



拖車碟煞車軸產品簡報

北美重車工業巨擘  MERITOR 旗下歐規車軸品牌

報告人 至晟貿易

ARES

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關於



Meritor公司的總部位於美國密西根州，是年營業額**75億美金**，在全球**25個國家**擁有**120間工廠**，員工超過**36,500人**，頂級的全球運輸產業供應商。產品範圍涵蓋商用卡車、拖車、特種**OEM**、輕型車及相關的售後維修市場的系統整合，模組及零件。



全球分布

Brake Global Reach



ROR 鼓煞氣懸 & 碟煞系懸 系統

ROR Trailer Products

Air Disc Brake Axles



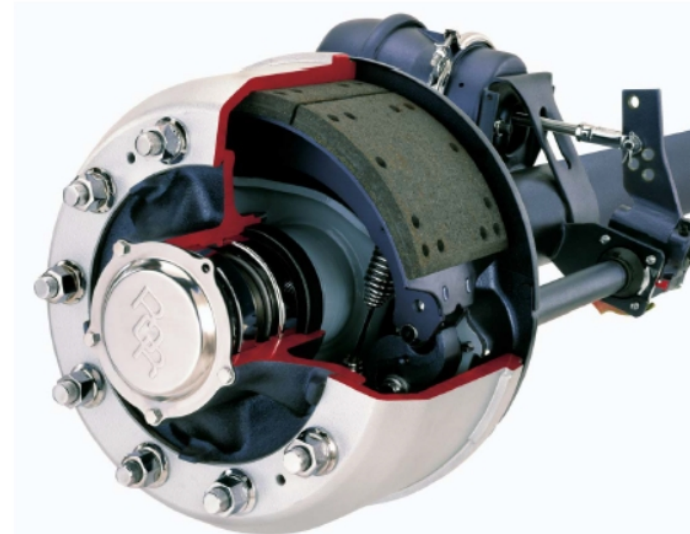
choose for reliability . . .
choose for quality . . .
choose for robustness . . .

. . . your profitability is our concern

ArvinMeritor.

ROR Trailer Products

Drum Brake Axles



choose for reliability . . .
choose for quality . . .
choose for robustness . . .

