



```

80  obj[gen-1] = 88.80  temp_best_value_gen = 88.80
81  No, maintain solution and obj[gen] = 88.80 , and the tolerance_counter = 5
82  solution chromosome =
83  first level: [ [ 3.5 9. 14. 19.5 26. 28.5 3. 4. 3.5 2.5 3.5 3.5 4. 2.
84  4. ]
85  second level: [ 3. 2. 0. 5. 4. 0. 4. 1. 7. 11. 15. 2. 18. 19. 22.]
86  third level: [3. 3. 2. 5. 5. 2. 3. 7. 2. 2. 3. 6. 8. 1. 3.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 88.80  temp_best_value_gen = 88.80
91  No, maintain solution and obj[gen] = 88.80 , and the tolerance_counter = 6
92  solution chromosome =
93  first level: [ [ 3.5 9. 14. 19.5 26. 28.5 3. 4. 3.5 2.5 3.5 3.5 4. 2.
94  4. ]
95  second level: [ 3. 2. 0. 5. 4. 0. 4. 1. 7. 11. 15. 2. 18. 19. 22.]
96  third level: [3. 3. 2. 5. 5. 2. 3. 7. 2. 2. 3. 6. 8. 1. 3.] ]
97  The No. 6 iteration is finished!
98
99  Beging the No. 7 iteration:
100 obj[gen-1] = 88.80  temp_best_value_gen = 88.80
101 No, maintain solution and obj[gen] = 88.80 , and the tolerance_counter = 7
102 solution chromosome =
103 first level: [ [ 3.5 9. 14. 19.5 26. 28.5 3. 4. 3.5 2.5 3.5 3.5 4. 2.
104 4. ]
105 second level: [ 3. 2. 0. 5. 4. 0. 4. 1. 7. 11. 15. 2. 18. 19. 22.]
106 third level: [3. 3. 2. 5. 5. 2. 3. 7. 2. 2. 3. 6. 8. 1. 3.] ]
107 The No. 7 iteration is finished!
108
109 -----
110
111 The iteration is terminated and then visulize the solution:
112 solution chromosome =
113 first level: [ [ 3.5 9. 14. 19.5 26. 28.5 3. 4. 3.5 2.5 3.5 3.5 4. 2.
114 4. ]
115 second level: [ 3. 2. 0. 5. 4. 0. 4. 1. 7. 11. 15. 2. 18. 19. 22.]
116 third level: [3. 3. 2. 5. 5. 2. 3. 7. 2. 2. 3. 6. 8. 1. 3.] ]
117 Objective function values and some other indicators:
118 Obj0 = 24.00      Obj1 = 432.00      Obj0 + Obj1 = 456.00
119 Total movement of crane: 60.00
120 Total waiting time in berth position: 113.00
121 Total index of q during berthing: 587.00
122 Specific arrangement for each vessel:
123 V_id: 0      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 3.0      gama_i1: 4.0
124      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
125      li: 4.0      xi: 9.0      bow of i: 7.0      tail of i: 11.0      gama_i0: 2.0      gama_i1: 5.0
126      duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
127 V_id: 2      li: 6.0      xi: 14.0      bow of i: 11.0      tail of i: 17.0      gama_i0: 0.0      gama_i1: 2
128      duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
129 V_id: 3      li: 5.0      xi: 19.5      bow of i: 17.0      tail of i: 22.0      gama_i0: 5.0      gama_i1: 7
130      duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
131 V_id: 4      li: 8.0      xi: 26.0      bow of i: 22.0      tail of i: 30.0      gama_i0: 4.0      gama_i1: 6
132      duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
133 V_id: 5      li: 3.0      xi: 28.5      bow of i: 27.0      tail of i: 30.0      gama_i0: 0.0      gama_i1: 3
134      duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
135 V_id: 6      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 4.0      gama_i1: 7.0
136      duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
137 V_id: 7      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 1.0      gama_i1: 2.0
138      duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
139 V_id: 8      li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 7.0      gama_i1: 11.0
140      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
141 V_id: 9      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 11.0      gama_i1: 15.0
142      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
143 V_id: 10     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 15.0      gama_i1: 18.
144      duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
145 V_id: 11     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 2.0      gama_i1: 3.0
146      duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
147 V_id: 12     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 18.0      gama_i1: 19.
148      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
149 V_id: 13     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 19.0      gama_i1: 22.
150      duration_time_i: 3.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
151 V_id: 14     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 22.0      gama_i1: 25.
152      duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
153
154 Algorithm finished and the total CPU time: 1232 s
155 End
156

```