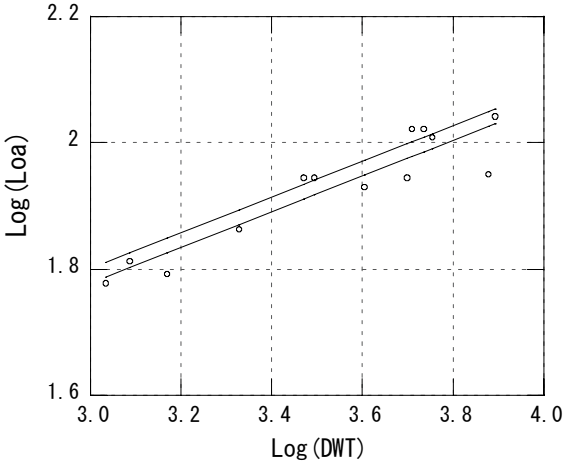



**Figure 3-59** Oil Tanker d-DWT




$Y=\alpha \cdot X^{\beta}$

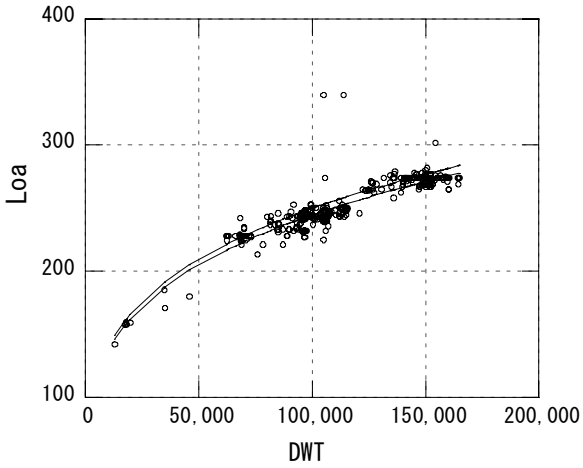
| | 50% | 75% |
|---|---|---|
| α | 8.5137 | 8.9769 |
| β | 0.2826 | 0.2826 |

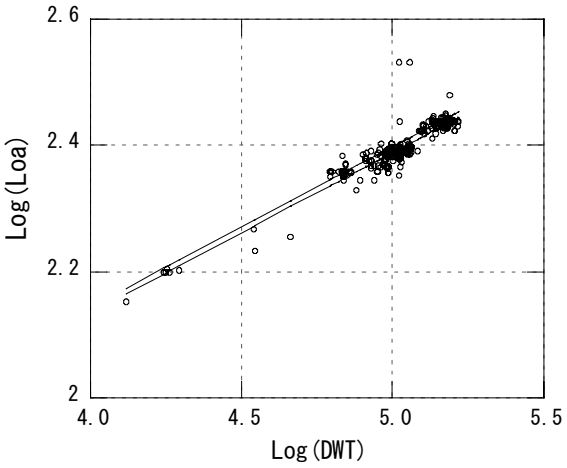
$\log Y=a+b\log X$

( $R^2$= 0.855 , σ= 0.034 )

| | 50% | 75% |
|---|---|---|
| a | 0.9301 | 0.9531 |
| b | 0.2826 | 0.2826 |

**Figure 3-60** Oil Tanker (Less than 8,000DWT) Loa-DWT




$Y=\alpha \cdot X^{\beta}$

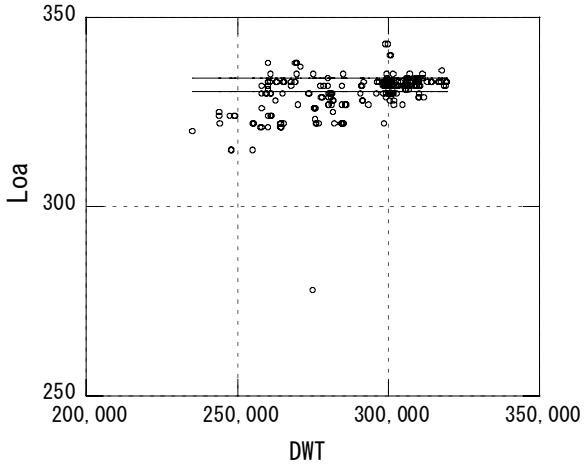
| | 50% | 75% |
|---|---|---|
| α | 13.1416 | 13.4278 |
| β | 0.2539 | 0.2539 |