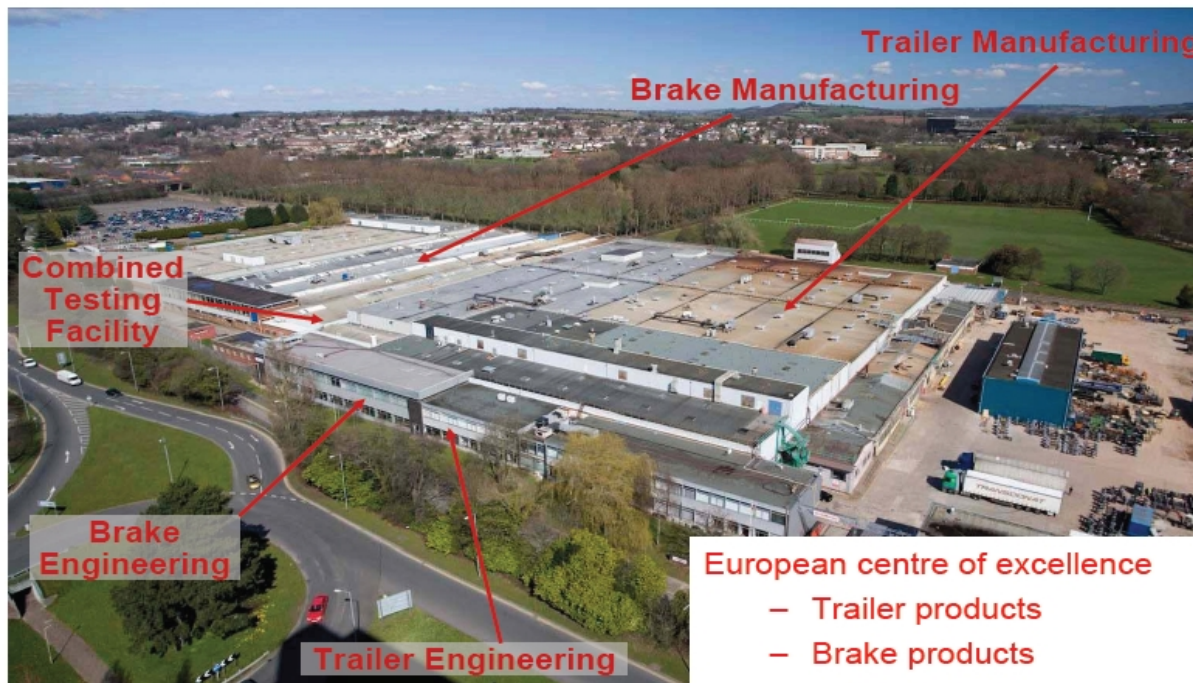
. . . your profitability is our concern

ArvinMeritor.

Meritor-ROR 英國碟煞技研及生產中心

50年來在尾車車軸，煞車及懸吊系統的經驗，製造出無懈可擊的拖車系統。在Meritor-ROR獨步全球超過20,000平方公尺的英國Cwmbran的技研中心裡，最新的設計被廣泛的測試及精煉。這些資源使得Meritor-ROR的科技領先業界、生產無可匹敵的產品

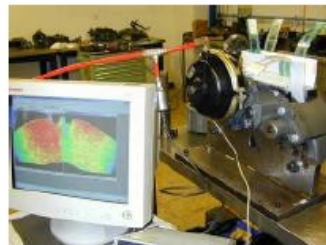
Cwmbran Technical Centre



Meritor-ROR 英國碟煞技研及生產中心 各式測試設備

Engineering Process and Tools

- Brake Test Facilities
 - 6 Static Torque (Chucker) Rigs
 - 3 Dynamometers (RDW accreditation)
 - Multiple static stroking stations
 - Vibration Test Rig
 - Environmental Chambers
 - Temperature, Humidity, Salt Spray & Slurry
 - Servo hydraulic fatigue rigs
 - Vehicle telemetry for Data Acquisition
 - Spectral Analysis for noise solutions



ArvinMeritor.

Meritor-ROR 碟煞家族及產品演進

Extensive Disc Brake Experience



Meritor
ADB1560

1981



Meritor
RADB2000

1992



Meritor
DX

1997



LucasVarity
Duco

1999



Lucas Girling
D2

1988



Lucas Girling
Lisa

1994



Lucas
Elsa1

1996



LucasVarity
Elsa2

2000



Meritor
ELSA225/ 195

30 Years of Disc Brake Engineering

ArvinMeritor

ROR 車軸使用的碟煞和Renault
& Volvo 使用之產品為同一系列，
均為MERITOR生產

ROR 與 Renault 於全歐洲攜手合
作提供24小時無休的服務

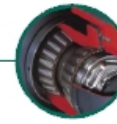
Disc Brake current ELSA Family

225E, 225L and 195M as fitted to all
Volvo and Renault Heavy Trucks



ROR Trailer Products

Compatico Trailer System developed with Renault Trucks



ArvinMeritor.

ROR產品保證來自歐洲

所有ROR車軸和氣懸系統套件，全部來自英國和義大利原廠生產製造，直接供應客戶或車體廠，絕無來自不明國家的相仿產品，或因次級產品魚目混珠，造成您使購買和使用上的風險。

ROR碟煞保證原廠製造

大多數車軸製造商，並沒有自有的碟煞產品，及車軸輪殼（HUB），而是向第三方購入安裝為主。但Meritor ROR 車軸是使用自家所生產的Meritor碟煞，早已被包括RENAULT /VOLVO / SCANIA /MAN /IVECO 這些頂尖歐洲重車全面採用。其設計及生命週期使用成本，已被充分的驗證，可以勝任車頭的煞車任務，在拖車上表現更是傑出。

