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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM,

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Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

(54) **Title:** METHOD AND APPARATUS FOR TORQUE CONTROL OF AN ELECTRICAL MACHINE

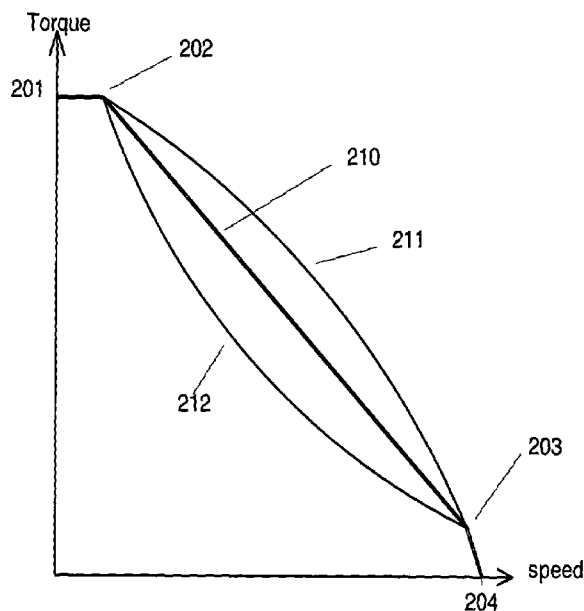


Figure 2

(57) **Abstract:** A control system for an electrical machine drive system which actively controls the machine excitation during conditions of rapid acceleration or deceleration to bring the machine to rest at the point when a specified torque or force has been applied to a mechanical load. This is achieved without requiring any load torque transducer and automatically compensates for inertial energy in an active manner so that when the electrical machine comes to rest the load which has been applied is close to the specified value, irrespective of the rate of change of speed which has occurred. The system comprises an electrical machine, a mechanical drive mechanism connected between the output of the electrical machine and the load, a circuit to supply current to one or more of the windings of the electrical machine, the torque controller having a function of expected load torque variation with electrical machine speed and involving the steps of monitoring the electrical machine speed to calculate rate of change of speed; estimating inertial torque of the electrical machine system; estimating the electrical machine torque from measurements of currents and/or voltages; estimating load torque; calculating a load torque error between the estimated load torque and expected load torque obtained from the function of expected load torque variation evaluated at the instantaneous electrical machine speed and using the load torque error to increase or decrease the electrical machine torque.





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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
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ADD. G05D17/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02P G05D B25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	the whole document	8,9
X	EP 2 031 363 A1 (ROCKWELL AUTOMATION TECH INC [US]) 4 March 2009 (2009-03-04) abstract; figure 1	1,10
Y	WO 98/47665 A1 (ATLAS COPCO TOOLS AB [SE]; GILES MARTIN ERIC [SE]; HANSSON GUNNAR CHRI) 29 October 1998 (1998-10-29) abstract; figures 1-4	8,9
A	US 5 315 501 A (WHITEHOUSE HUGH L [US]) 24 May 1994 (1994-05-24) abstract	1-10

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See patent family annex.

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Date of the actual completion of the international search 14 June 2013	Date of mailing of the international search report 28/06/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Zeng, Wenyan
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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