On-Line Suuplement to "A General Heuristic for Production Planning Problems"

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Complete computational results

The five following tables report the complete computational results.

Table 8 gives the value of the solutions found by the different heuristics, while the Table 9 gives the times for the same runs. Both tables are organized as follows: the first column is the name of the problem, the second specifies by which cut generator the basic formulation has been tightened, and the remaining gives the value of the solution found or the time in seconds needed by the considered heursitic. For the branching heuristics, the values of the solution found are the best solution found at the time IPE had finished, while the time is the time needed to find a solution at least as good as that of IPE.

In Tables 10, 11 and 12 are presented the complete computational results for the network design problems. The three Tables are organized as follows: the first column contains the name of the instance, the next group of four columns gives the value of the solution found by the routine specified by the first three rows, and the last four do the same for the times needed. As for lotsizing problems, the 'time' of BBbound is the time needed to find a solution at least as good as the one of IPE. There was no solution found by BBbound for g150x1100, g200x740d and g200x740e (XPRESS formulation) due to sensitivity to the numerical zero tolerances. Also, no solutions has been found by IPE for r80x800 and p500x2988b (XPRESS formulation) due to the difficulty of some LP relaxation. Those entries are indicated by "no sol.". All other blank entries mean that the initial LP relaxation was integer and there was thus no need for heuristics.

