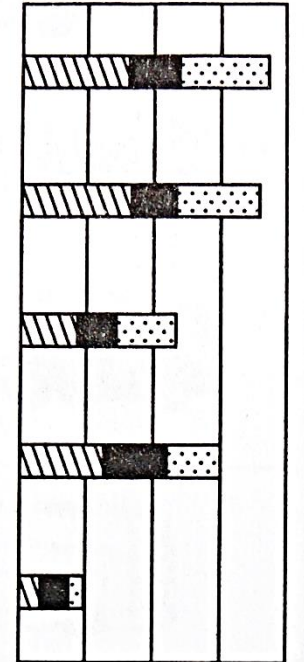
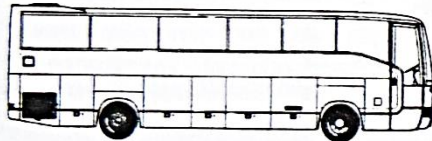
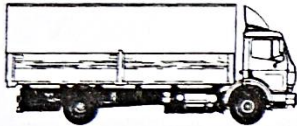


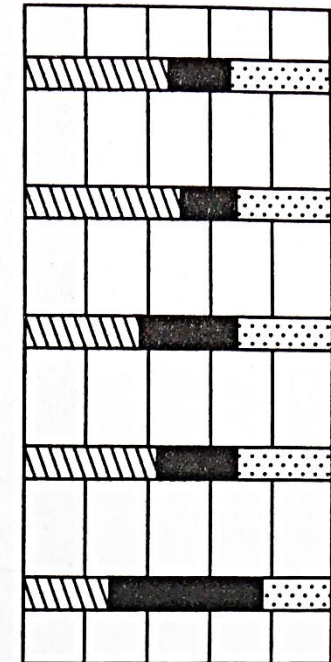
Járműáramlás

BUSZOK
TEHERAUTÓK

ELLENÁLLÁSOK



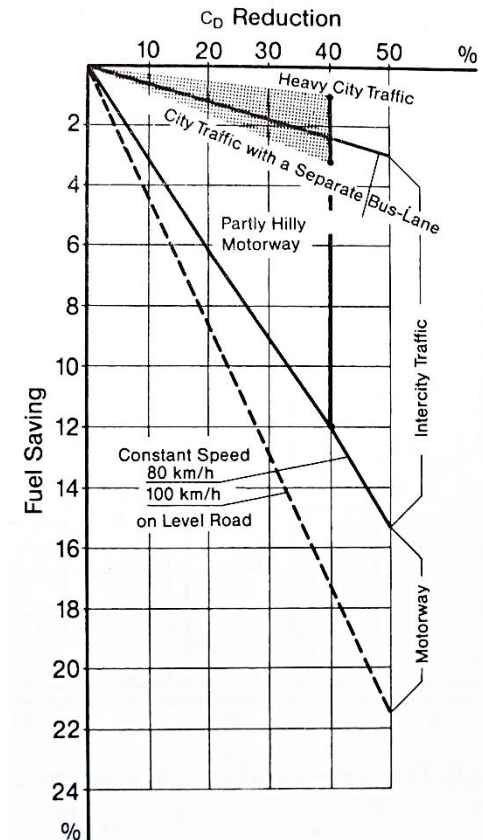
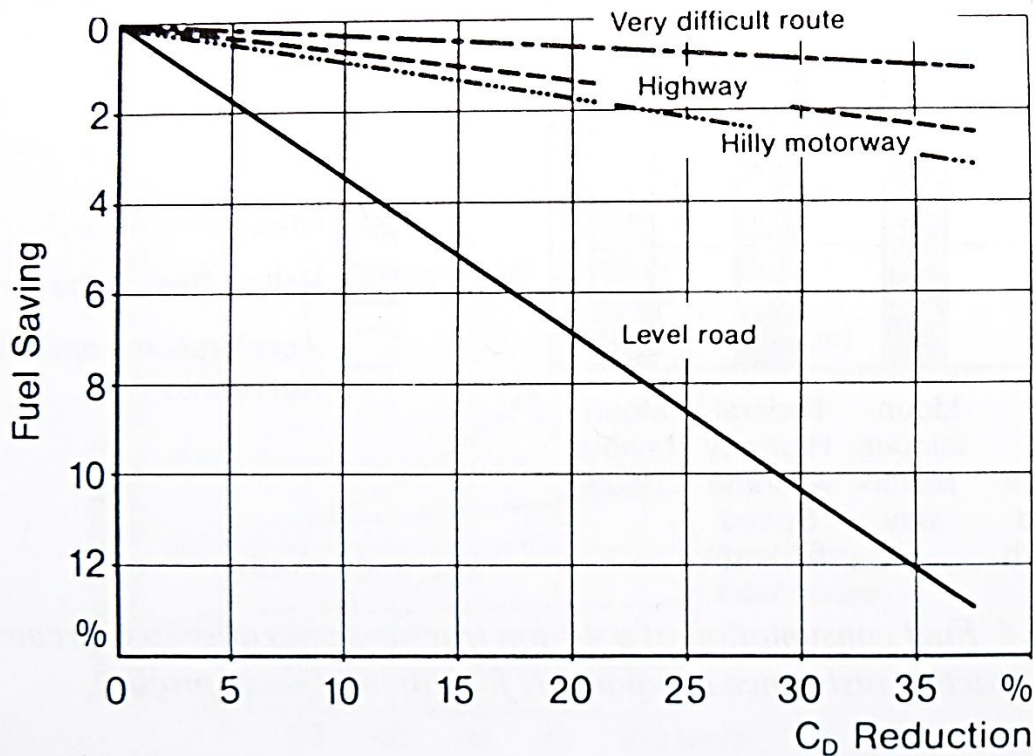
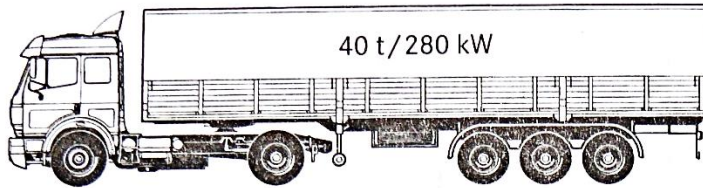
0 20 40
L/100 km
Fuel Consumption



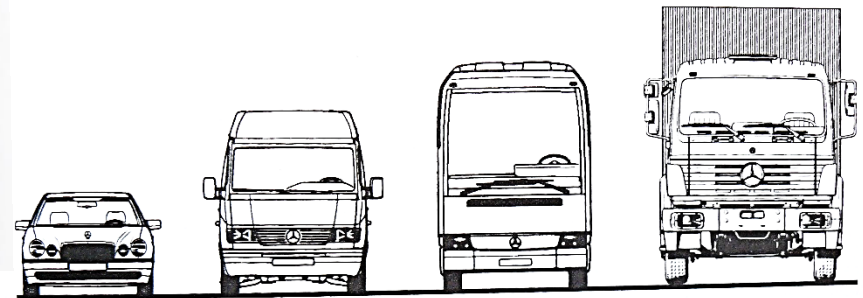
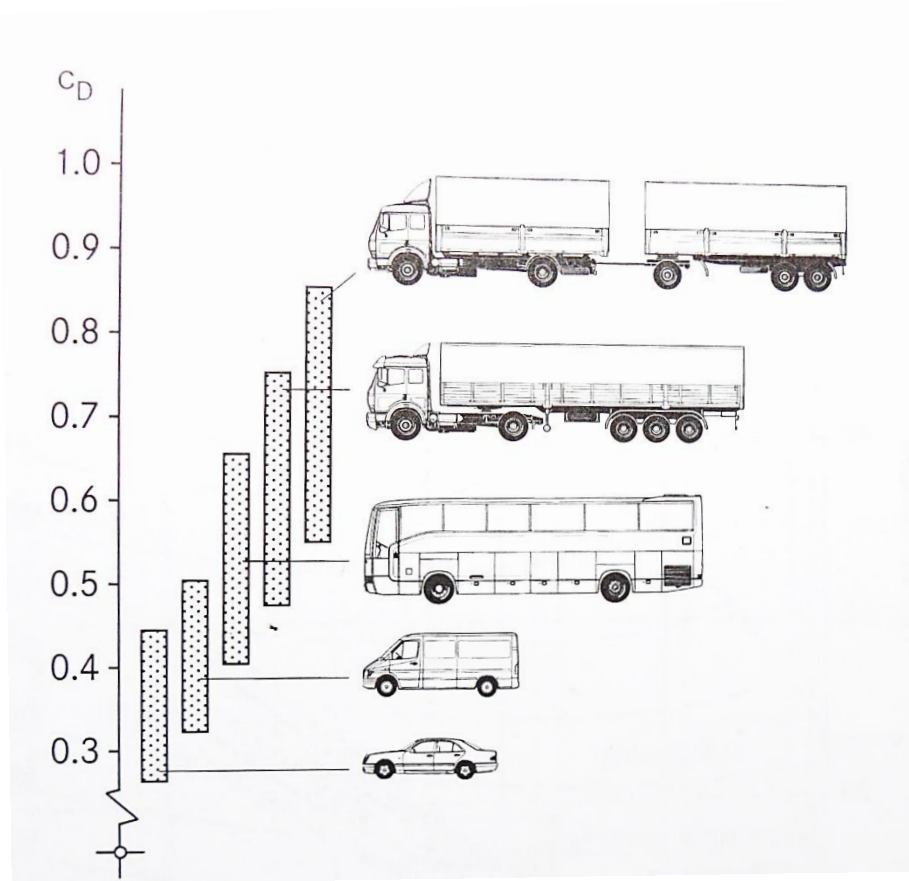
0 20 40 60 80 %
Percentage of
Fuel Consumption

