EUROMAP 45	PROTOCOL FOR COMMUNICATION BETWEEN BLOW MOULDING MACHINES AND A CENTRAL COMPUTER

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This recommendation was prepared by the Working Group "Blow Moulding Machines" of EUROMAP.

Contents

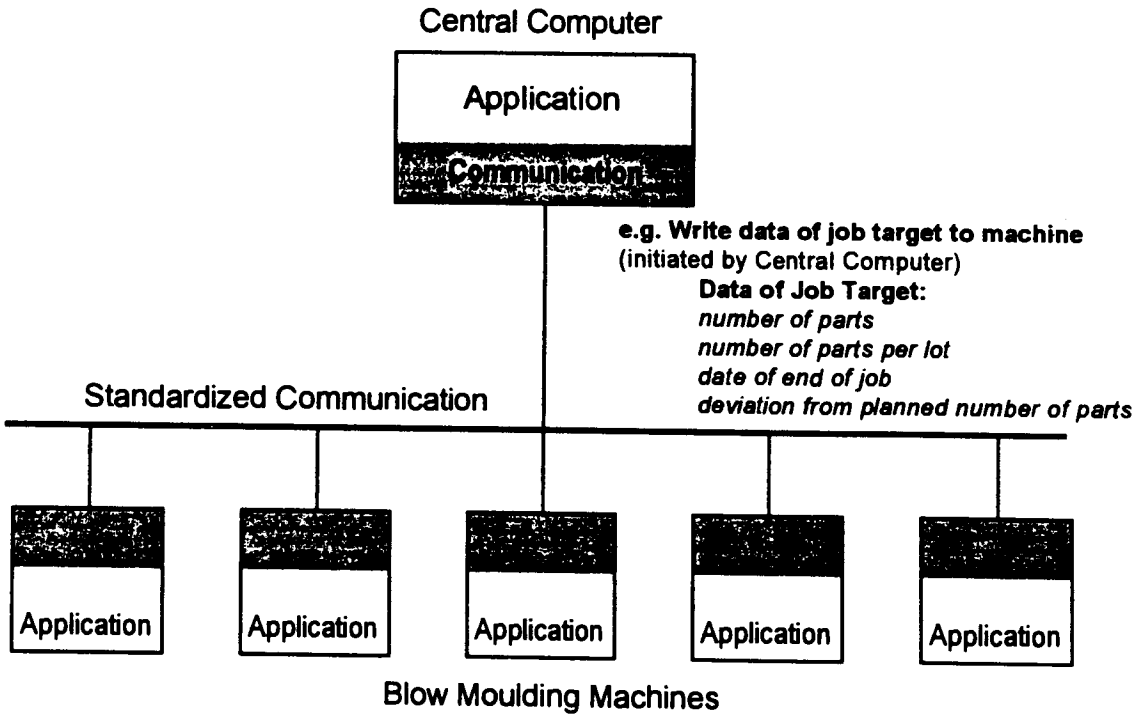
1. General Specifications

This part describes the requirements of the Blow Moulding Machine Application with respect to the communication between a Blow Moulding Machine and a central computer, the used standardized communication network, the required communication functions and the data exchanged between the Central Computer and the Blow Moulding Machines

1.1 Specification of EUROMAP 45 Topology

Blow Moulding Machines are connected via a standardized communication network to a central computer in order to exchange data (machine data, job related data, production status data, alarm data, process data, profiles, data sets...) between machines and a central computer.

The topology is as follows:



Part 1.2 specifies the standardized communication network and part 1.3 the supported communication functions. Part 2.1 gives an overview of all EUROMAP 45 telegrams grouped in three categories and part 2.2 specifies all data to be exchanged e.g. Job Target as depicted in the figure above in an abstract way i.e. the notation used represents the application specific information independent of any encoding information. The formal specification using a standardized method is defined in part 3.2.

1.2 Communication Network

The ISO Reference Model for Open Systems Interconnection (OSI) has been defined to form a framework for the development of communication protocol standards. Layer 1 to 4 cover reliable data transmission with error detection and correction, and layers 5, 6 and 7 govern the application oriented dialogue between users.

The Manufacturing Message Specification (MMS, ISO 9506) is the most important part of industrial communication to reduce the investment of building homogeneous automation systems using and integrating heterogeneous devices. MMS is the main application standard of MAP. MMS specifies more than 80 Services using the provided network functionality. The network itself is hidden to the application.

More important than a unique network is a unique application layer for different network types and different applications. The MMS interface is the key issue in future communication systems.

EUROMAP 45 uses the following Local Area Network to link devices: IEEE 802.3 (ISO 8802-3) Carrier Sense Multiple Access with Collision Detection (CSMA/CD, Ethernet), operating at 10 MBit per second with 500 m cable segments.

One basic idea of MAP/MMS is to support and promote interworking between controllers or devices in a heterogeneous system environment for distributed manufacturing automation based on a selection of useful OSI standards.

EUROMAP 45 uses a subset of proven MAP/MMS specification.

1.3 Communication Functions supported

The selected subset of MMS functions supports communication in the EUROMAP 45 environment between programmable devices and other intelligent devices, e.g. Personal Computer.

These functions are:

Basic functions

To communicate between the central computer and the machines basic functions e.g. connection establishment, identify machine or get status of machine are supported.

Variable access

Functions comparable with variable access in high-level computer languages (Read, Write, Information Report, Get Variable Access Attributes) are used e.g. to write a job definition from the central computer into a machine, to read job status or to receive specific profiles from a machine. The structures of these data are defined in variable objects. Reading and writing of data is initiated by the central computer, reporting data from a machine to the central computer is initiated by a machine.

2. Telegram Overview

2.1 Telegram List

EUROMAP 45 telegrams to be exchanged between the Central Computer and the Blow Moulding Machines are as follows:

	transfer at start of new job	cyclic driven transfer class	event driven transfer
Machine Identification	x		
Job Definition	x		
Job Target	x		x
Job Status 1			x
Job Status 2			x
Production Control Command	x		
Production Status			x
Machine Status			x
Ancillary Equipment Status			x
Alarms			x
Operator Identification			x
Time and Date from Central Computer	x		
Reinitialization of Production Counters after Machine Breakdown	x		
Actual Material Consumption for Job			x
Setpoint of Part Quality Parameters			x
Actual Values of Part Quality Parameters		x	
Actual Values of Process Parameters of extruder 1 - 8		x	
Actual Values of Process Parameters of head 1 - 3		x	
Actual Values of Process Parameters of station 1 + 2		x	
Limit Values of Process Parameters of Product of extruder 1 - 8	x		x
Limit Values of Process Parameters of Product of head 1 - 3	x		x
Limit Values of Process Parameters of Product of station 1+ 2	x		x
Profile y (x) with x equidistant from Machine		x	
Profile y (x) with x equidistant from Computer	x		x
Profile y (x) with x equidistant, Request from Computer			x
Profile y (x) from Machine		x	
Profile y (x) from Computer	x		x
Profile y (x), Request from Computer			x
ASCII Text Transfer	x		x
Machine Configuration	x		x
Job Configuration	x		x
Log In	x		x
Data Set	x		x
Transfer Task	x		x