		BBestim	Bbbound	Bbdepth	IPE	RR	SSR	CMSB	Relax&Fix
pp08a	basic	8160	7720	8160	8040	8150	8320	9120	7580
	XPRESS	7710	7690	7710	8020	8620	8840.03	9030.01	7870
	bc-prod	7370	7370	7350	7790	8020	8120	8780	7460
set1ch	basic	60913	63236.5	60913	69945.75	63538.5	71295	88924.25	55977
	XPRESS	60761.8	58997.6	60761.8	60038	59157.3	61664.05	68801.56	55032
	bc-prod	54672.5	54672.5	54672.5	55420.5	58119.75	59900.25	61556	54672.5
tr6-15	basic	40641	no sol.	39762	40248	42263	43308	46183	40567
	XPRESS	39798.2	40852	40096.2	38976	40359.24	43787.21	44741.1	39777.25
	bc-prod	37801	38044	38502	39039	39154	40469	40469	37984
tr6-30	basic	no sol.	no sol.	no sol.	65632	69977	71594	78563	66059
	XPRESS	66754.2	65736	66754.2	63073	67939.37	69408.25	74126.13	63124.2
	bc-prod	63298	63369	63446	64370	65224	66068	69097	62459
tr12-15	basic	no sol.	no sol.	no sol.	79352.1	88607	97233	101741	83649
	XPRESS	no sol.	84186	no sol.	79825.3	90101.16	100721.1	102688.1	80730.1
	bc-prod	no sol.	78117	no sol.	78098	77615	77885	77885	74761.9
tr12-30	basic	no sol.	no sol.	no sol.	138650	no sol.	no sol.	no sol.	142488
	XPRESS	no sol.	144943	no sol.	136883.3	150214.3	151459.3	161850.3	142087
	bc-prod	132822	131384	132545	131988	136553	137290	142581	130957
tr24-15	basic	no sol.	no sol.	no sol.	144370	152342	157293	180928	146185
	XPRESS	no sol.	no sol.	no sol.	139593.6	160459.5	171061.4	174042.1	143541.1
	bc-prod	136968	136820	137268	137153	139122	140363	143012	136636
tr24-30	basic	no sol.	no sol.	no sol.	303800	324084	336098	382422	309084
	XPRESS	no sol.	no sol.	no sol.	301778.5	342587.9	360611.6	382258.4	no sol.
	bc-prod	288550	288097	288768	290006	293423	294349	297891	288035
A1C1S1	basic	13599.3	13642.8	13728.1	13458.1	13467.7	13884.7	17314.6	13559.5
	XPRESS	13249.3	13609.5	13737.2	12969.2	13652	13737.9	15984	no sol.
	bc-prod	12159.1	12055	12128.6	12440.2	12973.6	13339.6	14322.3	12029.16
A1C1S1en	basic	13597.9	13642.8	13726.6	13556.2	13408.3	13992.6	16965.6	13559
	XPRESS	13667.2	13929.1	13984.6	12722.4	14117	14303.2	16837.5	no sol.
A2C1S1	basic	13802.2	13124.3	13705.9	12984	13144.8	13740.5	17102.6	12216
	XPRESS	13564.4	12558.8	13302.6	13014.1	14514.8	14514.8	18346.4	no sol.
	bc-prod	11280	11310.3	11695.2	11467.7	11834.9	11838.4	13915	10963.9
A2C1S1en	basic	13973.4	13441.7	13705.9	13434.5	13882.3	14393.3	17055.3	12216
	XPRESS	12679.1	12779.9	13680.8	12862.7	14172.5	14172.5	17298.62	no sol.
B1C1S1	basic	46815	no sol.	no sol.	27089.1	27955.9	38119.6	61852.6	38800.41
	XPRESS	no sol.	no sol.	no sol.	29313.2	40787.1	40787.1	59436.2	no sol.
	bc-prod	25089.9	25396.9	28886	25497.2	29024.4	36779.1	48056	25395.72
B1C1S1en	basic	46381.3	no sol.	no sol.	29712.9	30596.2	48915.3	62957.2	38800.41
	XPRESS	39716.8	no sol.	no sol.	29769.7	45371.2	45371.2	50015.2	28502.42
B2C1S1	basic	34327.7	no sol.	no sol.	29225.6	30089.9	43707.2	59717	33591.7
	XPRESS	no sol.	no sol.	no sol.	32003.9	45348.9	45922.8	53295.5	32160.55
	bc-prod	30964.5	30272.8	28689.8	31037.5	30868.3	33258.5	38994.6	27973.3
B2C1S1en	basic	38052.1	no sol.	no sol.	32774.9	33727.1	48568.9	59457.1	33540.22
	XPRESS	42937.3	no sol.	no sol.	31668.5	no sol.	no sol.	no sol.	no sol.
multia	basic	8353	8454	8353	5219	4702	4702	5899	6597
	XPRESS	6277	6641	6277	5034	5050.03	5050.03	7862	4970
multib	basic	6004	5887	6004	4318	4203	4203	4318	4376
	XPRESS	4591	5013	4591	4447	3911.01	3911.01	4375.01	3788
multic	basic	6686	5934	6686	4255	3982	3982	4819	5066
	XPRESS	5281	5578	5281	4646	4330.03	4330.03	6244	4000
multid	basic	33830.8	13523	33830.8	12802.5	13037.76	13037.76	13420.25	13446
	XPRESS	13686.8	12876	13686.8	13463	12998.2	12998.2	13034.57	12907.6
	bc-prod	18283.8	13438.1	18283.8	13348.5	202690	214085	214085	12875
multie	basic	49754.25	2625.5	49754.25	2625.5	2797.75	2797.75	2797.75	2625.5
	XPRESS	2701.36	2673	2701.4	2673	3407.09	4219.58	4219.58	2949.2
	bc-prod	2761.75	2761.75	2761.75	2749.75	2992	2992	2992	2633.5
multif	basic	89076	1444	89076	1440	1473	1473	1484	1440
	XPRESS	3818.8	1473	3818.8	1440	1473	1473	1473	1440