- Drag
- Rolling Resistance
- Acceleration - and Climbing Resistance

LÉGELLENÁLLÁS ÉS ÜZEMANYAG- MEGTAKARÍTÁS



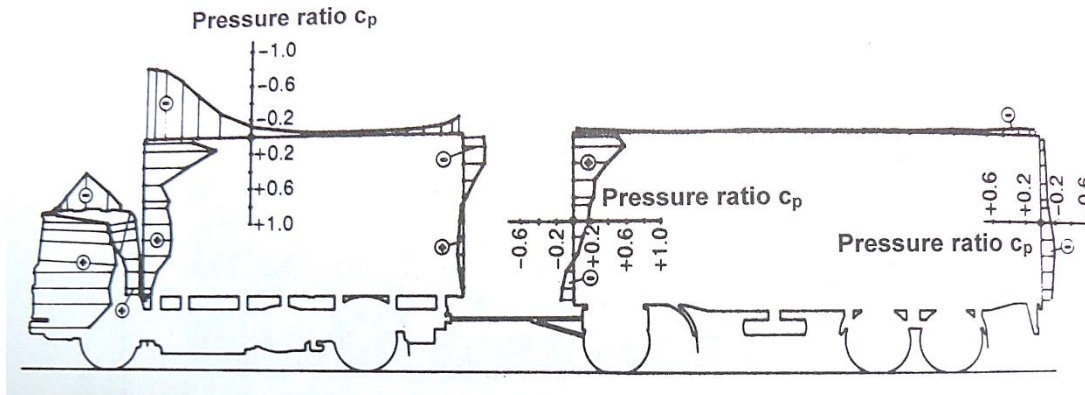
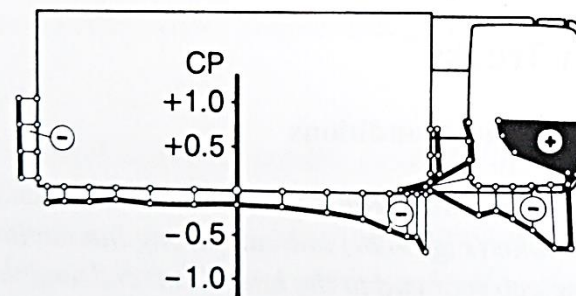
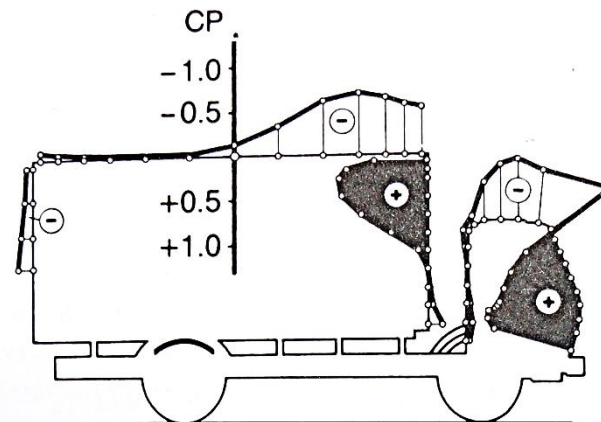
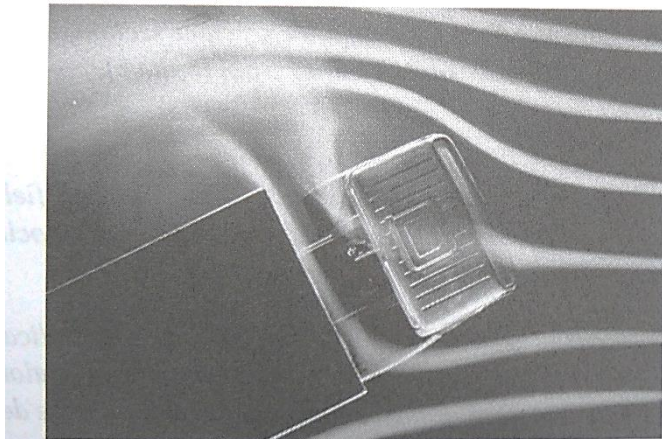
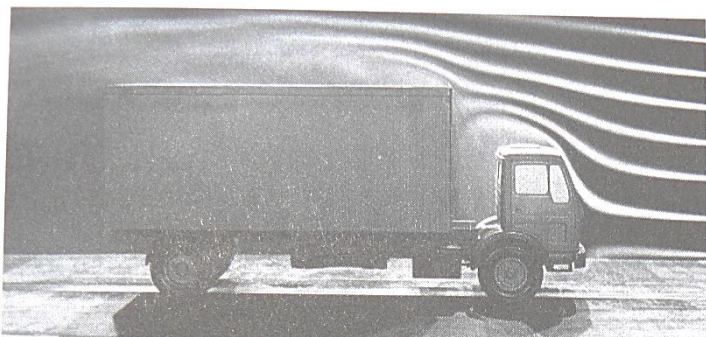
KERESZTMETSZET ÉS ELLENÁLLÁS- TÉNYEZŐ



A	2	4	7	9
C_D	1	1	1.5	2

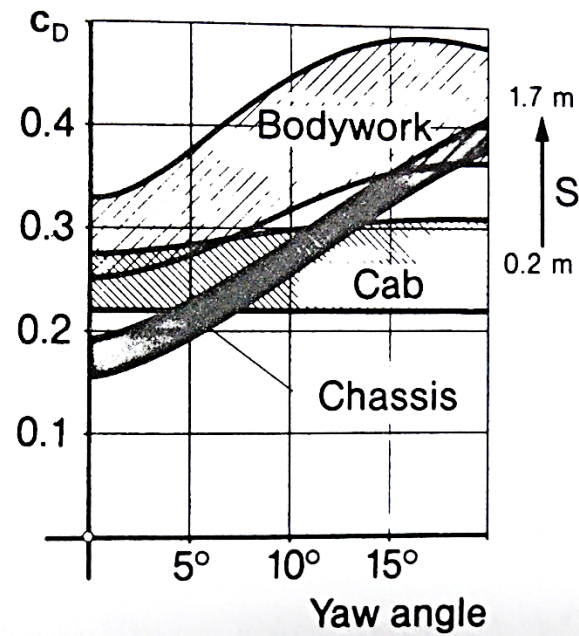
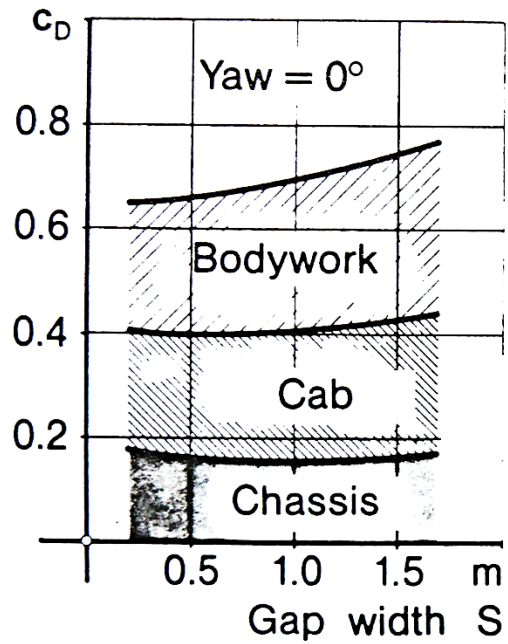
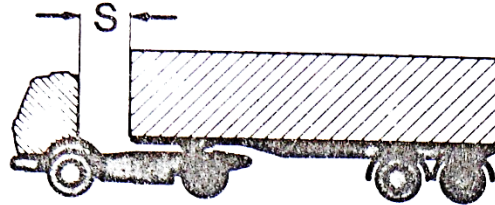
Teherautók légellenállása

ÁRAMVONALAK ÉS NYOMÁSMEGOSZTLÁS



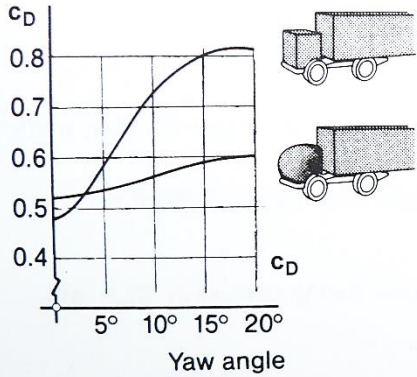
INTERFERENCIA

Vezetőfülke, alváz, rakodótér



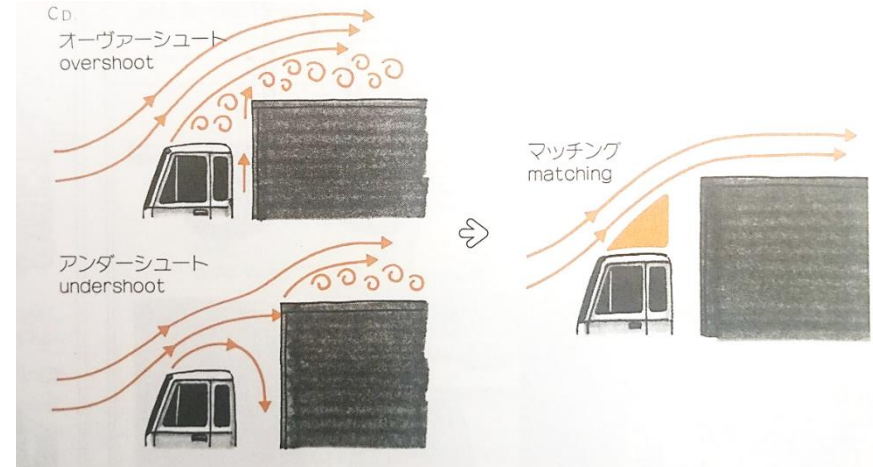
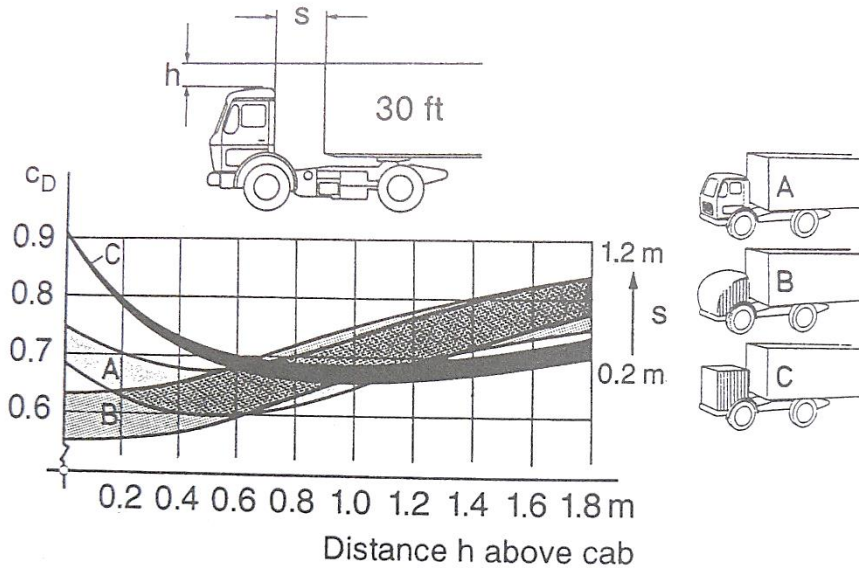
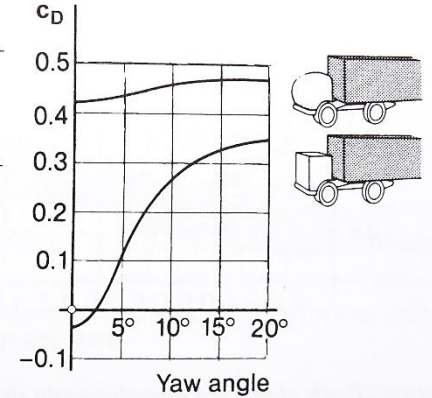
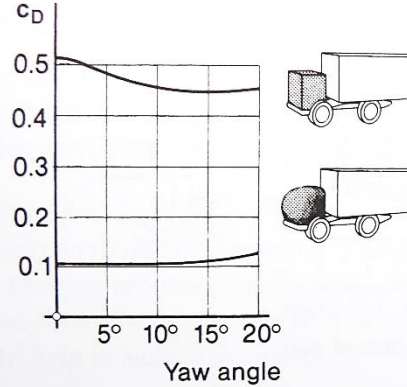
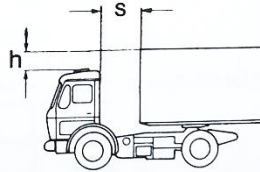
LÉGELLENÁLLÁS CSÖKKENTÉSE