符合認證標準

唯一取得台灣車輛研究測試中心/安審中心（ARTC /V SCC），**碟**
煞車軸測試合格的動態煞車測試報告，並授權讓車體打造業者申請審查報告的使用，也因為我們合格的車軸煞車系統，讓您在路上奔馳時，有最完整的保障。

三軸 22 噸、二軸17.5噸 完全達成法規規定

報告編號: A99CC628-421 附件: 02 / 02
(Application Index) (Attachment)

基本資料			
申請廠商(者)名稱	至遠企業股份有限公司		
申請法規項目名稱	☐ 動態煞車(車輛安全檢測基準第四十二項:自 96 年 1 月 1 日起實施) ☒ 動態煞車(車輛安全檢測基準第四十二項:自 100 年 1 月 1 日起實施)		
車輛廠牌	---	車輛型式系列	---
車種代號	---	軸組型態	---
底盤車廠牌	---	底盤車型式系列	---
底盤車軸組型態	---		
拖車煞車總成廠牌	至晟	拖車煞車總成型式系列	ART3
拖車煞車總成軸組型態	後雙軸		

圖面或照片及功能、規格說明資料^{*1*2}

<動態煞車>

1.圖面或照片:同檢測報告所記載(編號: A98VCAIG)。

2.功能、規格:同檢測報告所記載(編號: A98VCAIG)。
本報告測試件型式 ARTAFP3A 為碟式煞車

3.同系列內與檢測件檢測報告記載之規格差異:
☒ 無。
☐ 有,說明如下:

4.請說明於產品上辨識申請型式的方式及樣式(例如:廠牌、標誌、型號、產品序號(P/N)等):
同檢測報告所記載(編號: A98VCAIG)。

備註欄

^{*1}各型式中有任何差異均須明列宣告,若未據實以報,而致影響結果,自行負責。
^{*2}申請者依「檢測代表件選取原則」自行選定最嚴苛之檢測代表件型式,即為所檢附之檢測報告所載型式。
^{*3}總重(公噸): --- (M、N、O1、O2、O3(全拖車)、O4(全拖車)類車輛適用)
 總聯結重量(公噸): 43 (M、N、O1、O2、O3(半拖車)、O4(半拖車)類車輛適用)
 前/後軸組設計荷重(公噸): --- (M、N 類車輛適用)
 廠商宣告全負載軸重(公噸): 22 (O 類車輛適用)

報告編號: A99CC628-421 附件: 02 / 02
(Application Index) (Attachment)

基本資料			
申請廠商(者)名稱	至遠企業股份有限公司		
申請法規項目名稱	☐ 動態煞車(車輛安全檢測基準第四十二項:自 96 年 1 月 1 日起實施) ☒ 動態煞車(車輛安全檢測基準第四十二項:自 100 年 1 月 1 日起實施)		
車輛廠牌	---	車輛型式系列	---
車種代號	---	軸組型態	---
底盤車廠牌	---	底盤車型式系列	---
底盤車軸組型態	---		
拖車煞車總成廠牌	至晟	拖車煞車總成型式系列	ART2
拖車煞車總成軸組型態	後雙軸		

圖面或照片及功能、規格說明資料^{*1*2}

<動態煞車>

1.圖面或照片:同檢測報告所記載(編號: A98VCAIF)。

2.功能、規格:同檢測報告所記載(編號: A98VCAIF)。
本報告測試件型式 ARTAFP2A 為碟式煞車

3.同系列內與檢測件檢測報告記載之規格差異:
☒ 無。
☐ 有,說明如下:

4.請說明於產品上辨識申請型式的方式及樣式(例如:廠牌、標誌、型號、產品序號(P/N)等):
同檢測報告所記載(編號: A98VCAIF)。

備註欄

^{*1}各型式中有任何差異均須明列宣告,若未據實以報,而致影響結果,自行負責。
^{*2}申請者依「檢測代表件選取原則」自行選定最嚴苛之檢測代表件型式,即為所檢附之檢測報告所載型式。
^{*3}總重(公噸): --- (M、N、O1、O2、O3(全拖車)、O4(全拖車)類車輛適用)
 總聯結重量(公噸): 40 (M、N、O1、O2、O3(半拖車)、O4(半拖車)類車輛適用)
 前/後軸組設計荷重(公噸): --- (M、N 類車輛適用)
 廠商宣告全負載軸重(公噸): 17.5 (O 類車輛適用)

測試車上的碟式煞車



圖3 ARTAFP3A 右後45°視圖

測試車輛



圖6 ARTAFP3A 第一軸煞車型式(碟式)

測試車上的ABS配置



圖5 ARTAFP3A 煞車總泵&荷重比例閥&防鎖死煞車系統(ABS)

MeritorROR 碟煞，帶給您的好處

- 煞車作動非常迅速，大幅縮短停止距離。若同時安裝ABS及EBS系統，效果將更顯著。
- 碟煞具有穩定性的優點。能夠容忍更惡劣的磨擦水準改變，適用於所有的環境。且可以在重踩煞車的狀況下，增加穩定性。
- 相較於鼓式煞車更換來令片時的大費周章，碟煞來令片更換的時間相對極短，節省維修人力成本。
- 鼓式煞車眾所皆知的缺點，就是在連續或持續的重踩煞車下，會導致溫度上升使得煞車效能急遽降低。碟煞則有著極佳的制動效能。降低熱衰竭之影響，增加來令片壽命，提升煞車力。
- 散熱快，可大幅增加輪胎使用壽命。
- 直接的分幫和定位調整，給駕駛一個優越的煞車感覺。
- 自動煞車調整，增加行車安全，並可延長來令片使用壽命減少進廠次數。
- 簡易的磨耗指示監測，方便駕駛及車隊管理人員作業。
- 若拖車頭為碟煞配置，而尾車為鼓煞時常會導致拖車頭煞車損耗加速，增加營運成本。

碟煞煞車距離較短的實證(原文)



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Test results support advantages of air disc brakes over drum brakes

[Trailer/Body Builders](#)

Mon, 2003-12-01 12:00

Bendix Commercial Vehicle Systems LLC, a member of the Knorr-Bremse group, has released test data that confirms its current generation air disc brake product has performance advantages over S-Cam drum brakes.

The data was part of a presentation given at the Society of Automotive Engineers (SAE) International Truck and Bus Meeting and Exhibition in Fort Worth TX recently.

Eighty-four percent of states in the United States have commercial vehicle speed limits in the range of 65 to 75 miles per hour. In light of this, Bendix has been conducting tests of air-disc-braked vehicles and drum-braked vehicles at a range of legal speeds up to 75 mph.

Results showed that performance advantages of Bendix air disc brakes over drum brakes were even more pronounced at the higher legal speeds.

In the testing sequence, two tractor-trailers were driven side-by-side on a closed test track with simultaneously applied full brake pressure to stop the vehicles at 75 mph. One tractor was equipped with a typical S-Cam brake setup, including 15" x 4" front brakes and 16.5" x 7" rear brakes. The other test tractor had front and rear axle Bendix ADB225 air disc brakes with 17" rotors.

Ron Plantan, principal engineer for Bendix air disc brakes, said, "During the side-by-side testing, data showed the stopping distances for the Bendix air disc brake-equipped truck was within the range of 305 to 325 feet. The drum brake-equipped truck stopped in the range of 450 to 518 feet initially when cold, but as the drums heated up, the stopping distances became progressively longer. Stopping distance for the hot drum brake-equipped vehicle exceeded 750 feet, while the air disc brakes consistently stopped at around 320 feet.