2.2 Exchanged Data between Central Computer and Machines

2.2.1 Machine Identification (Read by computer)

The Machine Identification is composed of the following components:

EUROMAP-Protocol version
manufacturer code
machine code
code of extruder 1
code of extruder 2
code of extruder 3
code of extruder 4
code of extruder 5
code of extruder 6
code of extruder 7
code of extruder 8
code of blow head 1
code of blow head 2
code of blow head 3
code of station 1
code of station 2

2.2.2 Job Definition (Read/Write by computer, Reported by machine)

The Job Definition is composed of the following components:

job code
job text description
part code
part text description
colour
material code of extruder 1
material code of extruder 2
material code of extruder 3
material code of extruder 4
material code of extruder 5
material code of extruder 6
material code of extruder 7
material code of extruder 8
data set identification no. of processing data set
data set identification no. of machine data set

2.2.3. Job Target (Write by computer)

The Job Target is composed of the following components:

number of parts
number of parts per lot
date of end of job
deviation from planned number of parts

2.2.4 **Job Status 1** (Reported by machine)

The Job Status 1 is composed of the following components:

number of machine cycles
number of good parts
number of moulds in production
number of cavities in production

2.2.5 **Job Status 2** (Read by computer, Reported by machine)

The Job Status 2 is composed of the following components:

number of rejected parts since start of job concerning to reject reason code 1
number of rejected parts since start of job concerning to reject reason code 2
.
.
.
number of rejected parts since start of job concerning to reject reason code 99

2.2.6 **Production Control Command** (Write by computer)

The Production Control Command is composed of the following components:

remote operation mode "set up"
remote operation mode "start"
remote operation mode "stop"

2.2.7 **Production Status** (Reported by machine)

The Production Control Status is composed of the following components:

"Status Identification"
- *production*
- *set up production*
- *job target reached, production stopped*
- *production automatically interrupted*
- *production interrupted by operator*
- *waiting for job definition*
- *waiting for job start*

"Production"
- *parts under quality specs*
- *without ancillary equipment*
- *job target reached*
- *material change*
- *colour change*
- *reserved for EUROMAP*

"Set up production"
- *no reason specified*
- *set up of machine*
- *set up of ancillary equipment*
- *mould assembly*
- *mould disassembly*
- *change of extruder*
- *change of head*
- *change of die*
- *change of blow pin*
- *change of ancillary equipment*
- *change of material*
- *change of colour*
- *test run*
- *maintenance*
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

"Job target reached, production stopped"
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

"Production automatically interrupted"
- *personal safety conditions*
- *extruder fault*
- *head fault*
- *hydraulic unit fault*
- *clamping unit fault*
- *mould fault*
- *fault of transport device*
- *ancillary equipment fault*
- *processing fault*
- *job target reached*
- *others*
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

"Production interrupted by operator"
- *no reason specified*
- *general machine fault*
- *mechanical machine fault*
- *hydraulic machine fault*
- *electrical machine fault*
- *pneumatic machine fault*
- *mould fault*
- *fault of ancillary equipment*
- *lack of material*
- *processing fault*
- *no operator available*
- *job target reached*
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

"Waiting for job definition"
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

"Waiting for job start"
- *reserved for EUROMAP*
- *reserved for manufacturer's reasons*

2.2.8 Machine Status (Reported by machine)

The Machine Status is composed of the following components:

"Status"

automatic
semi automatic
manual
set up
standby

"Number of total machine cycles"

2.2.9 Ancillary Equipment Status (Reported by machine)

The Ancillary Equipment Status is composed of the following components:

"Code of ancillary equipment"
"Status"

automatic
manual
setup
standby

number of ancillary devices (repeated max. 20 times)

2.2.10 Alarms (Read by computer, Reported by machine)

The Alarms are composed of the following components:

personal safety conditions
extruder fault
head fault
hydraulic unit fault
clamping unit fault
mould fault
fault of part transport device
ancillary equipment fault
processing fault
others
alarm time

This alarm bit pattern is useful for transfer of appeared and disappeared alarms and for synchronisation purposes.

2.2.11 Operator Identification (Read by computer, Reported by machine)

The Operator Identification is composed of the following components:

operator 1
operator 2

2.2.12 Time and Date from Central Computer (Write by computer)

The Time and Date from Central Computer is composed of the following component:

time and date

2.2.13 Reinitialization of Production Counters after Machine Breakdown (Write by computer)

The Reinitialization of Production Counters after Machine Breakdown is composed of the following components:

number of total machine cycles
number of machine cycles of actual job
number of good parts of actual job

2.2.14 Actual Material Consumption for Job (Read by computer, Reported by machine)

The Actual Material Consumption for Job is composed of the following components:

actual material weight in hundredths of kg / lbs of
extruder 1
extruder 2
extruder 3
extruder 4
extruder 5
extruder 6
extruder 7
extruder 8

2.2.15 Setpoint of Part Quality Parameters (Read/Write by computer)

The Setpoint of Part Quality Parameters is composed of the following components:

"Part weight" *in tenth of g / hundredth of oz*
"Gross weight" *in tenth of g / hundredth of oz*
... up to 99 components

All quality parameter values are structured:
setpoint of part quality parameter
relative plus tolerance of part quality parameter
relative minus tolerance of part quality parameter

2.2.16 Actual Values of Part Quality Parameters (Reported by machine)

The Actual Value of Part Quality Parameters is composed of the following components:

"Part weight" *in tenth of g / hundredth of oz*
"Gross weight" *in tenth of g / hundredth of oz*
... up to 99 components

All actual quality parameters are structured:
part identification code
actual part quality parameter

2.2.17 Actual Values of Process Parameters of Extruder (Reported by machine)

The Actual Value of Process Parameters of Extruder is composed of the following components:

"Extruder identification"
"Part identification code"
"Parameter"

- *melt temperature of extruder in °C / °F*
- *melt pressure of extruder in bar / psi*
- *torque of extruder in Nm / Nm*
- *screw speed of extruder in min^{-1} / rpm*
- *cooling water temperature of feeding zone inlet of extruder in °C / °F*
- *cooling water temperature of feeding zone outlet of extruder in °C / °F*
- *cooling water flow of feeding zone of extruder in l/min / cfm*
- *actual value of throughput per hour of extruder in kg/h / lbs/h*

2.2.18 Actual Values of Process Parameters of Head (Reported by machine)

The Actual Value of Process Parameters of Head is composed of the following components:

"Head identification"
"Part identification code"
"Parameter"

- *melt temperature of head in °C / °F*
- *melt pressure of head in bar / psi*
- *hydraulic pressure of ejection in bar / psi*
- *ejection time of head in tenth of s / s*
- *ejection volume of head in tenth of l / cu.in.*

2.2.19 Actual Values of Process Parameters of Station (Reported by machine)

The Actual Value of Process Parameters of Station is composed of the following components:

"Station identification"
"Part identification code"
"Parameter"

