This paper addresses procurement planning in oil refining, which has until now only had limited attention in the literature. We introduce a mixed integer nonlinear programming (MINLP) model and develop a novel two-stage solution approach, which aims at computational efficiency while addressing the problems due to discrepancies between a non-linear and a linearized formulation. The proposed model covers realistic settings by allowing the blending of crude oil in storage tanks, by modeling storage tanks and relevant processing units individually, and by handling more crude oil types and quality parameters than in previous literature. The developed approach is tested using historical data from Statoil A/S as well as through a comprehensive numerical analysis. The approach generates a feasible procurement plan within acceptable computation time, is able to quickly adjust an existing plan to take advantage of individual procurement opportunities, and can be used within a rolling time horizon scheme. © 2013 Elsevier Ltd.
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.167 SNIP 1.752
Web of Science (2010): Impact factor 2.072
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.171 SNIP 2.137
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.288 SNIP 2.094
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.621 SNIP 1.916
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.306 SNIP 1.888
Scopus rating (2005): SJR 1.306 SNIP 1.882
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.112 SNIP 1.86
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.332 SNIP 1.884
Scopus rating (2002): SJR 0.8 SNIP 0.916
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.951 SNIP 0.745
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.125 SNIP 1.054
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.05 SNIP 1.131

Original language: English

Keywords: Blending, Crude oil, Decision support systems, Digital storage, Nonlinear programming, Refining, Tanks (containers), Petroleum refining, Procurement planning, Oil refining industry, Mixed integer non-linear programming, Solution approach, Crude oil scheduling, Decision support

DOI: 10.1016/j.compchemeng.2013.05.006
Source: dtu
Source-ID: n:oai:DTIC-ART:compendex/389718366::30584
Research output: Research - peer-review ; Journal article – Annual report year: 2013