"The performance advantages for air disc brakes at higher speeds are particularly noteworthy when considering that during nighttime driving, low-beam headlights only provide 350 feet of visibility," said Plantan. "This is within the range of the air disc brakes' ability to stop a vehicle, but is not the case for drum brakes."

At 60 mph, the air disc brake-equipped truck stopped in the range of 185 to 210 feet in both the hot and cold brake temperature conditions. The drum brake-equipped truck stopped in the range of 255 to 292 feet with cold brakes and more than 425 feet with hot brakes.

Source URL: <http://trailer-bodybuilders.com/archive/test-results-support-advantages-air-disc-brakes-over-drum-brakes>

<http://trailer-bodybuilders.com/print/archive/test-results-support-advantages-air-disc-brakes-over-drum-brakes?eid=forward>

碟煞煞車距離較短的實證(譯文)

測試資料證明碟煞對比鼓煞的優越性

BENDIX 為 KNORR集團旗下一員，此為其所作碟煞與鼓煞的比較實驗。
此資料也於全美汽車工程師大會中發表。

84%的商用重車於美國的行車速度為65-75英里(100-120)公里，本實驗也設定此速度
測試顯示碟煞的優秀表現，而在法定速度的上限時更加凸顯。

測試方法為將兩台分別配備鼓式煞車(420mm x180mm)及碟式煞車(180mm碟盤)於車道上
並行，當時速到達120km時同時煞車。

當煞車溫度低時，鼓煞停車距離為450-518 英尺(15-17米)，碟煞為305-325英尺(10-11米)

當煞車溫度高時，鼓煞停車距離顯著增為為750 英尺(25米)，碟煞則保持為320英尺(10.5米)
值得提醒注意的是，夜間行駛時，近光燈的照明距離為約12米，此距離為碟煞的有效煞車，
距離，但鼓煞則無法煞停。

當時速為60英里(96公里)時，鼓煞的煞車距離為冷車255-292英尺(8-10米)，煞車鼓昇溫後
就拉長到425英尺(14米)，而碟式煞車的煞車距離則保持為185-220英尺(6-7.5米)，不隨溫度
改變而改變。

碟煞(車頭)和鼓煞(尾車)一起使用的實驗報告(原文)

TMD Friction position paper

“Air Disc and Drum Brake Compatibility and Auxiliary Retarders”

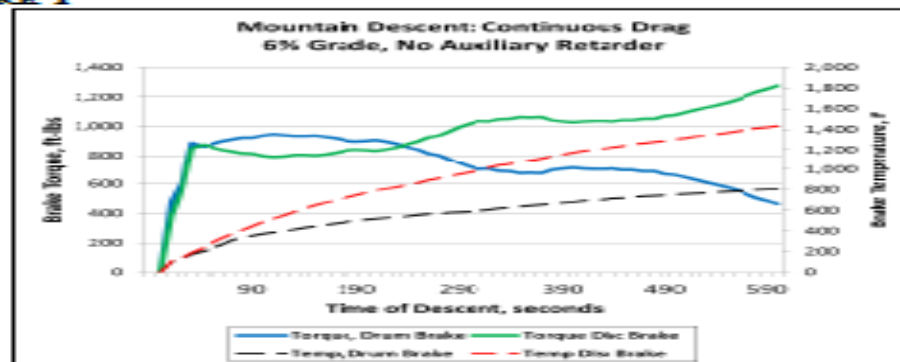
Disc brakes are the future of braking on heavy-duty vehicles in North America. They have less fade, more consistent torque output, and better in-stop characteristics. With air disc brakes becoming more common in North America, fleet operators however need to be aware that disc brakes, with their improved performance, should not be considered as a substitute for auxiliary retarders. Retarders are as important as ever, or possibly even more important, on vehicles that combine disc and drum brakes and operate on downgrades.