- *blowing pressure air in bar / psi*
- *blowing pressure nitrogen in bar / psi*
- *blowing pressure fluorine in bar / psi*
- *blowing pressure CO_2 in bar / psi*
- *hydraulic pressure of clamping unit in bar / psi*
- *cooling water temperature of mould inlet of in °C / °F*
- *cooling water temperature of mould outlet of in °C / °F*
- *cooling water flow of mould in l/min / cfm*
- *cycle time in tenth of s / s*

2.2.20 Limit Values of Process Parameters of Extruder 1
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 1 is composed of the following components:

melt temperature of extruder in °C / °F
melt pressure of extruder in bar / psi
torque of extruder in Nm / Nm
screw speed of extruder in min^{-1} / rpm
cooling water temperature of feeding zone inlet of extruder in °C / °F
cooling water temperature of feeding zone outlet of extruder in °C / °F
cooling water flow of feeding zone of extruder in l/min / cfm
actual value of throughput per hour of extruder in kg/h / lbs/h

All parameter values are structured:
setpoint
lower limit value
upper limit value
lower warning value
upper warning value

2.2.21 Limit Values of Process Parameters of Extruder 2
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 2 is structured as defined in 2.2.20

2.2.22 Limit Values of Process Parameters of Extruder 3
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 3 is structured as defined in 2.2.20

2.2.23 Limit Values of Process Parameters of Extruder 4
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 4 is structured as defined in 2.2.20

2.2.24 Limit Values of Process Parameters of Extruder 5
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 5 is structured as defined in 2.2.20

2.2.25 Limit Values of Process Parameters of Extruder 6
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 6 is structured as defined in 2.2.20

2.2.26 Limit Values of Process Parameters of Extruder 7
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 7 is structured as defined in 2.2.20

2.2.27 Limit Values of Process Parameters of Extruder 8
(Read/Write by computer)

The Limit Value of Process Parameters of Extruder 8 is structured as defined in 2.2.20

2.2.28 Limit Values of Process Parameters of Head 1 (Read/Write by computer)

The Limit Value of Process Parameters of Head 1is composed of the following components:

melt temperature of head in °C / °F
melt pressure of head in bar / psi
hydraulic pressure of ejection in bar / psi
ejection time of head in tenth of s / s
ejection volume of head in tenth of l / cu.in.

All parameter values are structured:

setpoint
lower limit value
upper limit value
lower warning value
upper warning value

2.2.29 Limit Values of Process Parameters of Head 2 (Read/Write by computer)

The Limit Value of Process Parameters of Head 2 is structured as defined in 2.2.28

2.2.30 Limit Values of Process Parameters of Head 3 (Read/Write by computer)

The Limit Value of Process Parameters of Head 3 is structured as defined in 2.2.28

2.2.31 Limit Values of Process Parameters of Station 1

(Read/Write by computer)
The Limit Value of Process Parameters of Station 1 is composed of the following components:

blowing pressure air in bar / psi
blowing pressure nitrogen in bar / psi
blowing pressure fluorine in bar / psi
blowing pressure CO_2 in bar / psi
hydraulic pressure of clamping unit in bar / psi
cooling water temp. of mould inlet of in °C / °F
cooling water temp. of mould outlet of in °C / °F
cooling water flow of mould in l/min / cfm
cycle time in tenth of s / s

All parameter values are structured:

setpoint
lower limit value
upper limit value
lower warning value
upper warning value

2.2.32 Limit Values of Process Parameters of Station 2
(Read/Write by computer)

The Limit Value of Process Parameters of Station 2 is structured as defined in 2.2.31

2.2.33 Profile y(x) (x equidistant) from Machine (Reported by machine)

The Profile y(x) (x equidistant) from Machine is composed of the following components:

"Value Identification "
- *actual value*
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *wall thickness profile (vertical 1)*
- *wall thickness profile (vertical 2)*
- *wall thickness profile (vertical 3)*
- *wall thickness profile (vertical 4)*
- *wall thickness profile (vertical 5)*
- *wall thickness profile (radial 1)*
- *wall thickness profile (radial 2)*
- *ejection profile (head 1)*
- *ejection profile (head 2)*
- *ejection profile (head 3)*

"Part identification code"
"Time in tenth of seconds or length in mm"
"Profile" is defined by 32 - 128 values

2.2.34 Profile y(x) (x equidistant) from Computer (Write by computer)

The Profile y(x) (x equidistant) from Computer is composed of the following components:

"Value Identification "
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *wall thickness profile (vertical 1)*
- *wall thickness profile (vertical 2)*
- *wall thickness profile (vertical 3)*
- *wall thickness profile (vertical 4)*
- *wall thickness profile (vertical 5)*
- *wall thickness profile (radial 1)*
- *wall thickness profile (radial 2)*
- *ejection profile (head 1)*
- *ejection profile (head 2)*
- *ejection profile (head 3)*

"Time in tenth of seconds or length in mm"
"Profile" is defined by 32 - 128 values

2.2.35 Profile y(x) (x equidistant), Request from Computer (Write by computer)

The Profile y(x) (x equidistant), Request from Computer is composed of the following components:

"Value Identification "
- *actual value*
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *wall thickness profile (vertical 1)*
- *wall thickness profile (vertical 2)*
- *wall thickness profile (vertical 3)*
- *wall thickness profile (vertical 4)*
- *wall thickness profile (vertical 5)*
- *wall thickness profile (radial 1)*
- *wall thickness profile (radial 2)*
- *ejection profile (head 1)*
- *ejection profile (head 2)*
- *ejection profile (head 3)*

2.2.36 **Profile y(x) from Machine** (Reported by machine)

The Profile y(x) from Machine is composed of the following components:

"Value Identification "
- *actual value*
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *profile of mould closing slow down of station 1 (s(t))*
- *profile of mould closing slow down of station 2 (s(t))*
- *profile of mould closing slow down of station 1 (v(s))*
- *profile of mould closing slow down of station 2 (v(s))*
- *profile of blow pin movement of station 1 (s(t))*
- *profile of blow pin movement of station 2 (s(t))*
- *profile of blow pin movement of station 1 (v(s))*
- *profile of blow pin movement of station 2 (v(s))*
- *profile of blowing pressure of station1*
- *profile of blowing pressure of station2*

"Part identification code"
"Profile points x "
"Profile points y "

each profile is defined by 32 - 256 values

2.2.37 **Profile y(x) from Computer** (Write by computer)

The Profile y(x) from Computer is composed of the following components:

"Value Identification "
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *profile of mould closing slow down of station 1 (s(t))*
- *profile of mould closing slow down of station 2 (s(t))*
- *profile of mould closing slow down of station 1 (v(s))*
- *profile of mould closing slow down of station 2 (v(s))*
- *profile of blow pin movement of station 1 (s(t))*
- *profile of blow pin movement of station 2 (s(t))*
- *profile of blow pin movement of station 1 (v(s))*
- *profile of blow pin movement of station 2 (v(s))*
- *profile of blowing pressure of station1*
- *profile of blowing pressure of station2*