Table 1: Lotsizing problems: value of the solutions

		Bbestim	Bbbound	Bbdepth	IPE	RR	SSR	CMSB	Relax&Fix
pp08a	basic	11	0.47	0.3	0.49	1.3	0.49	0.14	0.5
	XPRESS	0.5	0.4	0.5	0.48	1.47	0.73	0.32	8.6
	bc-prod	0.3	0.5	0.6	0.74	1.57	0.91	0.47	0.9
set1ch	basic	1	2.5	1	0.84	9.09	2.56	0.28	0.91
	XPRESS	4.5	1.3	1	1.56	9.76	2.81	0.44	3.05
	bc-prod	0.5	0.7	1.1	1.26	8.38	2.9	0.94	1.08
tr6-15	basic	0.7	8.5	1.2	1.06	2.13	1	0.17	0.66
	XPRESS	4.3	123	1	1.2	3.36	2.05	0.32	2.36
	bc-prod	1	0.85	1	1.31	3.19	1.24	0.32	1.27
tr6-30	basic	no sol.	1.5	no sol.	2.54	5.12	2.55	0.28	1.81
	XPRESS	no sol.	1	1	2.76	7.24	2.99	0.31	4.54
	bc-prod	1.1	1.8	1.5	1.7	9.56	3.6	0.59	3.92
tr12-15	basic	no sol.	no sol.	no sol.	2.49	7.32	3.66	0.22	1.46
	XPRESS	no sol.	181	no sol.	3.44	10.43	4.73	0.44	4.2
	bc-prod	no sol.	5.5	no sol.	3.53	11.43	5.56	0.99	2.94
tr12-30	basic	no sol.	no sol.	no sol.	6.58	no sol.	no sol.	no sol.	4.09
	XPRESS	no sol.	216	no sol.	9.12	14.47	9.13	1.33	12.5
	bc-prod	6.5	2.5	3.5	6.03	33.83	14.02	2.72	13.12
tr24-15	basic	no sol.	no sol.	no sol.	8.34	21.65	9.88	0.65	1.91
	XPRESS	no sol.	no sol.	no sol.	8.82	25.25	11.31	0.98	21.6
	bc-prod	5.2	3	5.8	6.01	33.08	14.12	1.87	5.32
tr24-30	basic	no sol.	no sol.	no sol.	32.73	73.19	32.49	1.13	7.69
	XPRESS	no sol.	no sol.	no sol.	35.65	85.06	37.87	2.19	no sol.
	bc-prod	6.5	6.5	14	21.15	129.91	63.07	6.18	18.9
A1C1S1	basic	144	57	17	28.8	499	313.6	17.64	34.5
	XPRESS	279	263	13	52.2	648.1	419.3	11.81	no sol.
	bc-prod	38	39	65	201.5	1864.5	1141.5	56.8	197.73
A1C1S1en	basic	35	64	20	31.5	496.5	360.1	19.92	38.8
	XPRESS	295	176	48	54	688.8	462.5	21.5	no sol.
A2C1S1	basic	46	159	12	29.2	428	276.5	13.71	45.9
	XPRESS	32	16	9	40.2	456.2	289.4	14.46	no sol.
	bc-prod	87	106	189	190	1545.1	837.1	48.62	146.95
A2C1S1en	basic	258	25	12	23.1	388	286.9	13.72	46.1
	XPRESS	37	18	13	49.8	851.9	693.9	17.88	no sol.
B1C1S1	basic	296	no sol.	no sol.	22.9	713.8	418.2	17.36	42.68
	XPRESS	no sol.	no sol.	no sol.	65.6	1099.7	569.5	30.48	no sol.
	bc-prod	113	176	50	224.17	3377.8	1596.3	100.5	159
B1C1S1en	basic	275	no sol.	no sol.	29.6	762.5	477.6	21.55	46.21
	XPRESS	93	no sol.	no sol.	49.6	1052.4	575.4	20.86	49.9
B2C1S1	basic	93	no sol.	no sol.	55	982.8	563.4	26.87	53.8
	XPRESS	no sol.	no sol.	no sol.	62.5	1565.5	916.2	35.11	76.31
	bc-prod	86	78	97	296.9	3923.1	1984.7	106.88	228.4
B2C1S1en	basic	49	no sol.	no sol.	32.9	1080.2	635.8	30.94	62.65
	XPRESS	220	no sol.	no sol.	58.4	no sol.	no sol.	no sol.	no sol.
multia	basic	70	11	5	0.64	21.49	5.23	0.35	2.31
	XPRESS	64	83	3	0.83	39.49	5.71	0.69	8.33
multib	basic	17	155	6	0.47	27.45	6.97	0.5	2.31
	XPRESS	12	8	4	0.91	37.9	7.79	0.55	17.9
multic	basic	26	11	5	1.46	28.66	5.01	0.57	2.44
	XPRESS	9.5	38	4	0.93	40.42	6.18	0.79	23.36
multid	basic	16	28	8	0.85	73.92	24.61	0.49	9.41
	XPRESS	47	12	10	2.02	102.77	30.86	0.96	24.99
	bc-prod	54	16	4	5.08	98.35	18.36	4.59	14.3
multie	basic	10	3	2	0.35	12.9	5.82	0.18	2.45
	XPRESS	5	1.7	2	0.67	25.96	7.47	0.54	4.65
	bc-prod	2.1	2.5	1	1.6	23.96	6.41	0.75	4.97
multif	basic	7	2	1	0.3	6.76	2.66	0.13	1.62
	XPRESS	2.2	1	1	0.55	8.93	3.51	0.14	0.86