Disc and drum brakes react differently to elevated temperatures, because of how they mechanically apply the friction material to the rotor or drum. In addition, disc brakes use semi-metallic linings while drum brakes use organic linings. Because of these design differences, vehicles where discs and drums are both utilized on the major load bearing axles can encounter high brake temperature operating conditions that will cause the air disc brake to “take over” the braking workload from the drum brake.

An example vehicle would be a tractor/trailer with air discs on the drive axles, and drum brakes on the trailer axles. If not properly equipped with a retarder, the vehicle could see high-brake temperature differentials on long downgrades that can lead to excessive disc pad and drum lining wear and drum/rotor cracking. The exception would be when discs are installed only on the steer axle, as this axle generally has higher “crack” pressures, smaller actuating air chambers, and better cooling airflow that would reduce these concerns.

Recent testing by TMD has confirmed this issue of high temperature disc/drum compatibility in dynamometer simulations of an 80,000 lb. tractor-trailer. A vehicle, not equipped with a retarder, in descending a 6 percent grade will experience a workload shift from the drum brakes to the disc brakes as elevated temperatures are reached. The disc brakes are shown to reach temperatures of greater than 1,400°F, while the drum brakes heat up to 800°F (Fig 1). The semi-metallic linings used on disc brakes are made to work at high temperatures, but these temperature ranges are simply too high for reasonable operating conditions.

FIGURE 1



<http://blogsdir.cms.rrcdn.com/11/files/2013/06/TMD-Friction-paper.pdf>

碟煞由於其諸多特性，將成為美國的主流。

若碟煞和鼓煞一起使用，鼓煞的工作負荷將轉移至碟煞上

如果車頭是碟煞，尾車是鼓煞，在沒有其他減速設備的情況下，會造成來令片異常磨損和剎車鼓破裂的可能。

“Air Disc and Drum Brake Compatibility and Auxiliary Retarders”

Disc brakes are the future of braking on heavy-duty vehicles in North America. They have less fade, more consistent torque output, and better in-stop characteristics. With air disc brakes becoming more common in North America, fleet operators however need to be aware that disc brakes, with their improved performance, should not be considered as a substitute for auxiliary retarders. Retarders are as important as ever, or possibly even more important, on vehicles that combine disc and drum brakes and operate on downgrades.

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由TMD公司的實際動態煞車測試中，確認了若無其他輔助煞車時，拖車頭配置為碟煞，尾車為鼓煞的搭配會產生高溫。