"Profile points x "
"Profile points y "

each profile is defined by 32 - 256 values

2.2.37 Profile y(x), Request from Computer (Write by computer)

The Profile y(x), Request from Computer is composed of the following components:

"Value Identification "
- *actual value*
- *set value*
- *positive tolerance value 1*
- *positive tolerance value 2*
- *negative tolerance value 1*
- *negative tolerance value 2*

"Profile identification "
- *profile of mould closing slow down of station 1 (s(t))*
- *profile of mould closing slow down of station 2 (s(t))*
- *profile of mould closing slow down of station 1 (v(s))*
- *profile of mould closing slow down of station 2 (v(s))*
- *profile of blow pin movement of station 1 (s(t))*
- *profile of blow pin movement of station 2 (s(t))*
- *profile of blow pin movement of station 1 (v(s))*
- *profile of blow pin movement of station 2 (v(s))*
- *profile of blowing pressure of station1*
- *profile of blowing pressure of station2*

2.2.39 ASCII Text Transfer (Write by computer, Reported by machine)

The ASCII Text Transfer is composed of the following components:

input
output

2.2.40 Machine Configuration (Read by computer, Reported by machine)

The Machine Configuration is composed of the following components:

available
machine identification
actual value of part quality parameters
actual value of process parameters of *extruder 1 - 8*, *head 1 - 3*, *station 1 - 2*

This Machine Configuration bit pattern is useful to transfer the availability of the machine's variables.

2.2.41 Job Configuration (Read/Write by computer)

The Job Configuration is structured as defined in 2.2.40

This Job Configuration bit pattern is useful to select the variables to be transferred.

2.2.42 Log In (Read/Write by computer, Reported by machine)

The Log In is composed of the following components:

log-on command / status of machine
log-off command / status of machine
log-on command / status of central computer
log-off command / status of central computer

This Log In bit pattern is useful to set the machine's or the computer's log-status

2.2.43 Data Set (Read/Write by computer)

The Data Set is composed of the following components:

Data set identification no.
Transferred block number
Data set values

2.2.44 Transfer Task (Write by computer, Reported by machine)

The Transfer Task is composed of the following components:

"Data set identification no."
"Number of last block"
"Task"
no task, end of task
start upload of processing specific data set initiated by machine
Start download of processing specific data set initiated by machine
start upload of machine specific data set initiated by machine
start download of machine specific data set initiated by machine
start upload of processing specific data set initiated by central computer
start download of processing specific data set initiated by central computer
start upload of machine specific data set initiated by central computer
start download of machine specific data set initiated by central computer
"Acknowledgement"
transfer allowed, positive acknowledgement for transfer
wrong operation mode of machine
data set not available at central computer
data set already existing at central computer
wrong data set
uncomplete data set

3. Detailed Telegram Structure

3.1 Overview about Standard Functions

The basic concepts of MMS are the so-called Virtual Manufacturing Device (VMD) and the Client-Server-Model. The overall modelling of MMS is that two devices are connected by a communication system. One device plays the client role, requesting another device (the server) to perform some defined operation. The request is transferred by an Request Protocol Data Unit (PDU). The other plays the MMS server role, performing the requested operation and responding with information resulting from the operation. The Response is transferred by an Response PDU.

A VMD - defined in the Server - represents the standardized view of the structure and external visible behavior of a real manufacturing device and makes available, for control and monitoring, the resources and functionality associated with that real manufacturing device.

The VMD contains MMS objects, which are made available for manipulation by MMS services. Such objects are variables and domains. A short description of these objects is given below (the names in the parenthesis describe examples of services which can be executed):

In EUROMAP 45 the VMD is located within the machine and the client within the central computer. The VMD contains all objects defined in part 3.2 of this document. The Client can use one of the defined functions e.g. Read, Write.

3.1.1 Environment and General Management

The environment and general management services contain the Initiate and Conclude services. These services allow the MMS-user:

a) to initiate communication with another MMS-user in the MMS environment, and to establish the requirements and capabilities that support that communication;

b) to conclude communication with another MMS-user in the MMS environment in a graceful manner;

c) to abort communications with another MMS-user in the MMS environment in an abrupt manner;

d) to cancel pending service requests;

e) to receive notification of protocol errors that occur.

3.1.2 VMD Support

The VMD support services contain the Status, UnsolicitedStatus, GetNameList and Identify services. The services allow the MMS-user to do the following:

a) get the status of a VMD;

b) receive an unsolicited message about the status of the VMD;

c) get lists of various defined objects;

d) identify the vendor specific attributes of the MMS application at the peer system;

3.1.3 Operations on the Named Variable Object

The services which operate upon the Named Variable object are listed below:

Read - This service is used to obtain the value of a real variable described by the Named Variable object;

Write - This service is used to replace the value of a real variable described by the Named Variable object;

InformationReport - This service is used to obtain the value of a real variable described by the Named Variable object;

GetVariableAccessAttributes - This service returns the attributes of a Named Variable object.

3.2 Exchanged Data between Central Computer and Machines (Detailed Telegram Structure)

3.2.1 EUROMAP 45 Types

The types "Identifier", "Integer8", "Integer16", "Integer32", "Unsigned8", "Unsigned16", and "Unsigned32" are used throughout this Standard. These types are defined as follows.

Identifier::=VisibleStringFROM("A"|"a"|"B"|"b"|"C"|"c"|"D"|"d"|"E"|"e"|"F"|"f"|
" G " | " g " | " H " | " h " | " I " | " i " | " J " | " j " | " K " | " k " | " L " | " l " |
" M " | " m " | " N " | " n " | " O " | " o " | " P " | " p " | " Q " | " q " | " R " | " r " |
" S " | " s " | " T " | " t " | " U " | " u " | " V " | " v " | " W " | " w " | " X " | " x " |
"Y"|"y"|"Z"|"z"|"$"|"_"|"0"|"1"|"2"|"3"|"4"|"5"|"6"|"7"|"8"|"9") SIZE(1..32) An Identifier shall not begin with a digit.

Integer8 ::= INTEGER(-128..127) — range -128 <= i <= 127
Integer16 ::= INTEGER(-32768..32767) — range -32,768 <= i <= 32,767
Integer32 ::= INTEGER(-2147483648..2147483647) — range -2**31 <= i <= 2**31 - 1
Unsigned8 ::= INTEGER(0..127) — range 0 <= i <= 127
Unsigned16 ::= INTEGER(0..32767) — range 0 <= i <= 32767
Unsigned32 ::= INTEGER(0..2147483647) — range 0 <= i <= 2**31 - 1

Array

This selection for the Type Specification parameter shall indicate that the node being described is a complex type that is constructed from an ordered sequence of elements of a single type, with elements numbered from zero (0), the first element, and increasing.

Structure

The Structure parameter shall specify that the node of the type tree describes a complex type that is constructed from an ordered list of one or more components, each of which may have a distinct type.

BIT STRING - The definition of this type is as specified for the bitstring type in ISO 8824. The Size parameter shall specify the number of bits in the bit string and an indication of whether this is an absolute number (indicating a fixed-length bitstring) or a maximum number (indicating a variable-length bitstring).

