



```

81 Cover: 1
82 Implied bound: 4
83 Projected implied bound: 2
84 MIR: 148
85 StrongCG: 190
86 Flow cover: 105
87 Zero half: 3
88 RLT: 41
89 Relax-and-lift: 644
90
91 Explored 3202 nodes (114357 simplex iterations) in 60.48 seconds (73.77 work units)
92 Thread count was 8 (of 8 available processors)
93
94 Solution count 3: 681 681 681
95 No other solutions better than 681
96
97 Optimal solution found (tolerance 1.00e-04)
98 Best objective 6.810000000000e+02, best bound 6.810000000000e+02, gap 0.0000%
99
100 Output optimal solution and the Optimal Obj: 681.0
101
102
103 Obj = 681.0
104
105 Solutions:
106   The total pi = 126.0
107   The total duration time in berth stage = 123.0
108   The total duration time in quay crane scheduling stage = 24.0
109   The total departure time in berth stage= 390.0
110   The total departure time in quay crane scheduling stage = 291.0
111   The total wasted crane work hour according QC0= 7.912711838691569
112   The last depature time in quay crane scheduling stage = 69.0
113
114 The specific solution are as follows:
115 Vessel i: 0:   li: 6,      pi: 14-20,      ai-di: 40-60,      taoi-deltai: 40-60,      periodi: 20,      taoPi_SP-
deltaPi_SP: 40-44,      periodPi: 4,      c_i: 5228251,      dowork: 5272880,      fa_i: 5
116 Vessel i: 1:   li: 4,      pi: 24-28,      ai-di: 65-84,      taoi-deltai: 65-84,      periodi: 19,      taoPi_SP-
deltaPi_SP: 65-69,      periodPi: 4,      c_i: 4785088,      dowork: 4877414,      fa_i: 4
117 Vessel i: 2:   li: 6,      pi: 24-30,      ai-di: 27-54,      taoi-deltai: 27-54,      periodi: 27,      taoPi_SP-
deltaPi_SP: 27-33,      periodPi: 6,      c_i: 6986991,      dowork: 7118388,      fa_i: 3
118 Vessel i: 3:   li: 5,      pi: 28-33,      ai-di: 62-76,      taoi-deltai: 62-76,      periodi: 14,      taoPi_SP-
deltaPi_SP: 62-65,      periodPi: 3,      c_i: 3642623,      dowork: 3954660,      fa_i: 3
119 Vessel i: 4:   li: 4,      pi: 20-24,      ai-di: 39-58,      taoi-deltai: 39-55,      periodi: 16,      taoPi_SP-
deltaPi_SP: 39-42,      periodPi: 3,      c_i: 4163453,      dowork: 4218304,      fa_i: 4
120 Vessel i: 5:   li: 7,      pi: 7-14,      ai-di: 25-49,      taoi-deltai: 25-42,      periodi: 17,      taoPi_SP-deltaPi_SP
: 25-27,      periodPi: 2,      c_i: 4423517,      dowork: 4745592,      fa_i: 7
121 Vessel i: 6:   li: 5,      pi: 9-14,      ai-di: 9-21,      taoi-deltai: 9-19,      periodi: 10,      taoPi_SP-deltaPi_SP: 9
-11,      periodPi: 2,      c_i: 2562192,      dowork: 3691016,      fa_i: 5
122 TimeSolveModel: 68.000000
123
124 TimeAll: 71.000000
125
126

```