Vezetőfülke



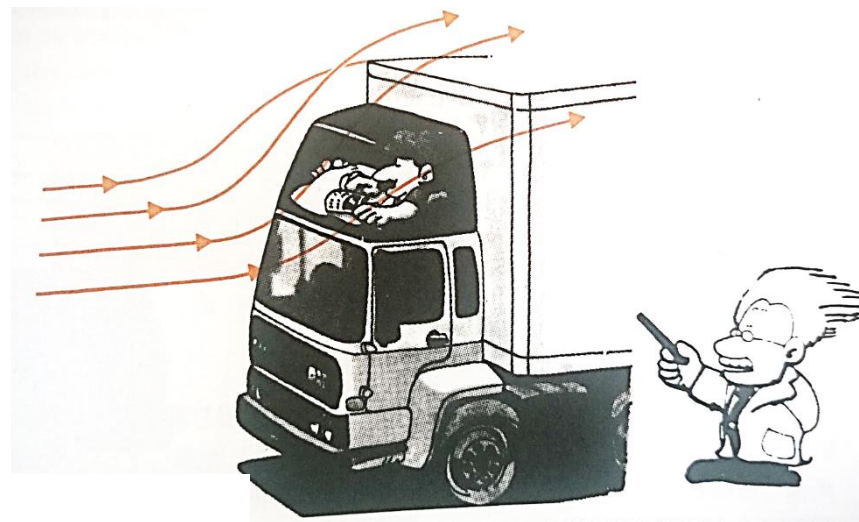
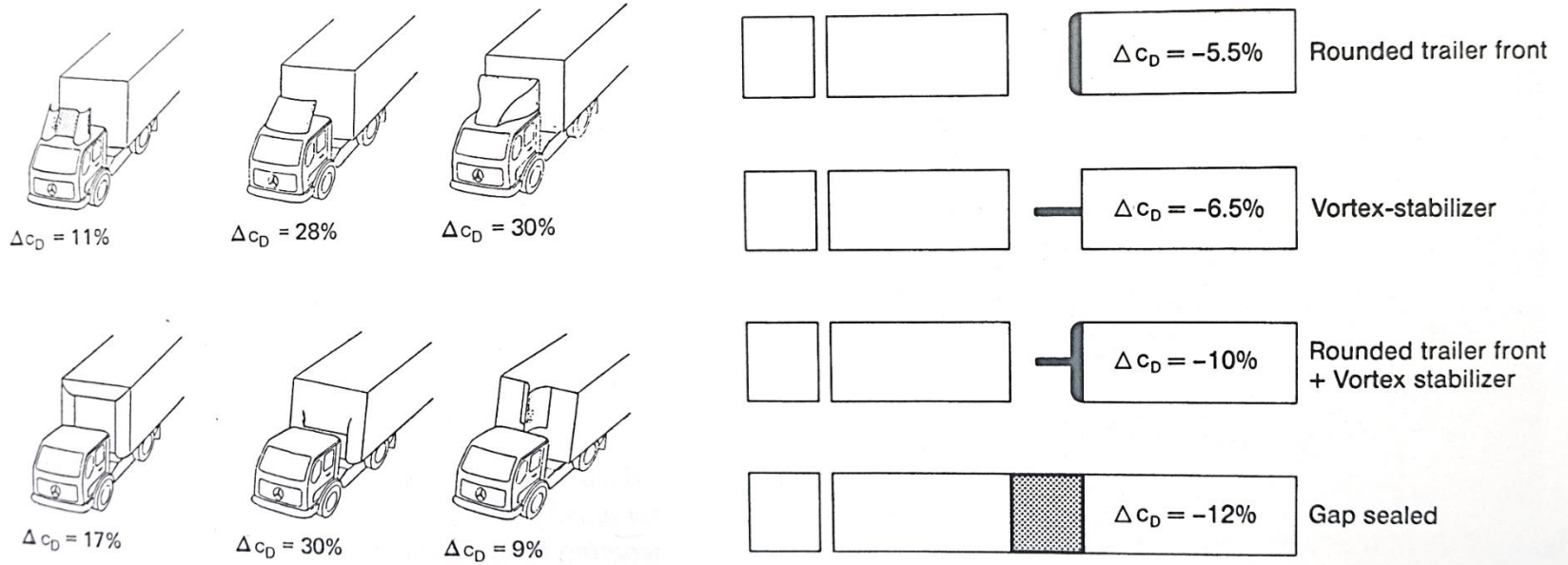
Distance above cab $h = 1.1$ m

Gap width $s = 0.7$ m



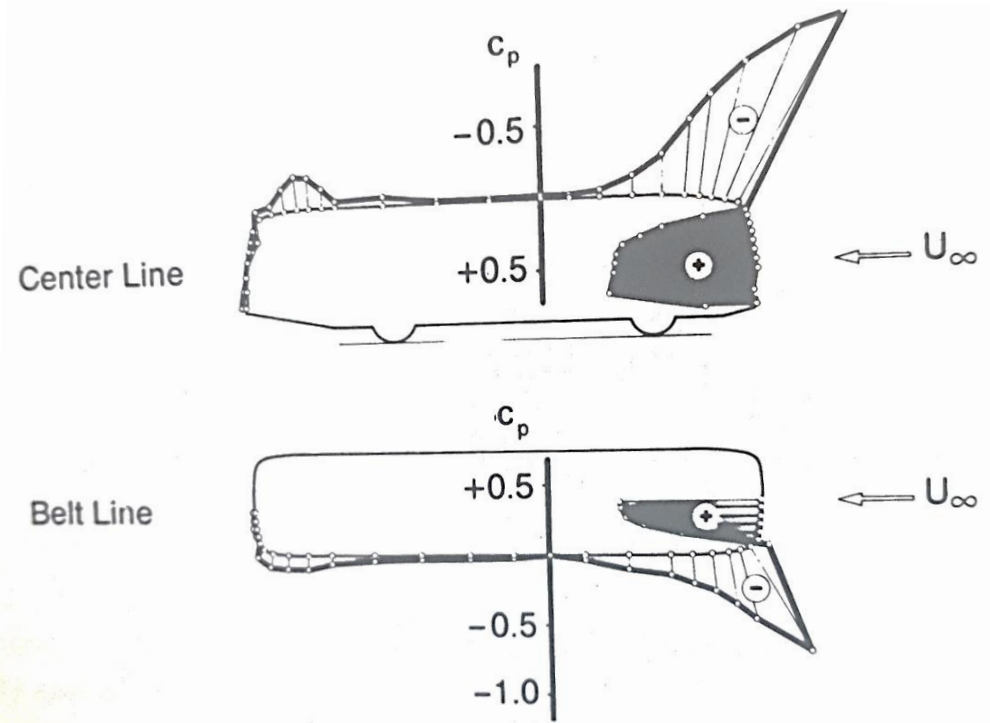
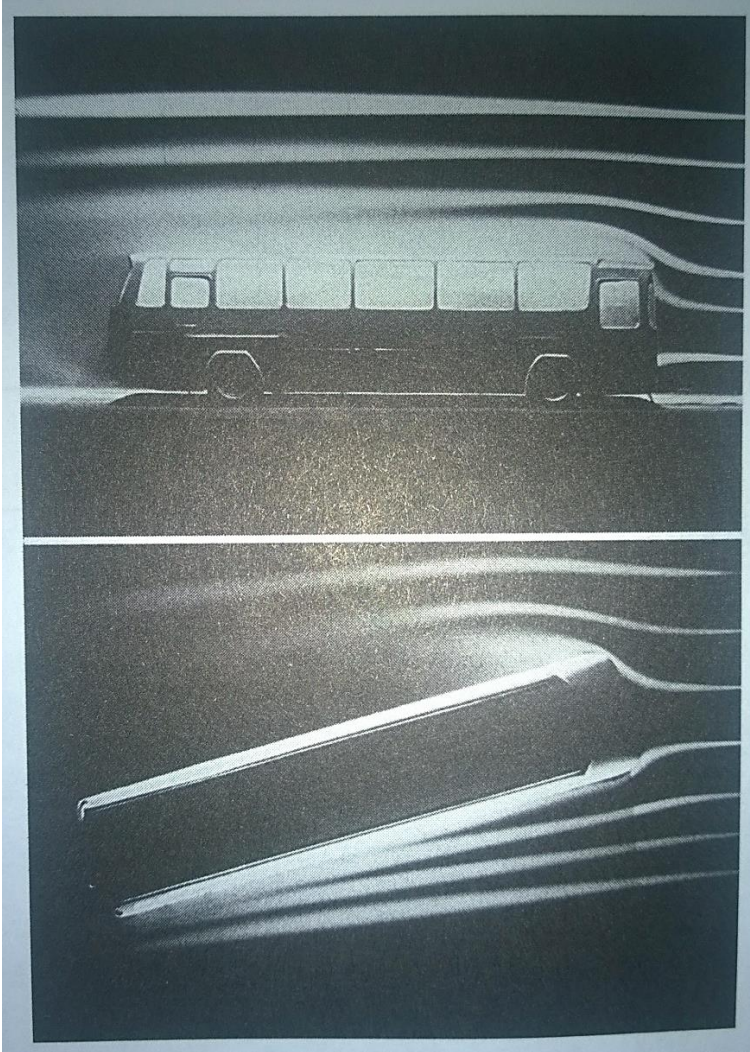
LÉGELLENÁLLÁS CSÖKKENTÉSE

Add-on devices (kiegészítők)