INTEGER - The definition of this type is as specified for the integer type in ISO 8824. The Size parameter shall specify the number of bits (assuming twos-complement representation) required in order to allow representation of all possible distinguished values.

UNSIGNED - The definition of this type is as specified for the integer type in ISO 8824, with the exclusion of the negative whole numbers. The Size parameter shall contain the number of bits (assuming binary representation) required in order to allow representation of all possible distinguished values.

OCTET STRING - The definition of this type is as specified for the octetstring type in ISO 8824 e. g. 'F0178534'H.

VISIBLE STRING - The definition of this type is as specified for the VisibleString type in ISO 8824 (ISO 646 String) e. g. "Materialcode=287".

GENERALIZED TIME - The definition of this type is as specified for the GeneralizedTime type in ISO 8824 *e.g.: "19920921092010.0" means 21.09.1992 9²⁰ and 10 s.*

3.2.2 Definition of the structured data for communication

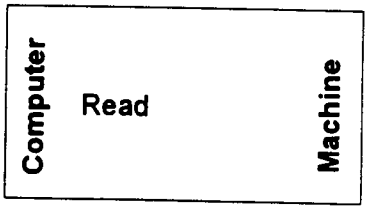
The description method is an accepted standard description method used by most important industries e.g. automobile industries. The description allows precise and accurate definition of structured information for data exchange.

All EUROMAP 45 Telegrams are mapped onto MMS Variables without any lost of information.

Variable objects are:

3.2.2.1 Machine Identification
3.2.2.2 Job Definition
3.2.2.3 Job Target
3.2.2.4 Job Status 1
3.2.2.5 Job Status 2
3.2.2.6 Production Control Command
3.2.2.7 Production Status
3.2.2.8 Machine Status
3.2.2.9 Ancillary Equipment Status
3.2.2.10 Alarms
3.2.2.11 Operator Identification
3.2.2.11 Time and Date from Central Computer
3.2.2.13 Reinitialization of Production Counter after Machine Breakdown
3.2.2.14 Actual Material Consumption for Job
3.2.2.15 Setpoint of Part Quality Parameters
3.2.2.16 Actual Values of Part Quality Parameters
3.2.2.17 Actual Values of Process Parameters of Extruder 1-8
3.2.2.18 Actual Values of Process Parameters of Head 1-3
3.2.2.19 Actual Values of Process Parameters of Station 1-2
3.2.2.20 Limit Values of Process Parameters of Extruder 1
3.2.2.21 Limit Values of Process Parameters of Extruder 2
3.2.2.22 Limit Values of Process Parameters of Extruder 3
3.2.2.23 Limit Values of Process Parameters of Extruder 4
3.2.2.24 Limit Values of Process Parameters of Extruder 5
3.2.2.25 Limit Values of Process Parameters of Extruder 6
3.2.2.26 Limit Values of Process Parameters of Extruder 7
3.2.2.27 Limit Values of Process Parameters of Extruder 8
3.2.2.28 Limit Values of Process Parameters of Head 1
3.2.2.29 Limit Values of Process Parameters of Head 2
3.2.2.30 Limit Values of Process Parameters of Head 3
3.2.2.31 Limit Values of Process Parameters of Station 1
3.2.2.32 Limit Values of Process Parameters of Station 2

3.2.2.1 Machine Identification

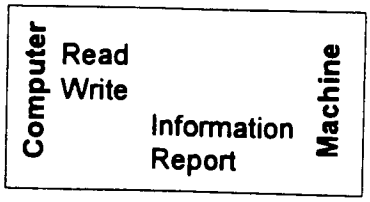


Object: Named Variable
Key Attribute: Variable Name = VMD-specific **"MACHID"**
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -Number of Codes (16)

semantic:	*EUROMAP-Protocol version*	*Array element 0*
	manufacturer code	*Array element 1*
	machine code	*Array element 2*
	code of extruder 1	*Array element 3*
	code of extruder 2	*Array element 4*
	code of extruder 3	*Array element 5*
	code of extruder 4	*Array element 6*
	code of extruder 5	*Array element 7*
	code of extruder 6	*Array element 8*
	code of extruder 7	*Array element 9*
	code of extruder 8	*Array element 10*
	code of blow head 1	*Array element 11*
	code of blow head 2	*Array element 12*
	code of blow head 3	*Array element 13*
	code of station 1	*Array element 14*
	code of station 2	*Array element 15*

element Type = visible string 4}
Attribute: Access Method
Semantic: Implicit

3.2.2.2 Job Definition



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "JOBDEF"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -Number of Values(15)

semantic: job code	*Array element 0*
job text description	*Array element 1*
part code	*Array element 2*
part text description	*Array element 3*
colour	*Array element 4*
material code of extruder 1	*Array element 5*
material code of extruder 2	*Array element 6*
material code of extruder 3	*Array element 7*
material code of extruder 4	*Array element 8*
material code of extruder 5	*Array element 9*
material code of extruder 6	*Array element 10*
material code of extruder 7	*Array element 11*
material code of extruder 8	*Array element 12*
data set identification no. of processing data set	*Array element 13*
data set identification no. of machine data set	*Array element 14*

element Type = visible string 20}

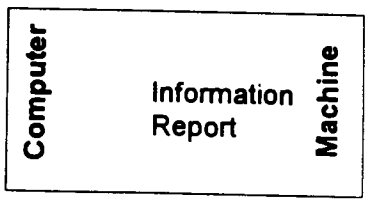
Attribute: Access Method
Semantic: Implicit

3.2.2.3 Job Target

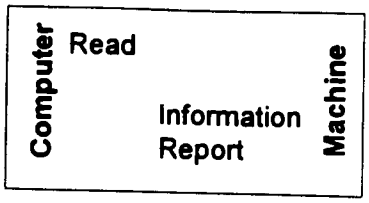
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**JOBTARGT**"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "**NOPARTS**"
component Type = unsigned 32},
semantic: number of parts
{component Name = "**NOPASLOT**"
component Type = unsigned 16},
semantic: number of parts per lot
{component Name = "**DATENDJO**"
component Type = generalizedtime}, *e.g.:19920921092010.0*
semantic: date of end of job *21.09.1992 9.[20] and 10 s*
{component Name = "**DEVFRPLA**"
component Type = integer 16
semantic: deviation from planned number of parts }}
Attribute: Access Method
Semantic: Implicit

3.2.2.4 Job Status 1

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**JOBSTAT1**"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "**NOCYCL**"
component Type = unsigned 32},
semantic: number of machine cycles
{component Name = "**NGODPART**"
component Type = unsigned 32},
semantic: number of good parts
{component Name = "**NMOULPRO**"
component Type = unsigned 16},
semantic: number of moulds in production
component Name = "**NCAVPRO**"
component Type = unsigned 16
semantic: number of cavities in production }}
Attribute: Access Method
Semantic: Implicit



3.2.2.5 Job Status 2

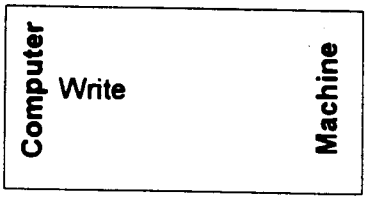


Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**JOBSTAT2**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = array{
number of Elements -Number of reject reason codes (99)
semantic: each array element represents the number of rejected parts since start of job concerning to a reject reason code.

reject reason code 1	*Array element 0*
reject reason code 2	*Array element 1*
.	.
.	.
.	.
reject reason code 99	*Array element 98*

element Type = unsigned 16}
Attribute: Access Method
Semantic: Implicit

3.2.2.6 Production Control Command



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**PRCONCMD**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = bit-string 16,
semantic: remote operation mode "set up" (0),
remote operation mode "start" (1),
remote operation mode "stop" (2),
Attribute: Access Method
Semantic: only one of three bits are allowed to be set at one time.

