Online materials

1. Unsolvable instances

1.1. Small instances set

bay_04_05_090_1.txt
bay_04_05_090_4.txt
bay_05_05_090_2.txt
bay_06_05_090_1.txt
bay_06_05_090_4.txt
bay_06_06_090_1.txt
bay_06_06_090_4.txt
bay_07_06_090_1.txt
bay_08_05_090_2.txt
bay_08_05_090_4.txt

1.2. Normal instances set

bay_08_06_090_3.txt
bay_08_06_090_4.txt
bay_08_07_090_3.txt

2. Results for Caserta et al. (2009) instances

Set size	Re-implementation	Proposed	Dec. re.
3x3	151.71	143.73	5.26%
3x4	196.84	190.83	3.05%
3x5	241.40	235.99	2.24%
3x6	295.76	289.34	2.17%
3x7	341.42	335.28	1.80%
3x8	406.53	397.57	2.20%
4x4	335.93	307.36	8.50%
4x5	418.08	395.77	5.34%
4x6	482.97	467.41	3.22%
4x7	575.98	553.24	3.95%
5x4	509.38	465.21	8.67%
5x5	637.54	594.42	6.76%
5x6	768.96	722.77	6.01%
5x7	878.46	829.55	5.57%
5x8	1011.00	964.06	4.64%
5x9	1149.15	1091.49	5.02%
5x10	1292.34	1233.65	4.54%
6x6	1126.01	1038.29	7.79%
6x10	1827.31	1732.39	5.19%
10x6	3377.56	3330.94	1.38%
10x10	5406.54	5551.58	-2.68%

Table 1: Crane working time for 3s execution time [hours].

Set size	Re-implementation	Proposed	Inc. re.
3x3	4410	4221	4.48%
3x4	5271	5460	-3.46%
3x5	5922	6090	-2.76%
3x6	7121	7376	-3.46%
3x7	7882	8085	-2.51%
3x8	9040	9268	-2.46%
4x4	9176	8789	4.40%
4x5	11295	11305	-0.09%
4x6	12047	12595	-4.35%
4x7	13936	14470	-3.69%
5x4	14083	13640	3.25%
5x5	16990	17373	-2.20%
5x6	19954	20493	-2.63%
5x7	21604	21812	-0.95%
5x8	24159	25339	-4.66%
5x9	26758	27531	-2.81%
5x10	28997	29985	-3.29%
6x6	28831	29830	-3.35%
6x10	40739	43307	-5.93%
10x6	76748	90285	-14.99%
10x10	108664	144359	-24.73%

Table 2: Relocations for 3s execution time.

Set size	Re-implementation	Proposed	Dec. re.
3x3	151.71	143.73	5.26%
3x4	196.83	190.83	3.05%
3x5	240.83	235.99	2.01%
3x6	295.29	289.23	2.05%
3x7	340.99	335.25	1.68%
3x8	405.44	397.34	2.00%
4x4	334.92	307.19	8.28%
4x5	416.32	395.41	5.02%
4x6	481.20	466.15	3.13%
4x7	573.61	552.20	3.73%
5x4	507.02	463.91	8.50%
5x5	633.06	591.43	6.58%
5x6	764.20	715.89	6.32%
5x7	874.72	825.56	5.62%
5x8	1006.03	957.95	4.78%
5x9	1142.81	1086.36	4.94%
5x10	1285.62	1225.66	4.66%
6x6	1116.94	1030.07	7.78%
6x10	1818.17	1722.49	5.26%
10x6	3338.61	3231.70	3.20%
10x10	5368.97	5415.95	−0.88%

Table 3: Crane working time for 30s execution time [hours].

Set size	Re-implementation	Proposed	Inc. re.
3x3	4410	4221	4.48%
3x4	5271	5460	-3.46%
3x5	5922	6090	-2.76%
3x6	7159	7392	-3.15%
3x7	7924	8085	-1.99%
3x8	9070	9263	-2.08%
4x4	9168	8800	4.18%
4x5	11288	11358	-0.62%
4x6	12065	12616	-4.37%
4x7	13897	14496	-4.13%
5x4	14046	13582	3.42%
5x5	16984	17259	-1.59%
5x6	19864	20254	-1.93%
5x7	21559	21844	-1.30%
5x8	24144	25226	-4.29%
5x9	26663	27486	-2.99%
5x10	28923	29842	-3.08%
6x6	28697	29610	-3.08%
6x10	40680	42865	-5.10%
10x6	75841	86506	-12.33%
10x10	108048	139029	-22.28%

Table 4: Relocations for 30s execution time.

Set size	Re-implementation	Proposed	Dec. re.
3x3	151.71	143.73	5.26%
3x4	196.83	190.83	3.05%
3x5	240.34	235.99	1.81%
3x6	294.16	289.22	1.68%
3x7	340.24	335.25	1.46%
3x8	404.24	397.28	1.72%
4x4	334.27	307.13	8.12%
4x5	413.93	394.91	4.59%
4x6	479.59	464.90	3.06%
4x7	570.28	550.73	3.43%
5x4	504.99	462.76	8.36%
5x5	628.19	589.09	6.22%
5x6	756.54	708.84	6.31%
5x7	869.24	820.09	5.65%
5x8	996.83	949.58	4.74%
5x9	1132.68	1078.51	4.78%
5x10	1274.36	1214.95	4.66%
6x6	1103.23	1015.42	7.96%
6x10	1802.74	1708.64	5.22%
10x6	3280.07	3124.27	4.75%
10x10	5314.64	5221.30	1.76%

Table 5: Crane working time for 300s execution time [hours].

Set size	Re-implementation	Proposed	Inc. re.
3x3	4410	4221	4.48%
3x4	5271	5460	-3.46%
3x5	5922	6090	-2.76%
3x6	7207	7392	-2.50%
3x7	7969	8085	-1.43%
3x8	9114	9261	-1.59%
4x4	9154	8799	4.03%
4x5	11250	11393	-1.26%
4x6	12076	12586	-4.05%
4x7	13932	14531	-4.12%
5x4	14054	13485	4.22%
5x5	16920	17288	-2.13%
5x6	19795	20026	-1.15%
5x7	21521	21861	-1.56%
5x8	24137	25126	-3.94%
5x9	26513	27473	-3.49%
5x10	28821	29831	-3.39%
6x6	28485	29095	-2.10%
6x10	40500	42432	-4.55%
10x6	74667	82431	-9.42%
10x10	107204	131606	-18.54%

Table 6: Relocations for 300s execution time.