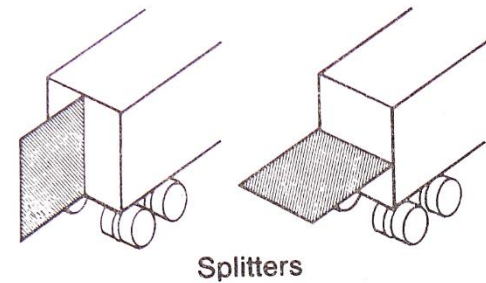
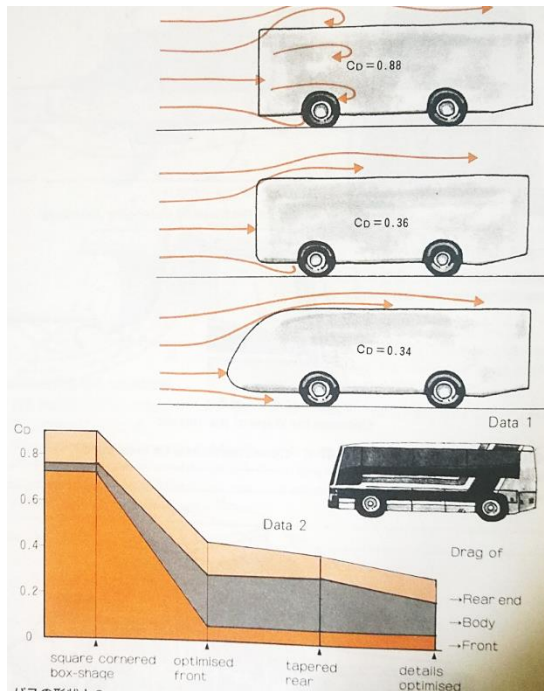
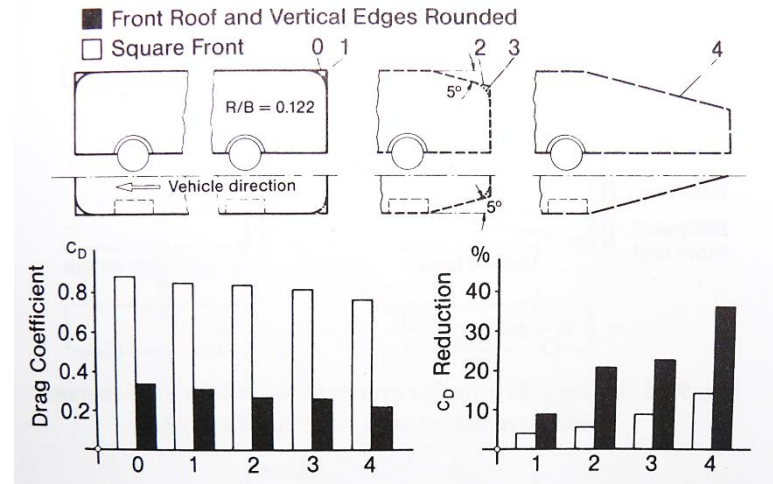
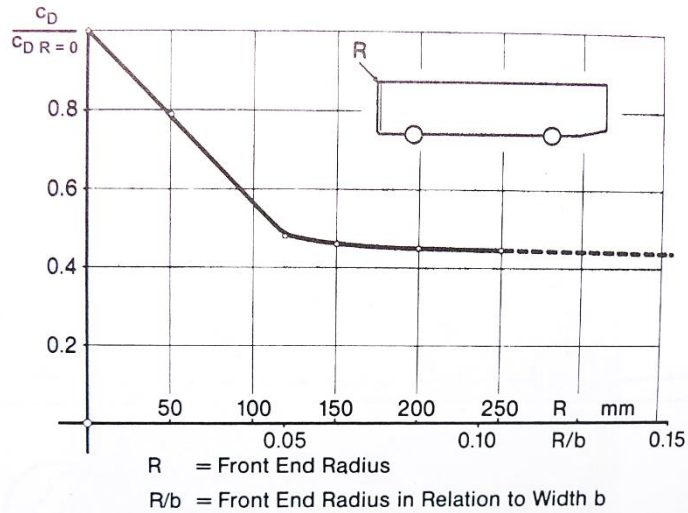
Buszok légellenállása és sarasodás