3.2.2.7 Production Status

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**PRODSTAT**"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure

Computer	Information Report	Machine

components {
{component Name = "**STATID**"
component Type = bit-string 16},

semantic:	*Status as follows:*	
	Production	*(0)*
	Set up production	*(1)*
	Job target reached, production stopped	*(2)*
	Production automatically interrupted	*(3)*
	Production interrupted by operator	*(4)*
	Waiting for job definition	*(5)*
	Waiting for job start	*(6)*

only one of seven bits are allowed to be set at one time
{component Name = "**PRODUC**" *Note: Status = (0)*
component Type = bit-string 32},

semantic:	*parts under quality specs*	*(0)*
	without ancillary equipment	*(1)*
	job target reached	*(2)*
	material change	*(3)*
	colour change	*(4)*
	reserved for EUROMAP	*(5-31)*

{component Name = "**SETUPROD**" *Note: Status =(1)*
component Type = bit-string 32},

semantic:	*no reason specified*	*(0)*
	set up of machine	*(1)*
	set up of ancillary equipment	*(2)*
	mould assembly	*(3)*
	mould disassembly	*(4)*
	change of extruder	*(5)*
	change of head	*(6)*
	change of die	*(7)*
	change of blow pin	*(8)*
	change of ancillary equipment	*(9)*
	change of material	*(10)*
	change of colour	*(11)*
	test run	*(12)*
	maintenance	*(13)*
	reserved for EUROMAP	*(14-23)*
	reserved for manufacturer's reasons	*(24-31)*

{component Name = "**JTREPRST**" *Note: Status = (2)*
component Type = bit-string 32},

semantic:	*job target reached, production stopped*	
	reserved for EUROMAP	*(0-23)*
	reserved for manufacturer's reasons	*(24-31)*

{component Name = "**PROAUINT**" component Type = bit-string 32},		*Note: Status = (3)*
semantic:	*production automatically interrupted*	
	personal safety conditions	*(0)*
	extruder fault	*(1)*
	head fault	*(2)*
	hydraulic unit fault	*(3)*
	clamping unit fault	*(4)*
	mould fault	*(5)*
	fault of transport device	*(6)*
	ancillary equipment fault	*(7)*
	processing fault	*(8)*
	job target reached	*(9)*
	others	*(10)*
	reserved for EUROMAP	*(11-23)*
	reserved for manufacturer's reasons	*(24-31)*
{component Name = "**PROINOP**" component Type = bit-string 32},		*Note: Status = (4)*
semantic:	*production interrupted by operator*	
	no reason specified	*(0)*
	general machine fault	*(1)*
	mechanical machine fault	*(2)*
	hydraulic machine fault	*(3)*
	electrical machine fault	*(4)*
	pneumatic machine fault	*(5)*
	mould fault	*(6)*
	fault of ancillary equipment	*(7)*
	lack of material	*(8)*
	processing fault	*(9)*
	no operator available	*(10)*
	job target reached	*(11)*
	reserved for EUROMAP	*(12-24)*
	reserved for manufacturer's reasons	*(25-31)*
{component Name = "**WAITJODF**" component Type = bit-string 32},		*Note: Status = (5)*
semantic:	*waiting for job definition*	
	reserved for EUROMAP	*(0-23)*
	reserved for manufacturer's reasons	*(24-31)*
{component Name = "**WAITJOST**" component Type = bit-string 32},		*Note: Status = (6)*
semantic:	*waiting for job start*	
	reserved for EUROMAP	*(0-23)*
	reserved for manufacturer's reasons	*(24-31)*

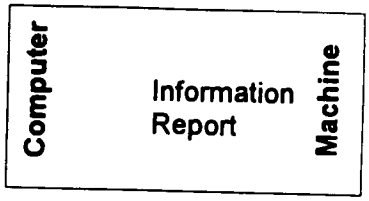
}

Attribute: Access Method

Semantic: implicit. All components will be transfered. But only the marked component (marked by status component Name = "Statid") is valid.

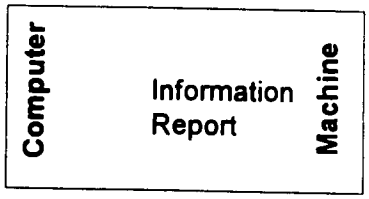
3.2.2.8 Machine Status

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**MACHSTAT**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = structure
components {
{component Name = "**STATUS**"
component Type = bit-string 16},
semantic: *automatic* *(0)*
semi automatic *(1)*
manual *(2)*
setup *(3)*
standby *(4)*
{component Name = "**NTOTMCYC**"
component Type = unsigned 32}
semantic: *Number of total machine cycles}*
Attribute: Access Method
Semantic: only one of five bits are allowed to be set at one time.

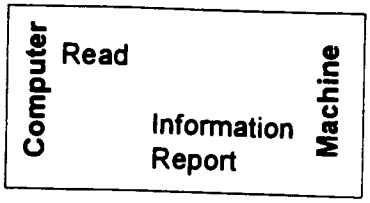


3.2.2.9 Ancillary Equipment Status

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**ANEQSTAT**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = array {
numberOfElements - Number of ancillary devices (max. 20)
elementType = structure {
{component Name = "**CAE**"
component Type = unsigned 16},
semantic: *code of ancillary equipment*
{component Name = "**STATUS**",
component Type = bit-string 16}
semantic: *automatic* *(0)*
manual *(1)*
setup *(2)*
standby *(3)* }}
Attribute: Access Method
Semantic: only one of four bits are allowed to be set at one time.