Table 2: Lotsizing problems: times

	Value				Times			
	basic		XPRESS		basic		XPRESS	
	BBbound	IPE	BBbound	IPE	BBbound	IPE	BBbound	IPE
beasleyC1	92	102	87	124	0.5	4.66	39	11.91
beasleyC2	167	171	167	193	1	8.11	1	9.92
beasleyC3	825	814	864	887	160	7.34	5	11.83
berlin	1542	1300	1906	1595	>300	50.53	>300	115.68
brasil	20047	16569	25619	27352	>300	281.25	51	115.57
mc11	12351	13057	23009	12979	6	8.89	>300	20.9
mc7	3989	4353	4428	4267	6	11.16	63	19.01
mc8	1656	1717	3170	1815	7	10.95	>300	24.64
beavma	410860	399425	383746	383285	161	0.46	0.5	0.37
mtest4ma	60342	52768	53679	53127	>300	2.04	22	4.18
g150x1100	84407	79492	no sol.	88826	>300	5.72	no sol.	141.05
g150x1650	85250	74691	76023	82778	>300	13.64	2	244.71
k15x420	875	843	819	909	35	1.51	0.5	9.79
k15x630	993	1037	936	947	1	2.34	0.5	2.93
p50x576	20462	19727	19742	19627	>300	1.86	3	2.93
p50x864	20236	19776	19173	19007	51	2.41	1	0.81
fixnet6	11012	4296	6316	4284	>300	1.84	49	3.22
g180x666	629603	638930	639783	633839	1	1.4	>300	4.47
g200x740c	681920	681972	681079	680624	0.7	0.73	18	1.34
g200x740d	589241	589150	no sol.	586227	5	1.36	no sol.	2.09
g200x740e	604423	604179	no sol.	600714	>300	1.59	no sol.	4.24
g55x188c	39085	36690	35464	35509	>300	0.53	0.5	0.51
h50x2450	437328	458026	553144	489175	1	24.61	>300	44.04
h50x2450b	56.09	53.8	68.22	67.27	>300	21.2	153	44.96
h50x2450c	3168	3184	3621	3497	1	53.24	>300	129.06
h50x2450e	3190	3194	3680	3843	36	51.48	1	128.74
h80x6320	5087	4913	6134	5541	>2000	414.13	>3000	1787
h80x6320b	4502	4293	4882	4811	>2000	426.59	>3000	1291
h80x6320c	4755	4704	5281	5056	>2000	409.65	>3000	1250.1
h80x6320d	5118	4796	5698	5433	>2000	408.03	>3000	1454.3
k15x210	17820	18244	16128	16180	0.5	2.01	0.5	0.93
k20x380b	11949	12337			1	3.37		
k20x380c	19374	18791	17159	22385	18	3.96	1	26.94
k20x380d	22546	25977	20979	20979	0.5	3.71	1	1.39
k20x380e	7377	7818			1	2.03		
p100x588c	173598	180220	172770	173742	3	6.43	0.5	7.86
p100x588d	5	5	6	6	0.5	4.9	4	6.03
p200x1188c	15531	15747	15078	29037	0.5	12.42	0.5	48.02
p500x2988c	15215	15215	15323	15215	9	9.06	9	1.57
p500x2988d	6	6	6	10	2	53.74	0.5	219.8