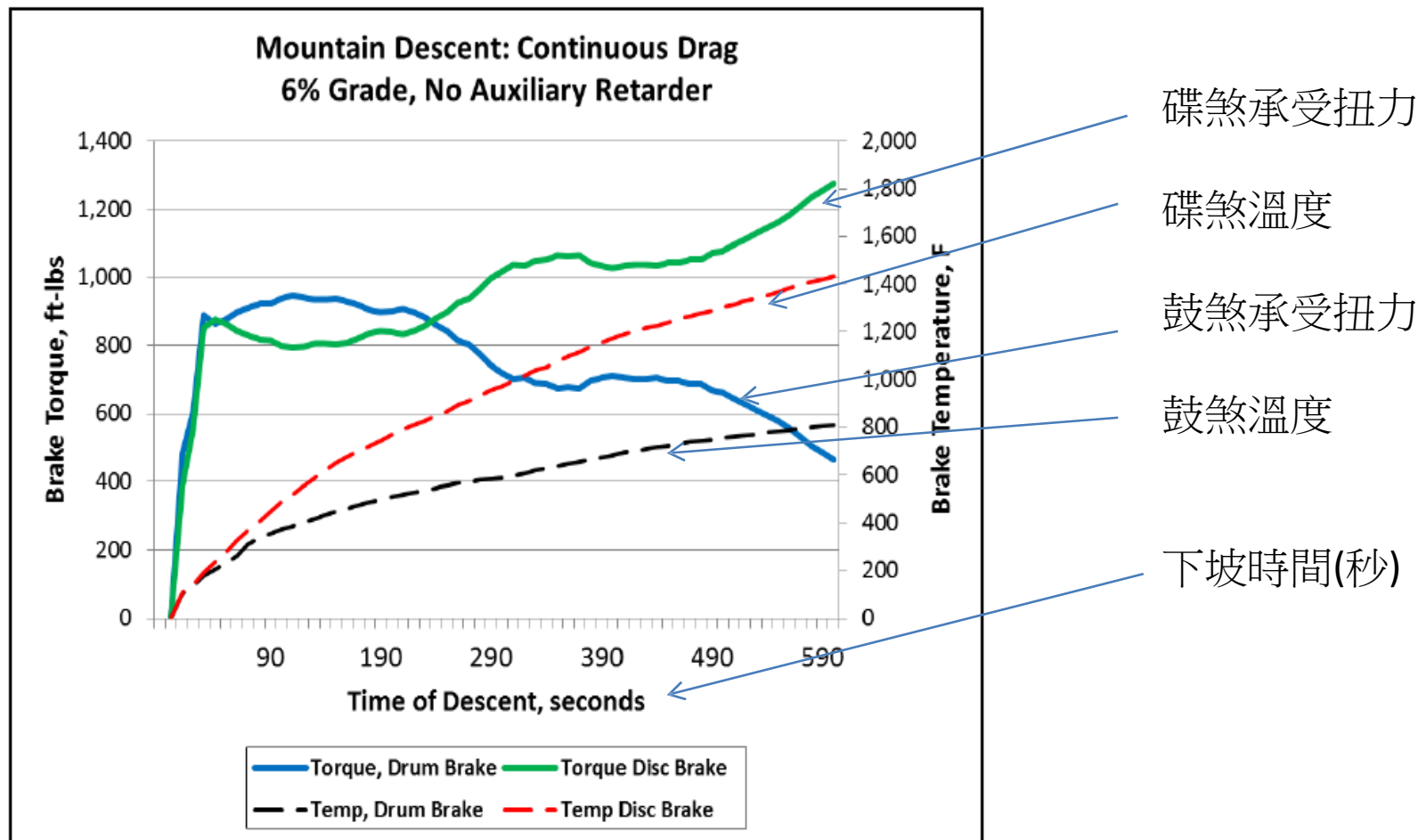
此測試為將一台連結總重36噸的半拖車，在斜度為6度(約同林口坡)的坡度下坡時，由於煞車負擔轉移到前方碟煞，因此碟煞溫度升高到1400°F(760 °C)，而鼓煞的溫度只有800 °F(426 °C)