3.2.2.10 Alarms



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**ALARM**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = structure {
{component Name = "**PERSCOND**"
component Type = bit-string 256},
semantic: *personal safety conditions*

emergency stop activated	*(0)*
safety gate open or safety photo cell activated	*(1)*
safety fault of hydraulic pressure	*(2)*
safety fault of pneumatic pressure	*(3)*

{component Name = "**EXTRF**"
component Type = bit-string 256},
semantic: *extruder fault*

stop of extruder 1	*(0)*
positive tolerance fault of barrel temperature of extruder 1	*(1)*
negative tolerance fault of barrel temperature of extruder 1	*(2)*
temperature sensor broken of extruder 1	*(3)*
short circuit of temperature sensor of extruder 1	*(4)*
heater band fault of extruder 1	*(5)*
cooling water fault of feeding zone of extruder 1	*(6)*
minimum current fault of drive of extruder 1	*(7)*
maximum current fault of drive of extruder 1	*(8)*
fault of drive of extruder 1	*(9)*
stop of extruder 2	*(10)*
positive tolerance fault of barrel temperature of extruder 2	*(11)*
negative tolerance fault of barrel temperature of extruder 2	*(12)*
temperature sensor broken of extruder 2	*(13)*
short circuit of temperature sensor of extruder 2	*(14)*
heater band fault of extruder 2	*(15)*
cooling water fault of feeding zone of extruder 2	*(16)*
minimum current fault of drive of extruder 2	*(17)*
maximum current fault of drive of extruder 2	*(18)*
fault of drive of extruder 2	*(19)*
stop of extruder 3	*(20)*
positive tolerance fault of barrel temperature of extruder 3	*(21)*
negative tolerance fault of barrel temperature of extruder 3	*(22)*
temperature sensor broken of extruder 3	*(23)*
short circuit of temperature sensor of extruder 3	*(24)*
heater band fault of extruder 3	*(25)*
cooling water fault of feeding zone of extruder 3	*(26)*
minimum current fault of drive of extruder 3	*(27)*
maximum current fault of drive of extruder 3	*(28)*
fault of drive of extruder 3	*(29)*
stop of extruder 4	*(30)*
positive tolerance fault of barrel temperature of extruder 4	*(31)*
negative tolerance fault of barrel temperature of extruder 4	*(32)*
temperature sensor broken of extruder 4	*(33)*
short circuit of temperature sensor of extruder 4	*(34)*
heater band fault of extruder 4	*(35)*
cooling water fault of feeding zone of extruder 4	*(36)*

minimum current fault of drive of extruder 4 (37)
maximum current fault of drive of extruder 4 (38)
fault of drive of extruder 4 (39)
stop of extruder 5 (40)
positive tolerance fault of barrel temperature of extruder 5 (41)
negative tolerance fault of barrel temperature of extruder 5 (42)
temperature sensor broken of extruder 5 (43)
short circuit of temperature sensor of extruder 5 (44)
heater band fault of extruder 5 (45)
cooling water fault of feeding zone of extruder 5 (46)
minimum current fault of drive of extruder 5 (47)
maximum current fault of drive of extruder 5 (48)
fault of drive of extruder 5 (49)
stop of extruder 6 (50)
positive tolerance fault of barrel temperature of extruder 6 (51)
negative tolerance fault of barrel temperature of extruder 6 (52)
temperature sensor broken of extruder 6 (53)
short circuit of temperature sensor of extruder 6 (54)
heater band fault of extruder 6 (55)
cooling water fault of feeding zone of extruder 6 (56)
minimum current fault of drive of extruder 6 (57)
maximum current fault of drive of extruder 6 (58)
fault of drive of extruder 6 (59)
stop of extruder 7 (60)
positive tolerance fault of barrel temperature of extruder 7 (61)
negative tolerance fault of barrel temperature of extruder 7 (62)
temperature sensor broken of extruder 7 (63)
short circuit of temperature sensor of extruder 7 (64)
heater band fault of extruder 7 (65)
cooling water fault of feeding zone of extruder 7 (66)
minimum current fault of drive of extruder 7 (67)
maximum current fault of drive of extruder 7 (68)
fault of drive of extruder 7 (69)
stop of extruder 8 (70)
positive tolerance fault of barrel temperature of extruder 8 (71)
negative tolerance fault of barrel temperature of extruder 8 (72)
temperature sensor broken of extruder 8 (73)
short circuit of temperature sensor of extruder 8 (74)
heater band fault of extruder 8 (75)
cooling water fault of feeding zone of extruder 8 (76)
minimum current fault of drive of extruder 8 (77)
maximum current fault of drive of extruder 8 (78)
fault of drive of extruder 8 (79)

{component Name = "HEADF"
component Type = bit-string 256},
semantic: *head fault*

positive tolerance fault of temperature of head 1 (0)
negative tolerance fault of temperature of head 1 (1)
temperature sensor broken of head 1 (2)
short circuit of temperature sensor of head 1 (3)
heater band fault of head 1 (4)
cooling water fault of head 1 (5)
fault of vertical wall thickness control of head 1 (6)
fault of radial wall thickness control of head 1 (7)

melt pres. fault from radial wall thickness control of head 1 (8)
maximum volume fault of accumulator head 1 (9)
positive tolerance fault of temperature of head 2 (10)
negative tolerance fault of temperature of head 2 (11)
temperature sensor broken of head 2 (12)
short circuit of temperature sensor of head 2 (13)
heater band fault of head 2 (14)
cooling water fault of head 2 (15)
fault of vertical wall thickness control of head 2 (16)
fault of radial wall thickness control of head 2 (17)
melt pres. fault from radial wall thickness control of head 2 (18)
maximum volume fault of accumulator head 2 (19)
positive tolerance fault of temperature of head 3 (20)
negative tolerance fault of temperature of head 3 (21)
temperature sensor broken of head 3 (22)
short circuit of temperature sensor of head 3 (23)
heater band fault of head 3 (24)
cooling water fault of head 3 (25)
fault of vertical wall thickness control of head 3 (26)
fault of radial wall thickness control of head 3 (27)
melt pres. fault from radial wall thickness control of head 3 (28)
maximum volume fault of accumulator head 3 (29)

{component Name = "**HYDRF**"
component Type = bit-string 256},
semantic: *hydraulic unit fault*

stop of motor for hydraulic unit (0)
minimum oil level fault (1)
minimum oil pressure fault (2)
oil filter blocked (3)
cooling water filter blocked (4)
pressure supervision of high pressure circuit activated (5)
pressure supervision of low pressure circuit activated (6)
fault of hydraulic pump control (7)
minimum oil temperature alarm (8)
maximum oil temperature alarm (9)
oil temperature sensor broken (10)
short circuit of oil temperature sensor (11)

{component Name = "**CLAMUF**"
component Type = bit-string 256},
semantic: *clamping unit fault*

oil filter of clamping unit blocked of station 1 (0)
closing fault of clamping unit of station 1 (1)
opening fault of clamping unit of station 1 (2)
stroke sensor fault of of clamping unit of station 1 (3)
constant position fault of clamping unit of station 1 (4)
controller fault of clamping unit of station 1 (5)
stroke sensor fault of carriage of station 1 (6)
end position fault of carriage of station 1 (7)
controller fault of carriage of station 1 (8)
oil filter of clamping unit blocked of station 2 (9)
closing fault of clamping unit of station 2 (10)
opening fault of clamping unit of station 2 (11)
stroke sensor fault of of clamping unit of station 2 (12)

constant position fault of clamping unit of station 2 *(13)*
controller fault of clamping unit of station 2 *(14)*
stroke sensor fault of carriage of station 2 *(15)*
end position fault of carriage of station 2 *(16)*
controller fault of carriage of station 2 *(17)*