$\log Y=a+b\log X$

( $R^2$= 0.871 , σ= 0.014 )

| | 50% | 75% |
|---|---|---|
| a | 1.1186 | 1.1280 |
| b | 0.2539 | 0.2539 |

**Figure 3-61** Oil Tanker (8,000～Less than 200,000DWT) Loa-DWT

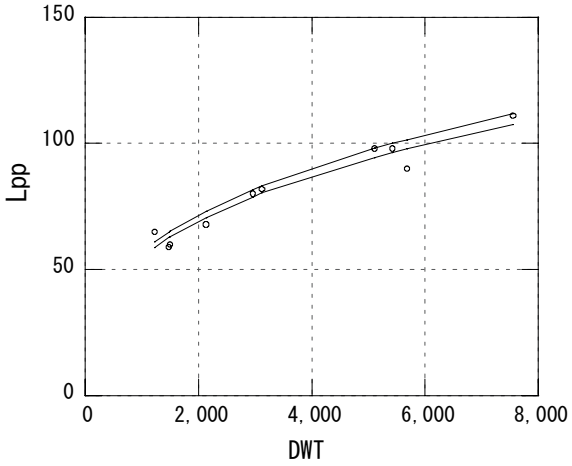


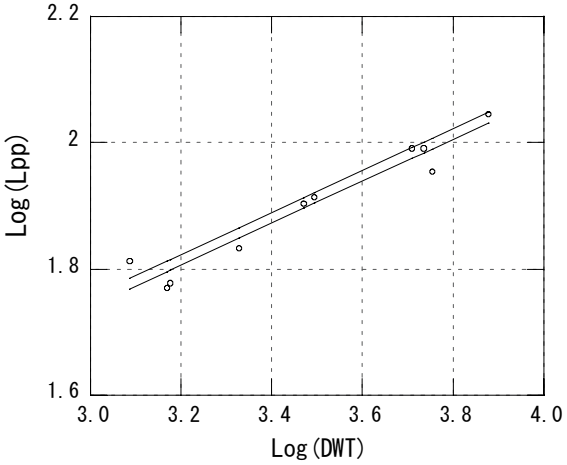

$Y=a_0$

（σ= 5.240 ）

| | Average | 75% |
|---|---|---|
| $a_0$ | 330.5 | 334.0 |

**Figure 3-62** Oil Tanker (200,000～Less than 400,000DWT) Loa-DWT




$Y=\alpha \cdot X^{\beta}$

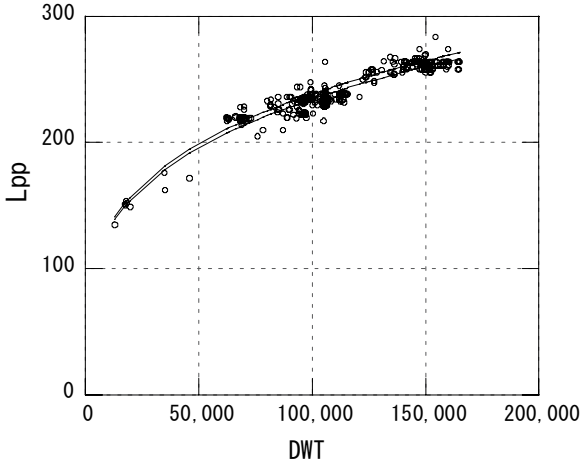
| | 50% | 75% |
|---|---|---|
| α | 5.5323 | 5.7430 |
| β | 0.3323 | 0.3323 |

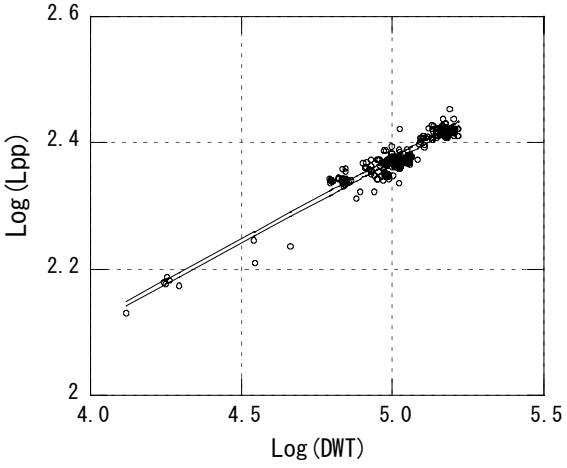
$logY=a+blogX$

( $R^2$= 0.938 , σ= 0.024 )