ÁRAMVONALAK ÉS NYOMÁSMEGOSZTLÁS

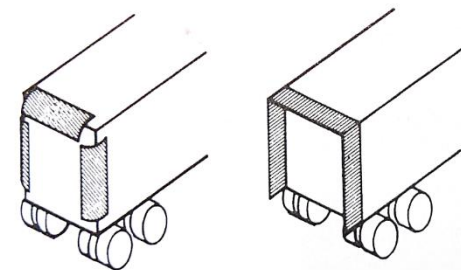


LÉGELLENÁLLÁS CSÖKKENTÉSE

Orr és hát

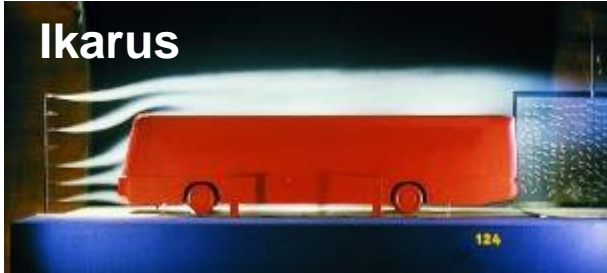


Splitters



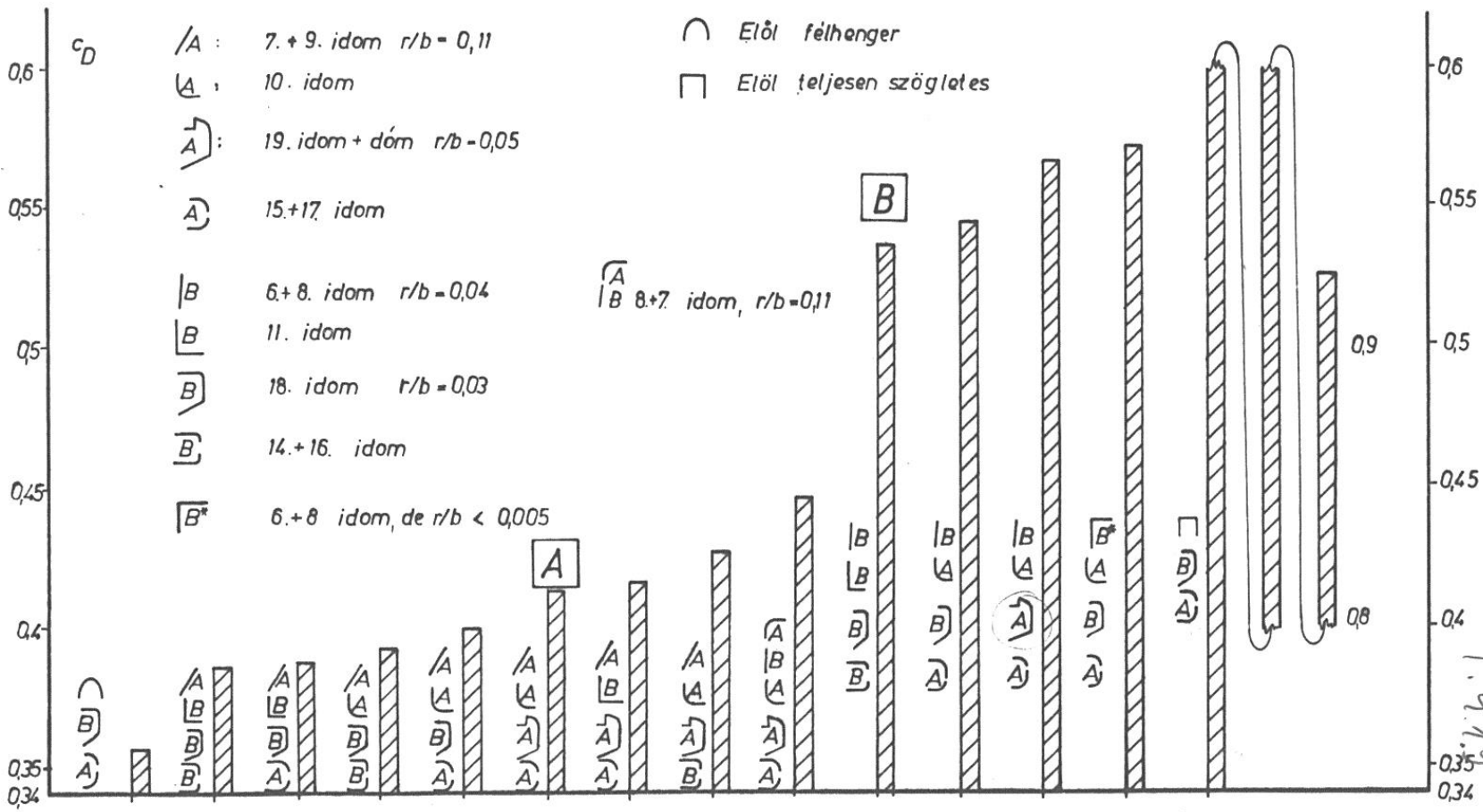
Vanes

Cavities



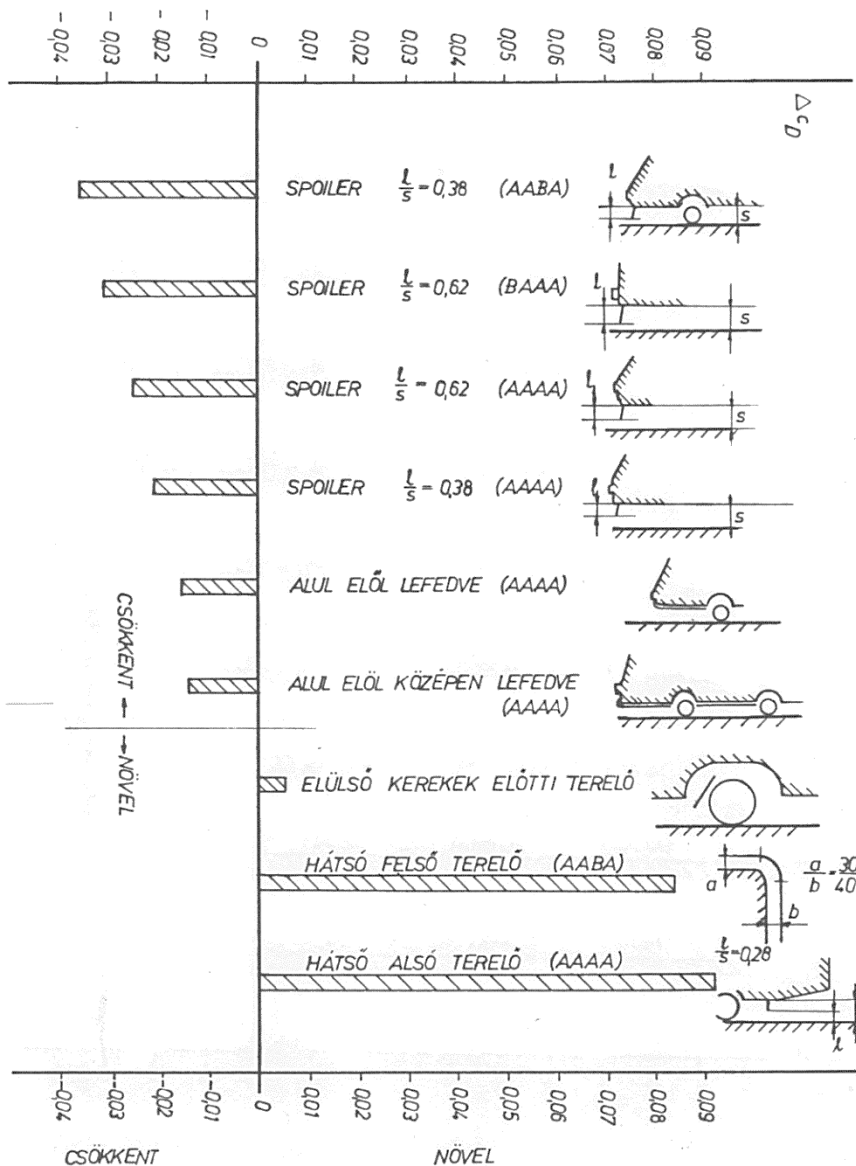
LÉGELLENÁLLÁS CSÖKKENTÉSE

Karosszéria változatok ellenállás-tényezője



LÉGELLENÁLLÁS CSÖKKENTÉSE

Add-on devices hatása az ellenállásra

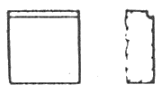


LÉGELLENÁLLÁS CSÖKKENTÉSE

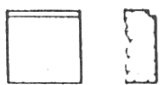
A nyíróréteg szabályozás

"LÉPCSŐ"

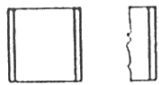
$s/h = 0.1$



-10%



-12%

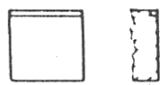


-25%

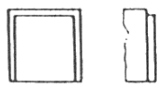


-28%

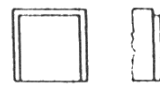
$(\Delta c_e / c_e) \times 100 [\%]$



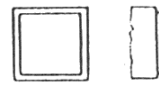
-15%



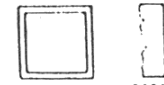
-43%



-48%



-54%



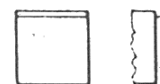
-46%

"KERITÉS"

$s/h = 0.1$



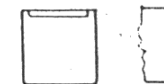
-10%



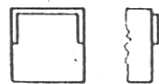
-10%



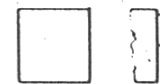
-12%



12%



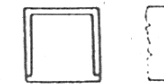
-25%



-23%



-40%

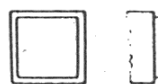


-42%

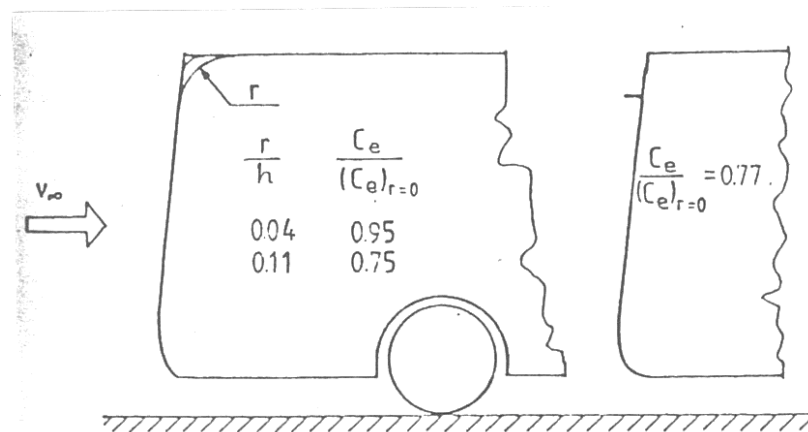
$(\Delta c_e / c_e) \times 100 [\%]$



-58%

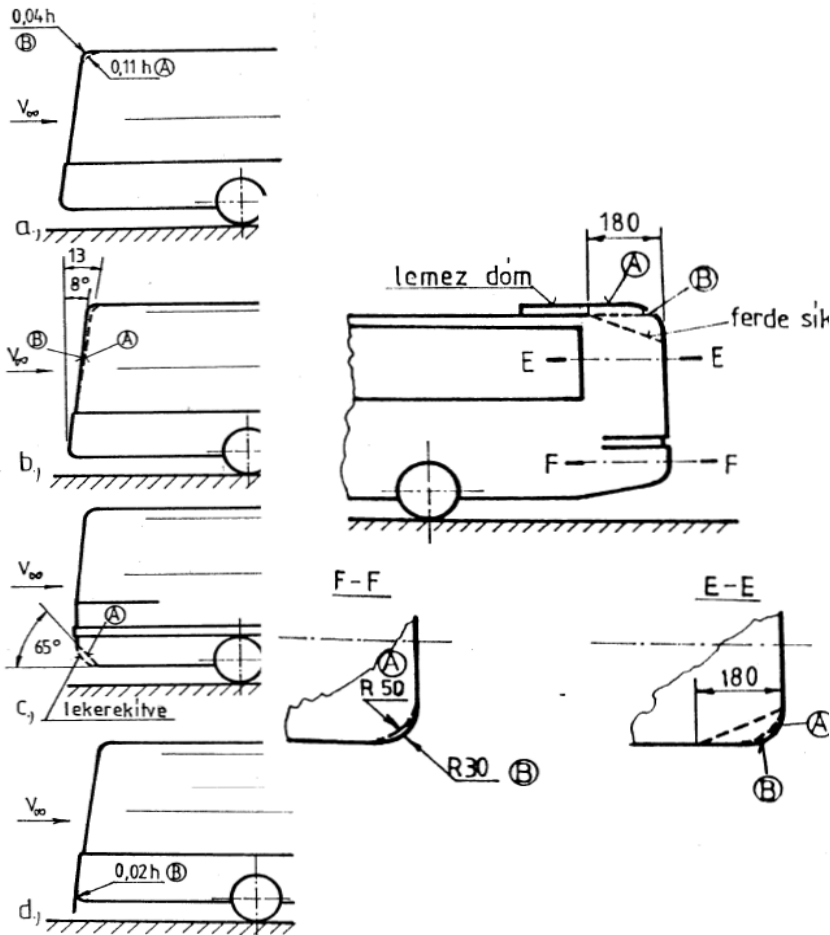


-36%



LÉGELLENÁLLÁS CSÖKKENTÉSE

Az ellenállás csökkenés vizsgálat eredményei

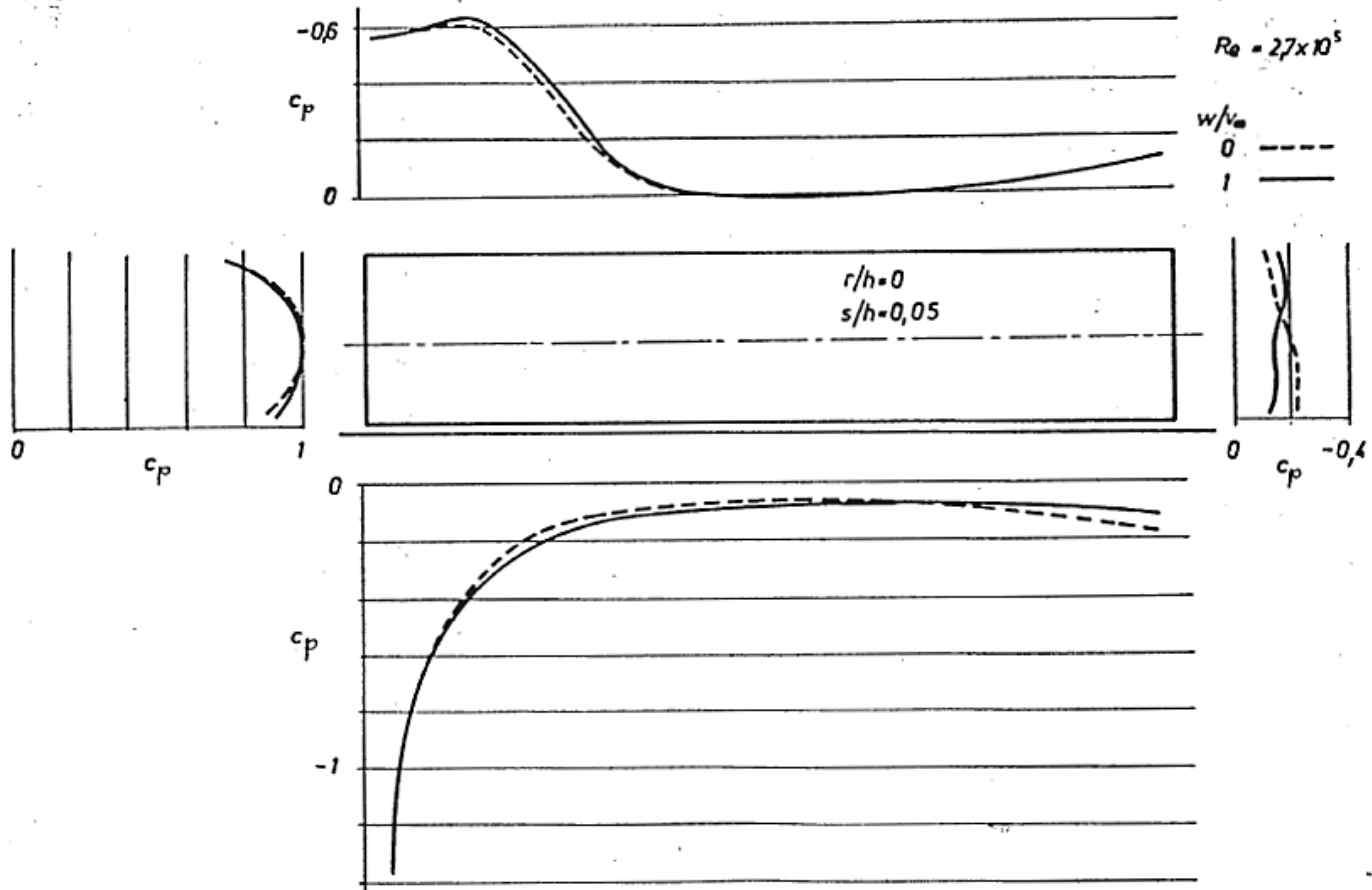


Geometria változtatás	$\Delta c_e / c_e \times 100\%$
homlokfal oldalsó és felső belépő éleinek lekerekítése ($r/h = 0.04$ -ről 0.11 -re)	-38%
homlokfal 8° -os döntése 11° -ra nő	-8%
homlokfal alsó élének és a kilépő élek lekerekítése	± 0
karosszéria aljának lefedése az első kerekek előtt	-4%
A homlokfal alatt spoiler a rés 38%-át takarja	-(5-8)%

Ellenállás-tényező csökkenés $c_e = 0.57$ -ről 0.39 -re (-32%). 100 km/h sebességnél az üzemanyag fogyasztás csökkenés 23% (+ zaj és sarasodás csökkenés).