雖然碟煞來令片一般耐熱性較佳，但此一溫度顯然比一般合理的操作溫度來的更高。

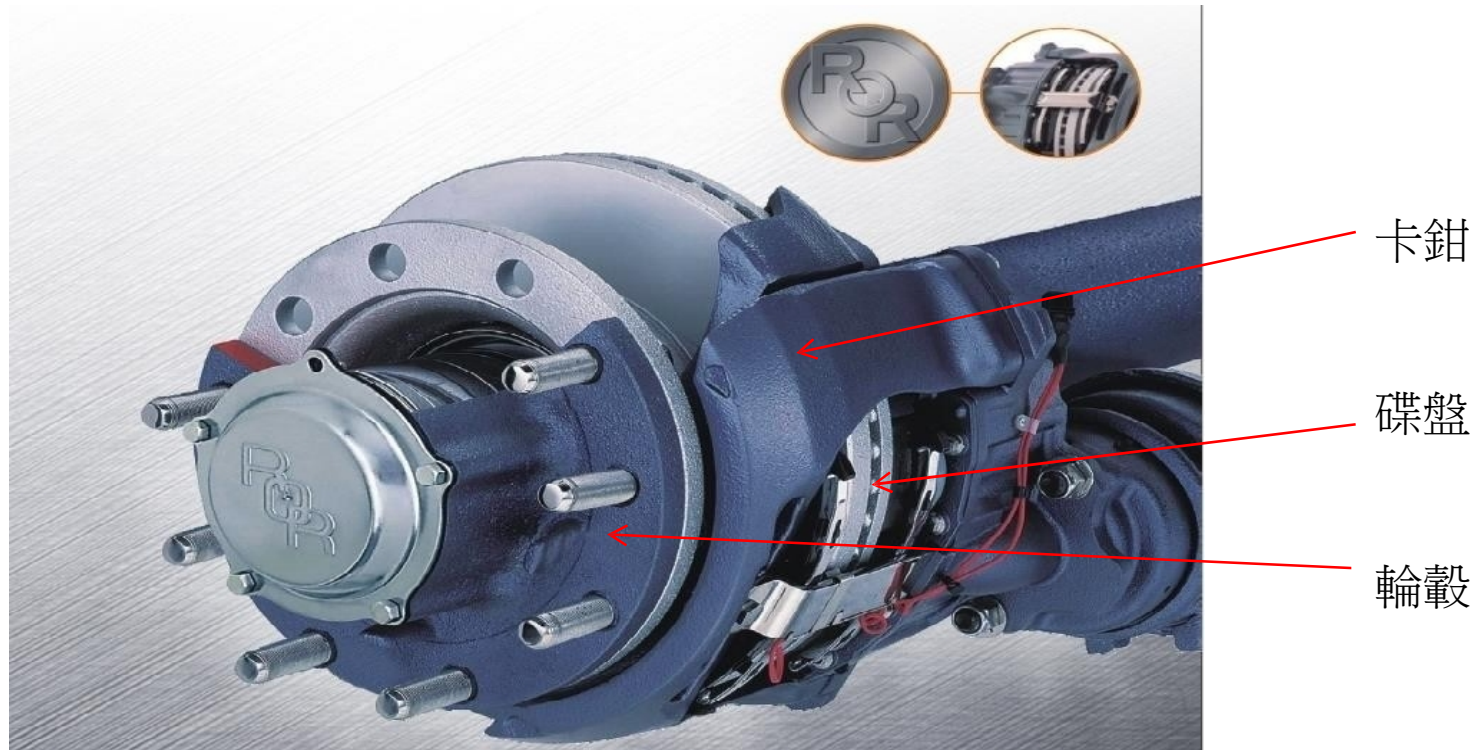
碟煞(車頭)和鼓煞(尾車)一起使用的實驗報告(圖解)

於6度的斜坡持續煞車時的狀況

FIGURE 1



碟煞設計可於行駛時避免輪胎脫落(飛輪)風險



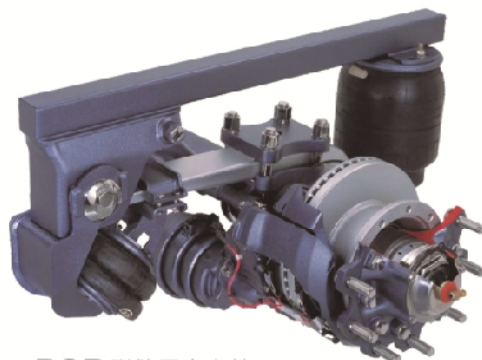
車輛行駛中若發生車軸的輪轂及軸承損壞(咬死)，一般鼓煞會有輪胎脫落(飛輪)的風險，這是因為鼓式煞車的煞車鼓連同輪轂直接脫落而導致的常見損壞，並為主要的事故原因。

碟煞的機構設計，碟盤包夾於卡鉗內，而碟盤又與輪轂緊密結合，故輪轂及軸承損壞時輪轂不致於直接脫落，可以大幅度降低意外產生時的車輛及道路風險

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