| | 50% | 75% |
|---|---|---|
| a | 0.7429 | 0.7591 |
| b | 0.3323 | 0.3323 |

**Figure 3-63** Oil Tanker (Less than 8,000DWT) Lpp-DWT




$Y=\alpha \cdot X^{\beta}$

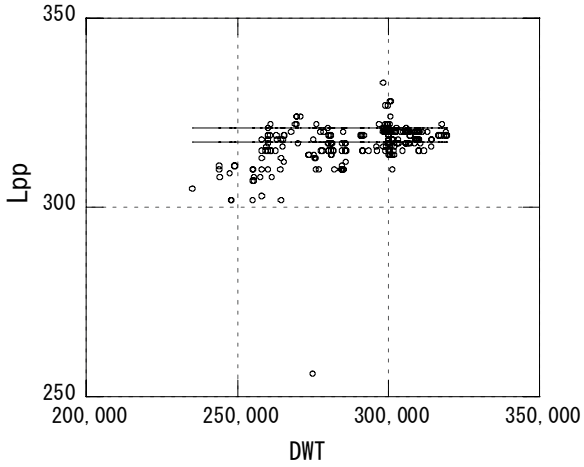
| | 50% | 75% |
|---|---|---|
| α | 11.9362 | 12.1401 |
| β | 0.2586 | 0.2586 |

$\log Y=a+b\log X$

( $R^2$= 0.915 , σ= 0.011 )

| | 50% | 75% |
|---|---|---|
| a | 1.0769 | 1.0842 |
| b | 0.2586 | 0.2586 |

**Figure 3-64** Oil Tanker (8,000～Less than 200,000DWT) Lpp-DWT

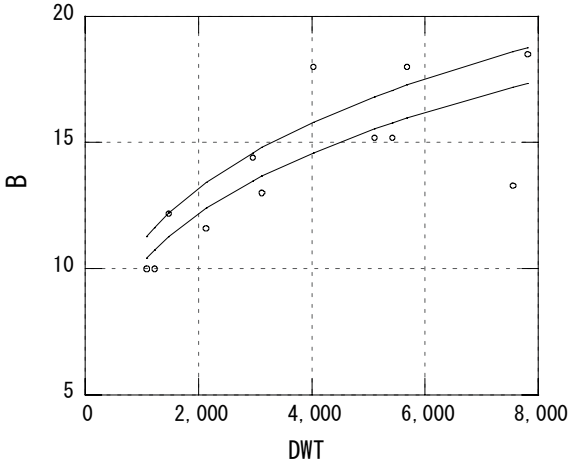


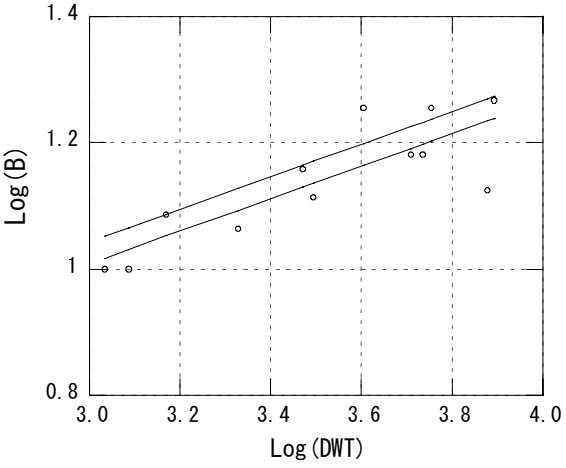

$Y=a_0$

（σ= 5.390 ）

| | Average | 75% |
|---|---|---|
| $a_0$ | 317.3 | 321.0 |

**Figure 3-65** Oil Tanker (200,000～Less than 400,000DWT) Lpp-DWT




$Y=\alpha \cdot X^{\beta}$

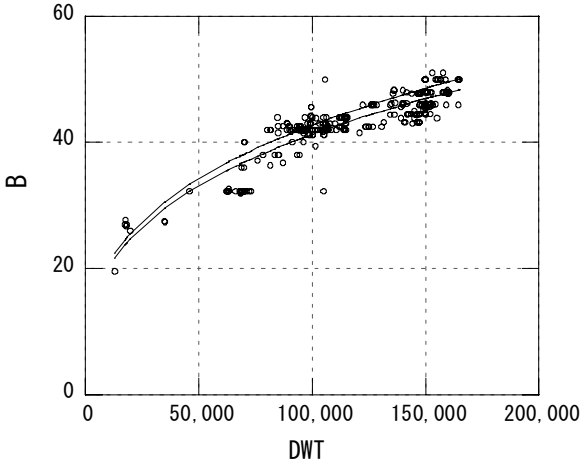
| | 50% | 75% |
|---|---|---|
| α | 1.7201 | 1.8629 |
| β | 0.2577 | 0.2577 |

