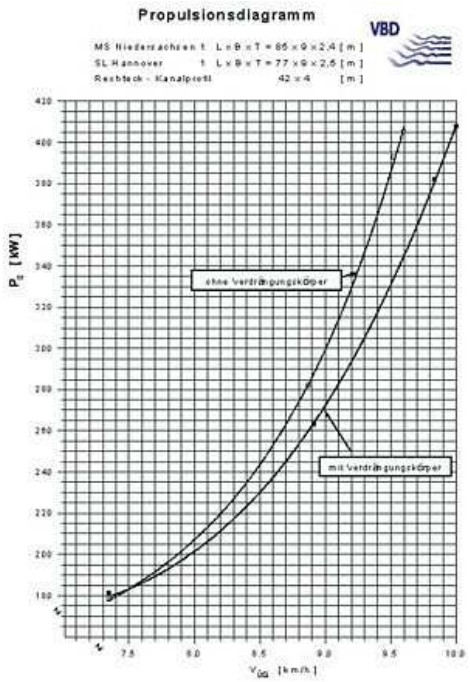
Measures for the reduction of fuel consumption and CO_2 emissions in inland navigation

	Removable filling for gaps in pushed conveys
Keywords	Hydrodynamics, fuel saving, pushed barge train
Short description	Due to the discontinuity of the ship's silhouette a vortex arises in the "gap" between the ship and the barge (or between two barges) at the coupling during operation consuming a considerable part of the propulsion power. If this vortex formation can be avoided or at least reduced, the propulsion power requirements will be reduced or the vessel can sail with increased speed. During flow around a pushed barge train, points of discontinuity appear between pushing motor vessel and pushed barge as well as between the barges, which lead to a flow separation (dead water, vortex) and to an additional formation of free surface waves. To reduce this formation of vortex and waves and simultaneously improve the efficiency of the propulsion, different fillings can be used.  Fig. 1: Installation of foam filling at the bow of the pushing ship (Photo DST)  Fig. 3: Full-scale tests with polyurethane made "wedge" to match the stump transom of the pushed barge (Photo DST) The DST Duisburg carried out full scale tests with different fillings (foam, rubber-inflatable) installed at the coupling of a pushed barge train and measured the resulting effects. While maintaining the same running speed the power requirement and thus the fuel consumption dropped by about 15 % because of less power installation when using these fillings.

(Taken from PLATINA Innovation Database http://www.naiades.info/innovations/index.php5/Innovation_database)

	Removable filling for gaps in pushed conveys
Objective & target	Reducing fuel consumption by means of a flexible filling between a push barge and the pushing motor vessel / another push barge without negative implications when vessels are used individually
Key success factors	The reduction of the vortex formation at the coupling can result in substantial fuel saving.
Innovative aspects	Flexible, cost efficient, dismountable filling at the coupling, when ship sails unloaded or without a push barge.
Benefits	Fuel saving of some 15 %; minimal fuel consumption in the two modes of operation – as a stay-alone unit and as a coupling train
Costs	approx. 100,000 €???
Limits, restrictions	Mounting / dismounting in daily operation difficult
Status	Model tests and full scale test carried out
Difficulties met	The inflatable version, which would be better suited for practical application, not properly tested due to insufficient funds
Year(s)	1999
Users, stakeholders	DST
Contact person	Mr Joachim Zöllner, DST-Duisburg, +49-(0)203-99369-40, http://www.dst-org.de/intro.htm
Website / publication	Publication no. 285 of DST, in German language, http://www.dst-org.de/intro.htm
Available data, publications	Publication no. 285 of DST
Further information	 Fig. 2: Propulsion power savings with integrated foam insert in the coupling gap
Filled in by	Branislav Zigic, Gernot Pauli
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