Table 3: Uncapacitated single-source network design problems: results

	Value				Times			
	basic		XPRESS		basic		XPRESS	
	BBbound	IPE	BBbound	IPE	BBbound	IPE	BBbound	IPE
g200x740	45301	46066	45022	44734	1	3.77	136	14.09
g200x740b	183819	183253	182513	181256	>300	1.9	>300	8.11
g200x740g	57121	49093	59279	48065	>300	4.62	>300	107.65
g200x740h	137235	136966	int infeasible	134583	7	5.58		53.79
g200x740i	43439	34002	44080	34343	>300	4.05	>300	100.27
g40x132	27818	27588	27432	27484	3	0.8	1	1.89
g50x170	31631	28765	30209	26072	20	0.94	52	0.88
g55x188	29296	26808	27966	25327	>300	0.87	46	1.83
k10x90	576	589	579	582	0.1	0.97	0.5	0.61
k14x182	8615	8491	8570	10465	37	3.83	0.3	10.5
k14x182b	11260	11561	11064	12379	1	1.72	0.3	2.12
k16x240	11028	11715	11655	14630	0.2	5.55	0.5	26.86
k16x240b	12444	13552	13139	13564	0.2	5.46	4	27.73
k20x380	2038	2177	2025	2695	0.1	4.95	0.5	36.55
p200x1188	11716	12313	12023	12297	1	16.68	9	156.77
p200x1188b	70416	65363	65382	65777	>300	15.67	47	233.65
p500x2988	72267	72287	73200	72662	3	9.09	>300	263.24
p500x2988b	192524	197333		no sol.	4	89.12		no sol.
p50x288	6377	6522	6216	6447	0.1	2.4	1	5.2
p50x288b	25389	23261	22440	23133	>300	2.34	0.5	5.67
p80x400	8796	8855	8939	8748	0.2	2.71	>300	10.04
p80x400b	45523	43387	42850	43685	>300	3.66	14	15.33
r20x100	17255	17335	16528	17205	1	1.51	1	1.52
r20x200	15151	16934	17626	17523	0.2	4.38	13	10.95
r30x160	24008	24244	24078	24127	1	1.69	1	2.31
r50x360	1885	1803	1836	1914	>300	3.42	13	72.07
r80x800	5447	5645		no sol.	0.5	14.39		no sol.
sp100x200	38503	35209	37356	34805	>300	0.6	3	0.38
sp150x300	32289	30918	34766	33178	>300	0.75	6	1.35
sp150x300b	58	60	58	60	0.5	1.44	0.5	2.56
sp150x300c	585371	590384	579970	572297	0.5	0.6	2	0.66
sp150x300d	69	71	72	71	0.5	0.98	4	1.6
sp50x100	51129	51489	50968	50968	0.3	0.33		
sp80x160	20245	22124	19549	19549	0.3	0.42	0.21	0.21
sp90x180	70588	69236	69798	68862	>300	0.86	1	0.33
sp90x250	28867	23844	23571	23571	>300	0.72	0.23	0.23

Table 4: Uncapacitated multi-source network design problems: results

	Value				Times			
	basic		XPRESS		basic		XPRESS	
	BBbound	IPE	BBbound	IPE	BBbound	IPE	BBbound	IPE
g200x740j	50637	48256	47613	47944	>300	2.98	14	22.96
g55x188d	35551	30699	29407	30215	134	0.56	1	1.42
k14x182c	21379	21103	19590	20718	3	1.76	1	3.72
k16x240c	17727	16284	14794	18496	91	1.41	3	9.74
p500x2988e	1E+09	72016	74261	72152	>300	6.66	>300	27.65
p50x288c	10497	10356	9844	10040	3	1.31	1	2.42
p80x400b	27928	23618	23519	23311	>300	2.07	5	2.41
r50x360b	2267	1879	1852	1872	>300	1.65	6	11.34

Table 5: Capacitated network design problems: results