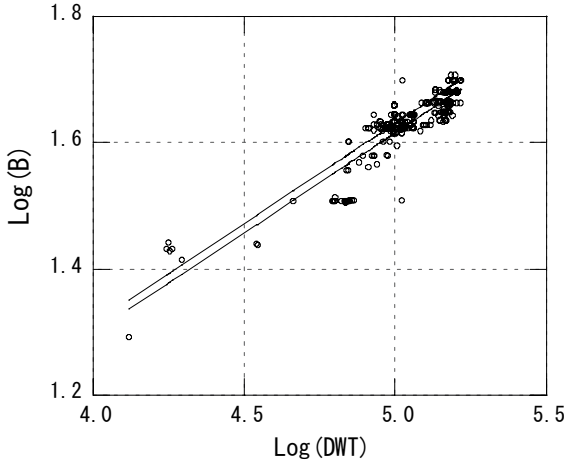
$\log Y=a+b\log X$

( $R^2$= 0.695 , σ= 0.051 )

| | 50% | 75% |
|---|---|---|
| a | 0.2356 | 0.2702 |
| b | 0.2577 | 0.2577 |

**Figure 3-66** Oil Tanker (Less than 8,000DWT) B-DWT




$Y=\alpha \cdot X^{\beta}$

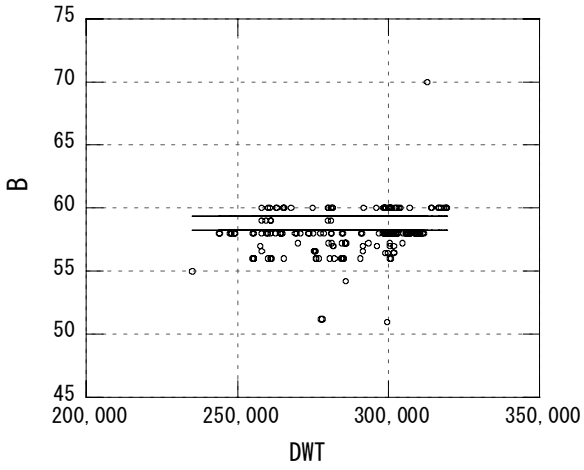
| | 50% | 75% |
|---|---|---|
| α | 1.0672 | 1.1043 |
| β | 0.3175 | 0.3175 |

$\log Y=a+b\log X$

( $R^2$= 0.807 , σ= 0.022 )