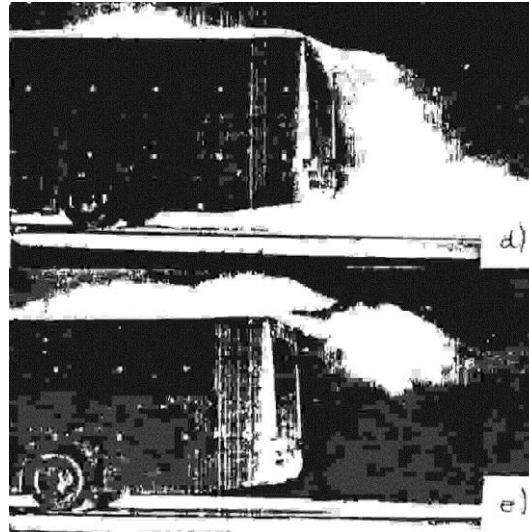
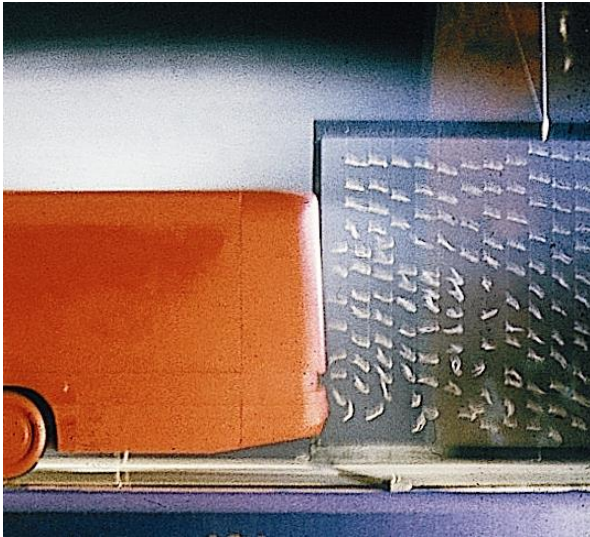
SARASODÁS

A futószalag mozgás hatása



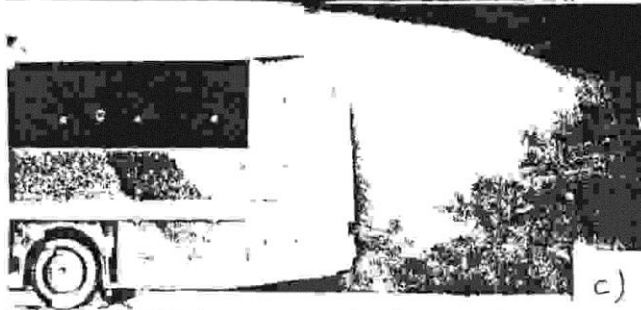
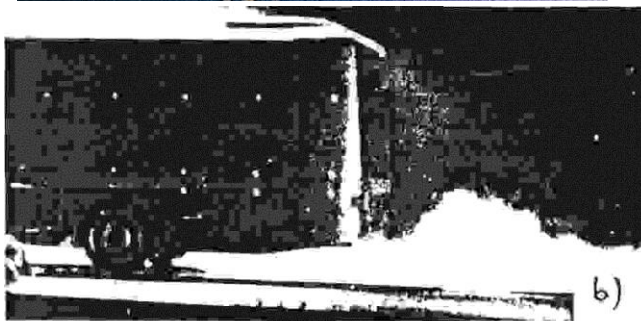
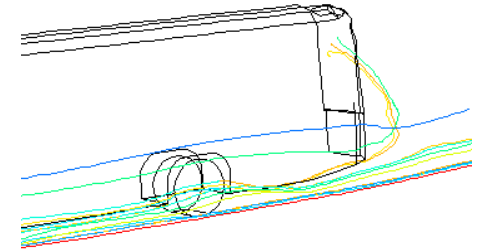
SARASODÁS

Hátfal



Kedvezőtlen kialakítás:

- éles alsó belépőél
- éles hátsó kilépőél

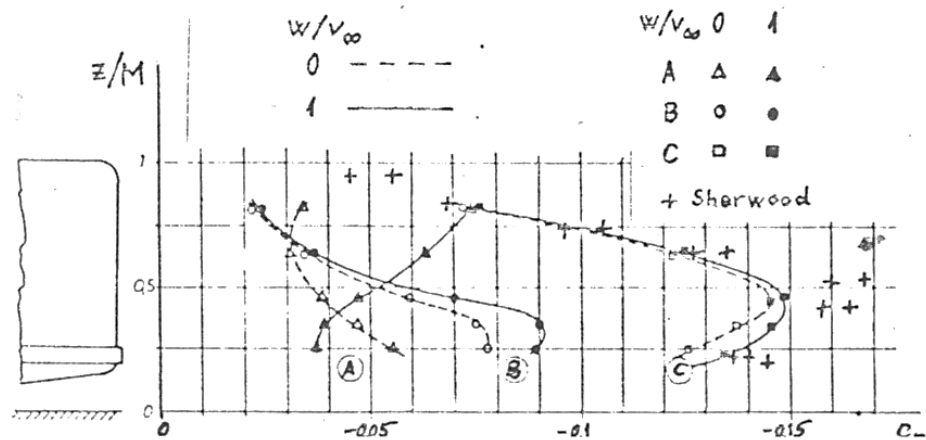
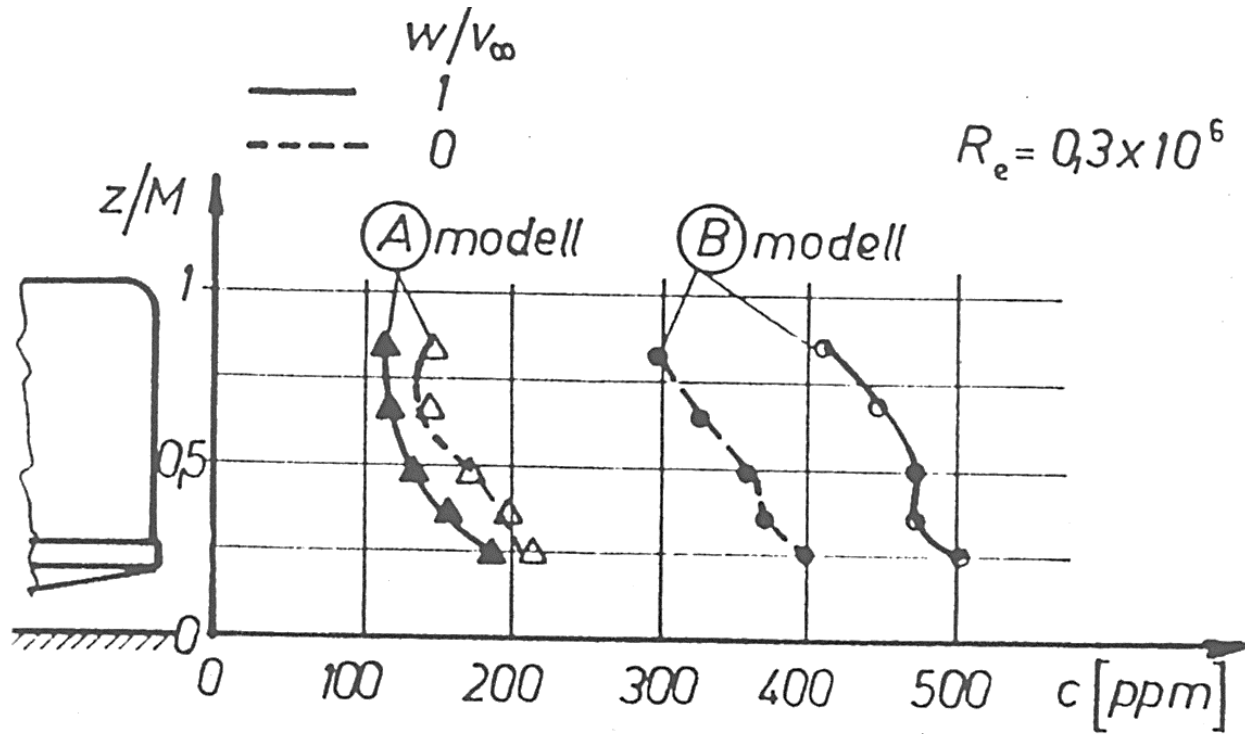


Kedvezőbb kialakítás:

- lekerekített alsó belépőél
- lekerekített hátsó kilépőél
- 73%-kal csökkent sarasodás

