


```
81  MIR: 3
82  Flow cover: 10
83  Zero half: 2
84  Relax-and-lift: 5
85
86  Explored 3671 nodes (70294 simplex iterations) in 105.19 seconds (93.14 work units)
87  Thread count was 8 (of 8 available processors)
88
89  Solution count 3: 524 524 524
90  No other solutions better than 524
91
92  Optimal solution found (tolerance 1.00e-04)
93  Best objective 5.240000000000e+02, best bound 5.240000000000e+02, gap 0.0000%
94
95  Output optimal solution and the Optimal Obj: 524.0
96
97
98  Obj = 524.0
99
100 Solutions:
101   The total pi = 115.0
102   The total duration time in berth stage = 99.0
103   The total duration time in quay crane scheduling stage = 27.0
104   The total departure time in berth stage= 298.0
105   The total departure time in quay crane scheduling stage = 226.0
106   The total wasted crane work hour according QC0= 4.352919087860903
107   The last depature time in quay crane scheduling stage = 59.0
108
109 The specific solution are as follows:
110 Vessel i: 0:  li: 6,      pi: 28-34,      ai-di: 55-63,      taoi-deltai: 55-63,      periodi: 8,      taoPi_SP-deltaPi_SP
: 55-59,      periodPi: 4,      c_i: 2094947,      dowork: 2109152,      fa_i: 1
111 Vessel i: 1:  li: 6,      pi: 8-14,      ai-di: 20-28,      taoi-deltai: 20-28,      periodi: 8,      taoPi_SP-deltaPi_SP:
20-22,      periodPi: 2,      c_i: 2103876,      dowork: 2109152,      fa_i: 3
112 Vessel i: 2:  li: 6,      pi: 26-32,      ai-di: 23-49,      taoi-deltai: 23-49,      periodi: 26,      taoPi_SP-
deltaPi_SP: 23-31,      periodPi: 8,      c_i: 6799974,      dowork: 6986566,      fa_i: 2
113 Vessel i: 3:  li: 7,      pi: 14-21,      ai-di: 34-42,      taoi-deltai: 34-42,      periodi: 8,      taoPi_SP-deltaPi_SP
: 34-35,      periodPi: 1,      c_i: 1978935,      dowork: 2109152,      fa_i: 6
114 Vessel i: 4:  li: 5,      pi: 21-26,      ai-di: 24-42,      taoi-deltai: 24-39,      periodi: 15,      taoPi_SP-
deltaPi_SP: 24-30,      periodPi: 6,      c_i: 3727432,      dowork: 3822838,      fa_i: 2
115 Vessel i: 5:  li: 4,      pi: 10-14,      ai-di: 1-18,      taoi-deltai: 1-11,      periodi: 10,      taoPi_SP-deltaPi_SP
: 1-3,      periodPi: 2,      c_i: 2561723,      dowork: 2636440,      fa_i: 3
116 Vessel i: 6:  li: 6,      pi: 8-14,      ai-di: 42-74,      taoi-deltai: 42-66,      periodi: 24,      taoPi_SP-deltaPi_SP
: 42-46,      periodPi: 4,      c_i: 6213536,      dowork: 6854744,      fa_i: 5
117 TimeSolveModel: 118.000000
118
119 TimeAll: 121.000000
120
121
```