| | 50% | 75% |
|---|---|---|
| a | 0.0282 | 0.0431 |
| b | 0.3175 | 0.3175 |

**Figure 3-67** Oil Tanker (8,000～Less than 200,000DWT) B-DWT

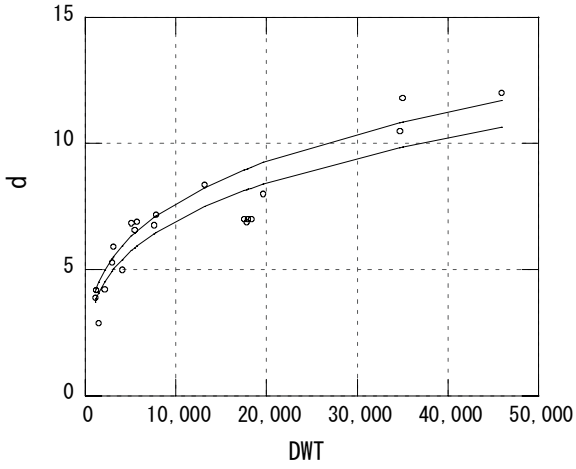


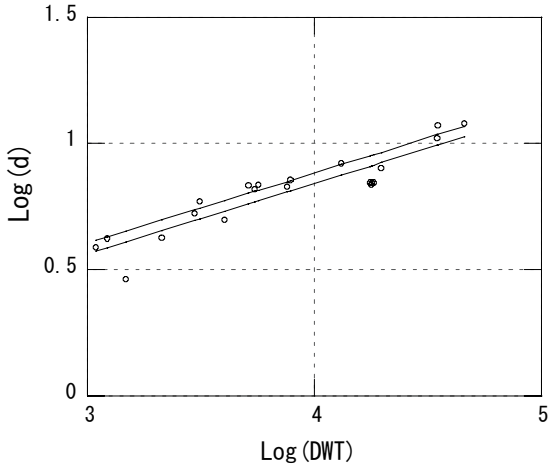

$Y=a_0$

（σ= 1.673 ）

| | Average | 75% |
|---|---|---|
| $a_0$ | 58.2 | 59.4 |

**Figure 3-68** Oil Tanker (200,000～Less than 400,000DWT) B-DWT




$Y=\alpha \cdot X^{\beta}$

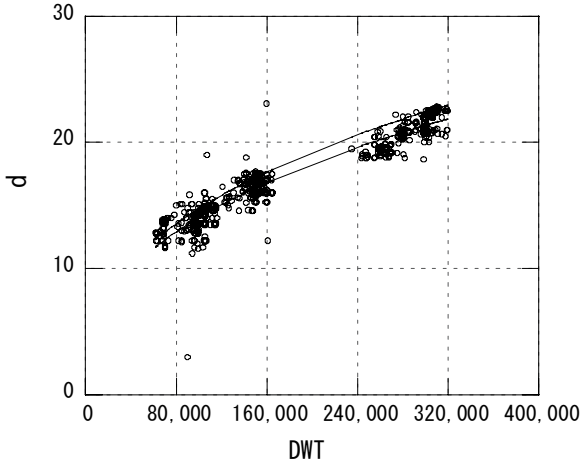
| | 50% | 75% |
|---|---|---|
| α | 0.5339 | 0.5877 |
| β | 0.2786 | 0.2786 |

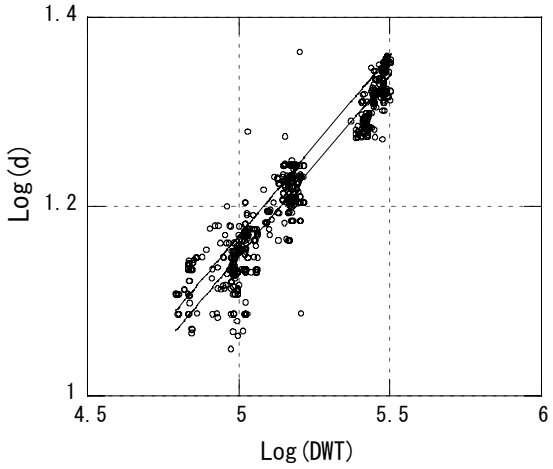
$\log Y=a+b\log X$

( $R^2=$ 0.830 , $\sigma=$ 0.062 )

| | 50% | 75% |
|---|---|---|
| a | -0.2725 | -0.2309 |
| b | 0.2786 | 0.2786 |

**Figure 3-69** Oil Tanker (～50,000DWT) d-DWT




$Y=\alpha \cdot X^{\beta}$

| | 50% | 75% |
|---|---|---|
| α | 0.1748 | 0.1836 |
| β | 0.3810 | 0.3810 |

$\log Y=a+b\log X$

( $R^2=$ 0.870 , $\sigma=$ 0.031 )

| | 50% | 75% |
|---|---|---|
| a | -0.7574 | -0.7362 |
| b | 0.3810 | 0.3810 |

**Figure 3-70** Oil Tanker (greater than 50,000～Less than 400,000DWT) d-DWT

### 3.4 Roll-on/Roll-off Ship

**Figure 3-71** to **Figure 3-73** show the results of analysis of Loa, B, and d for GT. And the following are the analysis method applied to each main dimension and the range of the ship classes to which each method was applied. Because the dimensions of ships of 60,000GT or more are unique, they were exempted from the statistical analysis. **Table 3-10** shows the results of analysis of each main dimension according to the ship class that was set.

(1) Loa, Lpp (**Figure 3-74**, **75**)

The ships were divided into three classes with 30,000GT and 40,000GT as the boundaries. Less than 30,000GT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.906 for Loa and $R^2$ = 0.900 for Lpp. 30,000GT or more and less than 40,000GT and 40,000GT or more and less than 60,000GT were analyzed by the average value analysis method.

(2) B (**Figure 3-76**)

The ships were divided into two classes with 40,000GT as the boundary. Less than 40,000GT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.725. 40,000GT or more and less than 60,000GT was analyzed by the average value analysis method.

(3) d (**Figure 3-77**)

The ships were divided into two classes with 30,000GT as the boundary. Less than 30,000GT was analyzed by the logarithmic regression analysis method, obtaining $R^2$ = 0.788. 30,000GT or more and less than 60,000GT was analyzed by the average value analysis method.

**Table 3-10** The results of analysis of main dimensions(Roll-on/Roll-off Ship)

| Gross Tonnage (t) | Length Overall (m) | Length P.P. (m) | Breadth Molded (m) | Full Load Draft (m) |
|---|---|---|---|---|
| 3,000 | 98 | 88 | 18.1 | 4.6 |
| 5,000 | 117 | 105 | 20.4 | 5.5 |
| 10,000 | 149 | 136 | 23.9 | 6.9 |
| 20,000 | 189 | 174 | 28.0 | 8.7 |
| 40,000 | 194 | 174 | 32.3 | 9.7 |
| 60,000 | 208 | 189 | 32.3 | 9.7 |