SARASODÁS

Hátfal

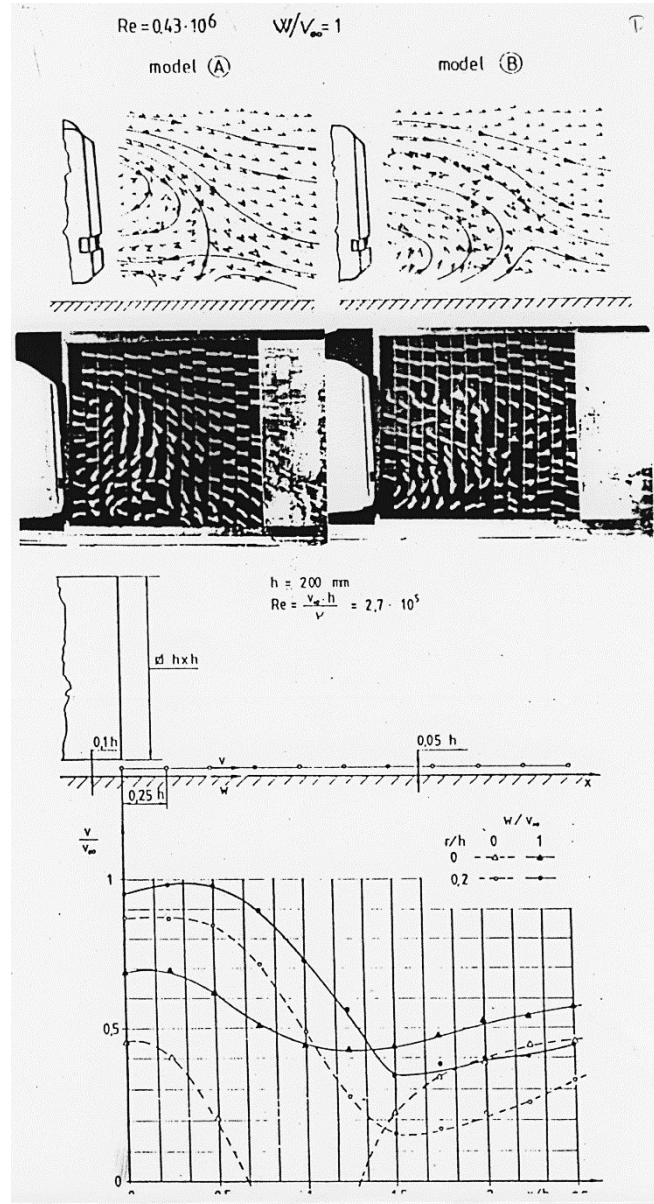


SARASODÁS

Hátfal – áramlás a nyomban

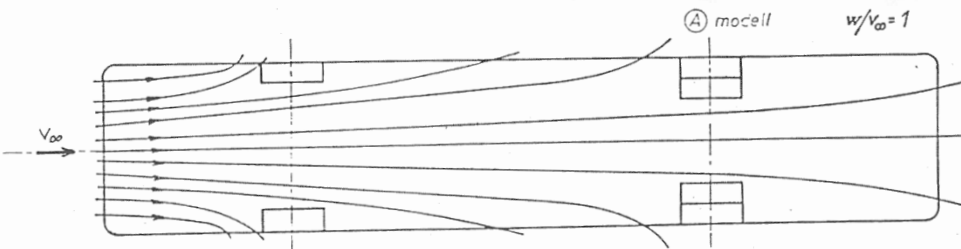
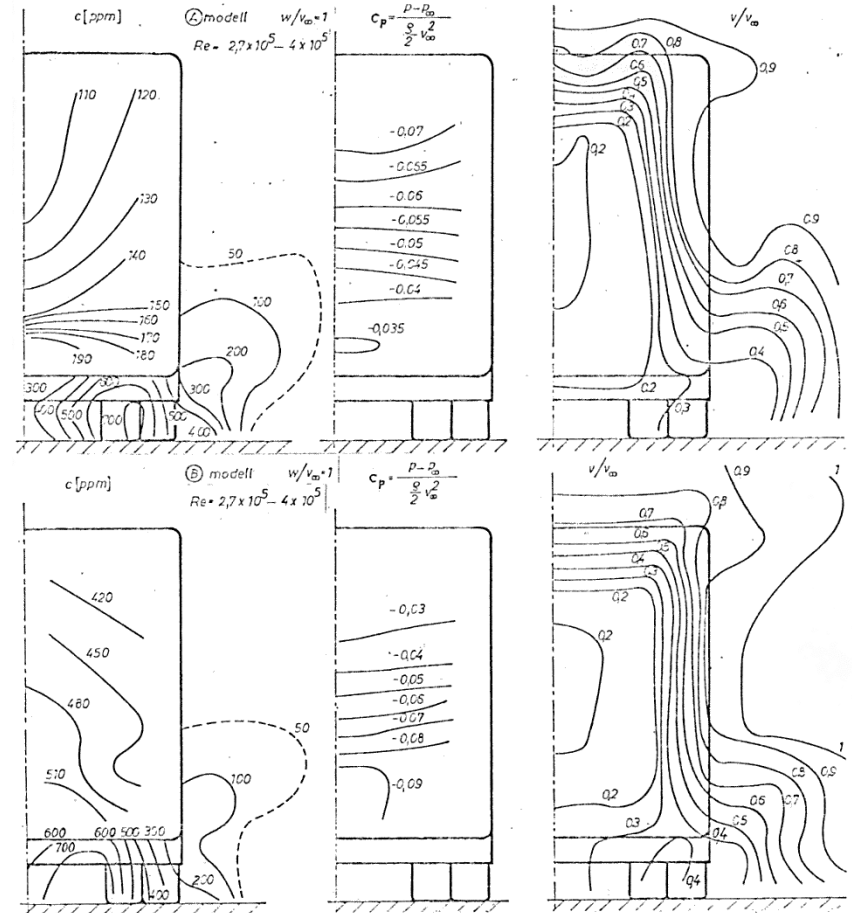
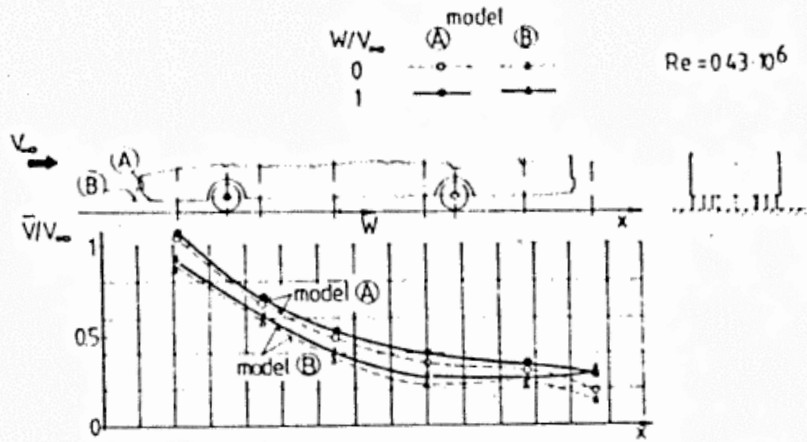
Kedvező

Kedvezőtlen



SARASODÁS

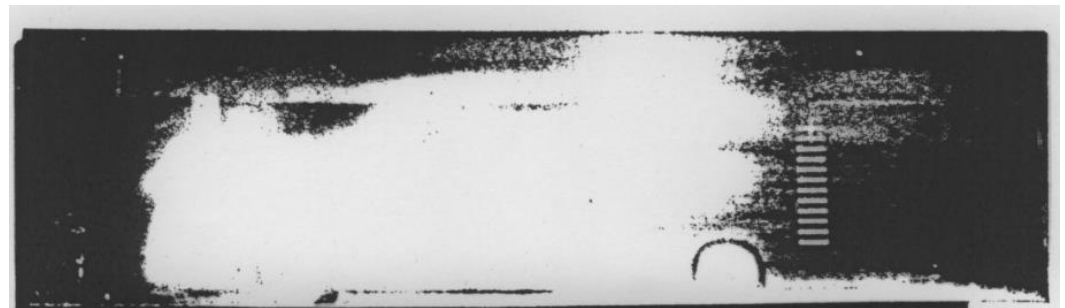
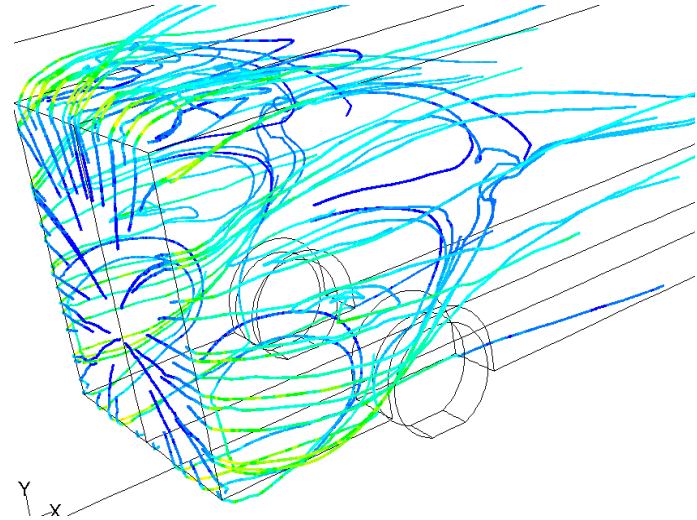
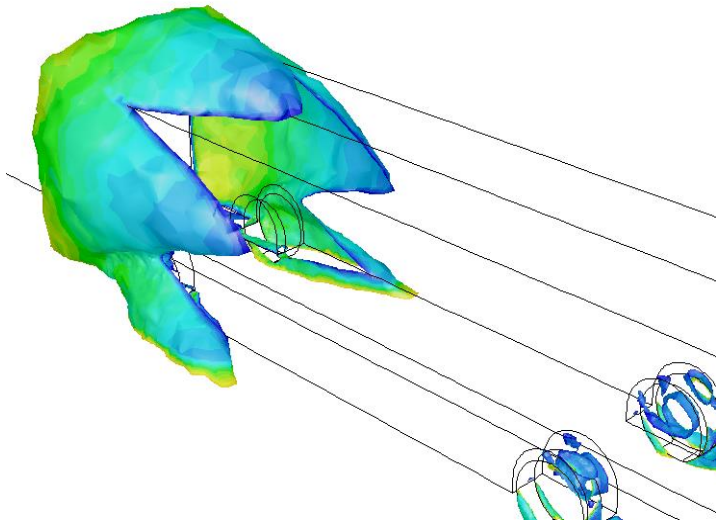
Oldalfal –karosszéria alól kiáramlás



SARASODÁS

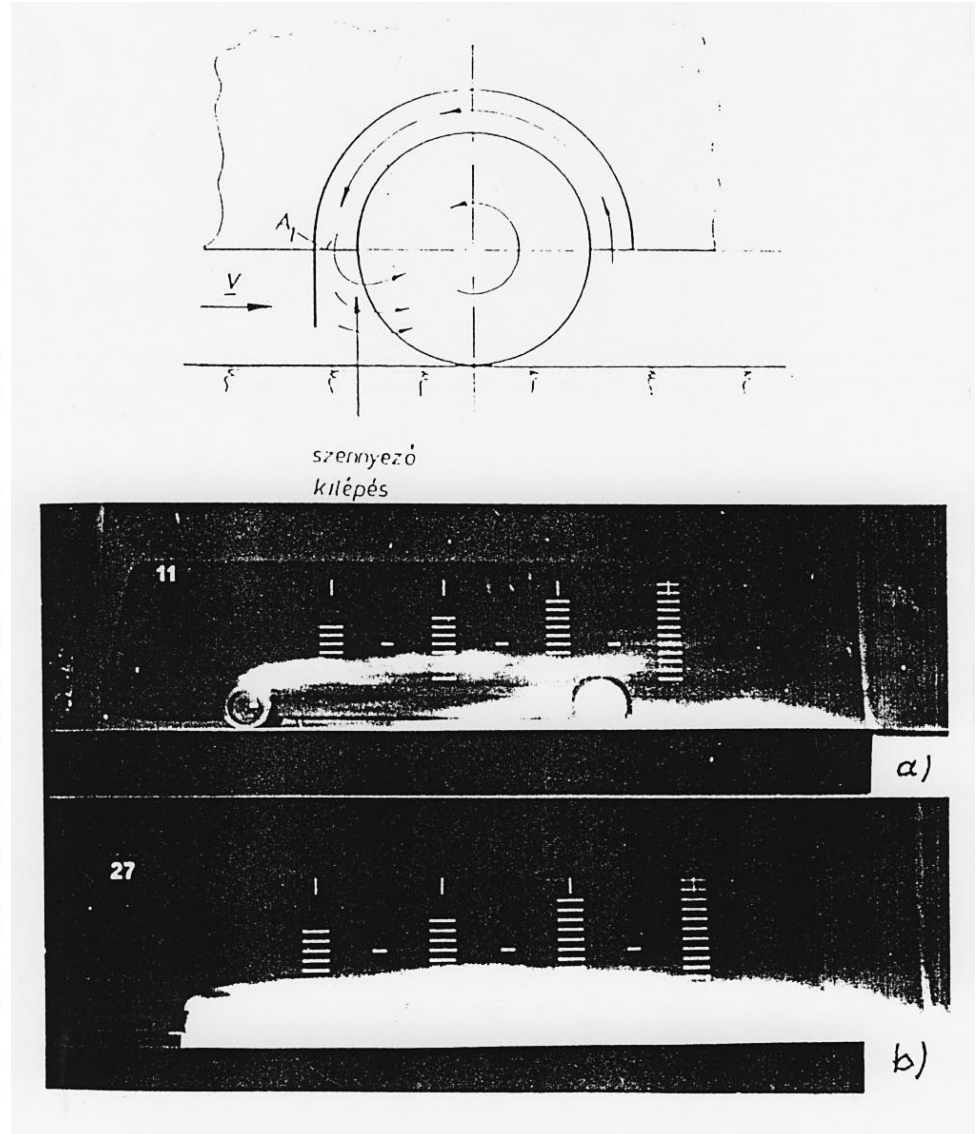
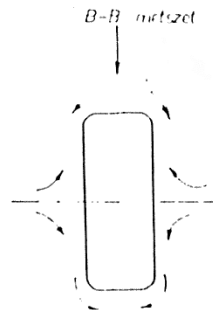
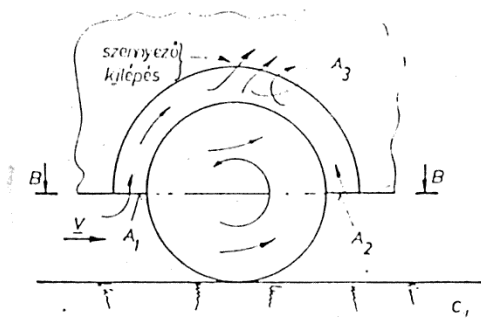
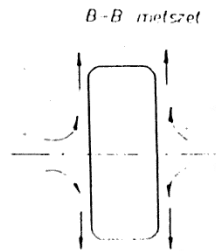
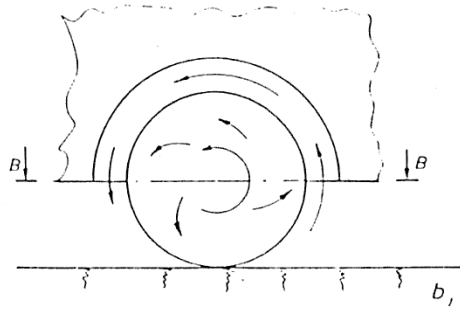
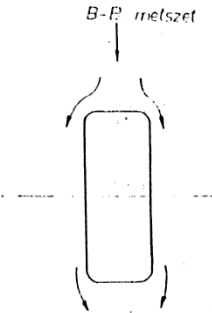
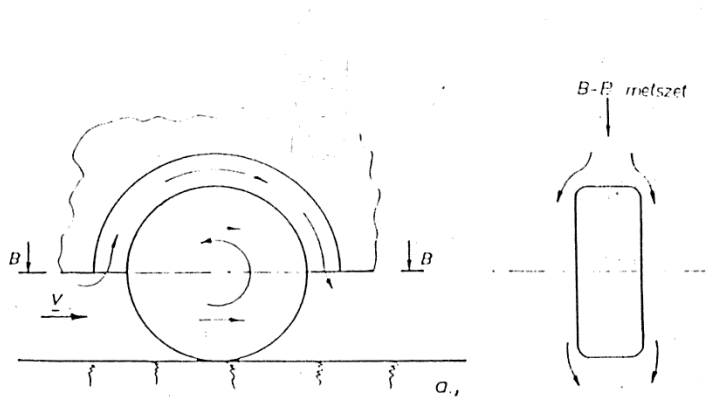
Oldalfal –kerékszokrányból kilépő szennyező

Ha az éles homlokfal mögött keletkező leválási buborék eléri a kerékkivágást: az egész oldalfal sarasodik.



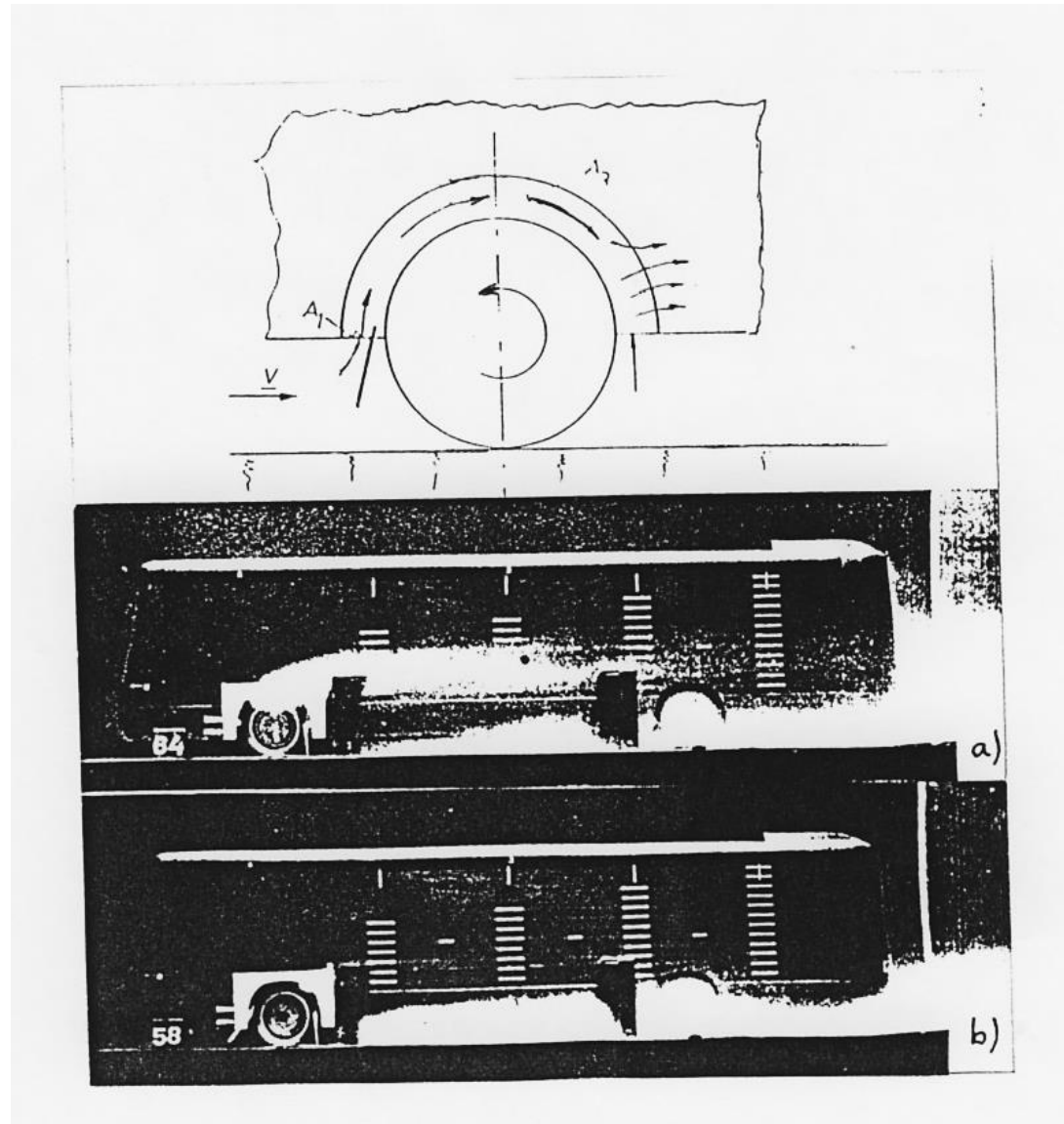
SARASODÁS

Oldalfal –kerékszekrényből kilépő szennyező



SARASODÁS

Oldalfal –kerékszékényből kilépő szennyező



A mérések összesítése

Karosszéria jellemző	Hátfal sárosodás			Oldalfal sárosodás			Ellenállás erő		
	Ront	Közöm- bős	Javit	Ront	Közöm- bős	Javit	Ront	Közöm- bős	Javit
homlokfal lökhárító lekerekítés			20-40 %	+!				← + →	
homlokfal felső él lekerekítés			7-11 %		+				27 %
homlokfal } oldalél } lekerekítés homlokfal } dőntés }		+				+!			8 %
hátsó fal oldalél lekerekítés			36-63 %		+			← + →	
hátsó fal felső él leke- rekítés /dómmal/			7-34 %		+		3-9 %		
hosszanti felső él alakja		+			+			+	
karosszéria alsó rész le- fedése elől			4-33 %			+			3-4 %
karosszéria alsó rész le- fedése közepén		← + →				+	0.5 %		
hátsó alsó terelőlemez h/H = 0.28			42~62 %		+		22,4 %		
homlokfal alatti spoiler	380 %					+!			5~9 %
terelő a kerékszekrények előtt	0-103 %					+!	1.4 %		
terelőlapát a hátfal fel- ső éle felett			94~98 %		+		23 %		