{component Name = "**MOULDF**"
component Type = bit-string 256},
semantic: *mould fault*
cutter fault *(0)*
blowing pressure fault of station 1 *(1)*
cooling water fault of station 1 *(2)*
core puller fault of station1 *(3)*
blow pin fault of station 1 *(4)*
blow needle fault of station 1 *(5)*
ejector fault of station 1 *(6)*
parison prebinch fault of station 1 *(7)*
stretching fault of station 1 *(8)*
fault of mould labeling unit *(9)*
blowing pressure fault of station 2 *(10)*
cooling water fault of station 2 *(11)*
core puller fault of station2 *(12)*
blow pin fault of station 2 *(13)*
blow needle fault of station 2 *(14)*
ejector fault of station 2 *(15)*
parison prebinch fault of station 2 *(16)*
stretching fault of station 2 *(17)*
fault of mould labeling unit *(18)*

{component Name = "**TRPDEVF**"
component Type = bit-string 256},
semantic: *fault of part transport device*
stroke sensor fault of part transport device of station 1 *(0)*
controller fault of part transport device of station 1 *(1)*
end position fault of part transport device of station 1 *(2)*
part transport supervision activated of station 1 *(3)*
stroke sensor fault of part transport device of station 2 *(4)*
controller fault of part transport device of station 2 *(5)*
end position fault of part transport device of station 2 *(6)*
part transport supervision activated of station 2 *(7)*

{component Name = "**ANEQUIF**"
component Type = bit-string 256},
semantic: *ancillary equipment fault*
fault of post cooling station 1 *(0)*
ancillary equipment of station 1 not ready *(1)*
fault of deflashing unit of station 1 *(2)*
fault of wide neck cutter of station 1 *(3)*
fault of leakage test of station 1 *(4)*
fault of post cooling station 2 *(5)*
ancillary equipment of station 2 not ready *(6)*
fault of deflashing unit of station 2 *(7)*
fault of wide neck cutter of station 2 *(8)*
fault of leakage test of station 2 *(9)*

{component Name = "PROCF"
component Type = bit-string 256},
semantic: *processing fault*

melt temperature fault of extruder 1	*(0)*
melt temperature fault of extruder 2	*(1)*
melt temperature fault of extruder 3	*(2)*
melt temperature fault of extruder 4	*(3)*
melt temperature fault of extruder 5	*(4)*
melt temperature fault of extruder 6	*(5)*
melt temperature fault of extruder 7	*(6)*
melt temperature fault of extruder 8	*(7)*
melt pressure fault of extruder 1	*(8)*
melt pressure fault of extruder 2	*(9)*
melt pressure fault of extruder 3	*(10)*
melt pressure fault of extruder 4	*(11)*
melt pressure fault of extruder 5	*(12)*
melt pressure fault of extruder 6	*(13)*
melt pressure fault of extruder 7	*(14)*
melt pressure fault of extruder 8	*(15)*
screw speed fault of extruder 1	*(16)*
screw speed fault of extruder 2	*(17)*
screw speed fault of extruder 3	*(18)*
screw speed fault of extruder 4	*(19)*
screw speed fault of extruder 5	*(20)*
screw speed fault of extruder 6	*(21)*
screw speed fault of extruder 7	*(22)*
screw speed fault of extruder 8	*(23)*
torque fault of extruder 1	*(24)*
torque fault of extruder 2	*(25)*
torque fault of extruder 3	*(26)*
torque fault of extruder 4	*(27)*
torque fault of extruder 5	*(28)*
torque fault of extruder 6	*(29)*
torque fault of extruder 7	*(30)*
torque fault of extruder 8	*(31)*
throughput fault of extruder 1	*(32)*
throughput fault of extruder 2	*(33)*
throughput fault of extruder 3	*(34)*
throughput fault of extruder 4	*(35)*
throughput fault of extruder 5	*(36)*
throughput fault of extruder 6	*(37)*
throughput fault of extruder 7	*(38)*
throughput fault of extruder 8	*(39)*
blowing pressure fault of station 1	*(40)*
blowing pressure fault of station 2	*(41)*
tolerance supervision of ejection volume of head 1	*(42)*
tolerance supervision of ejection volume of head 2	*(43)*
tolerance supervision of ejection volume of head 3	*(44)*
cycle time supervision	*(45)*
ejection time supervision of head 1	*(46)*
ejection time supervision of head 2	*(47)*
ejection time supervision of head 3	*(48)*

tolerance supervision of wall thickness profile, vertical 1 *(49)*
tolerance supervision of wall thickness profile, vertical 2 *(50)*
tolerance supervision of wall thickness profile, vertical 3 *(51)*
tolerance supervision of wall thickness profile, vertical 4 *(52)*
tolerance supervision of wall thickness profile, vertical 5 *(53)*
tolerance supervision of wall thickness profile, radial 1 *(54)*
tolerance supervision of wall thickness profile, radial 2 *(55)*
tolerance supervision of ejection profile for head 1 *(56)*
tolerance supervision of ejection profile for head 2 *(57)*
tolerance supervision of ejection profile for head 3 *(58)*
tolerance supervision of mould closing profile of station 1 *(59)*
tolerance supervision of mould closing profile of station 2 *(60)*
tolerance superv. of blow pin movement profile of station 1 *(61)*
tolerance superv. of blow pin movement profile of station 2 *(62)*
tolerance supervision of blow pressure profile of station 1 *(63)*
tolerance supervision of blow pressure profile of station 2 *(64)*

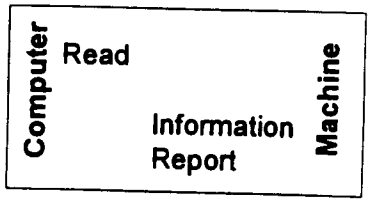
{component Name = "**OTH**"
component Type = bit-string 256},
semantic: others
air conditioning fault of control cabinet *(0)*
cooling fault of controller *(1)*
fault of power supply *(2)*

{component Name = "**ALATIME**",
component Type = timeOfDay} *note: length 4 octet*
semantic: alarm time}

Attribute: Access Method
Semantic: These Alarm bit patterns are useful for transfer of appeared and disappeared alarms and for synchronization purposes

3.2.2.11 Operator Identification

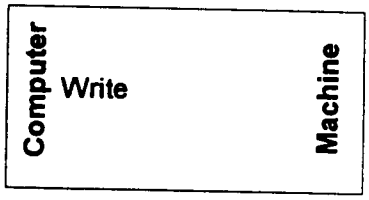
Object: Named Variable
Key Attribute: Variable Name = VMD-specific **"OPIDENT"**
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = **"OP1"**
component Type = visible-string 12}
semantic: operator 1
{component Name = **"OP2"**
component Type = visible-string 12}
semantic: operator 2}
Attribute: Access Method
Semantic: Operator Identification



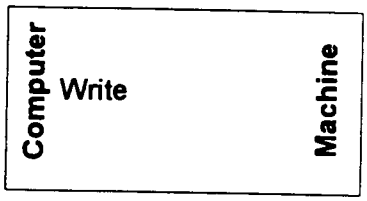
3.2.2.12 Time and Date from Central Computer

Object: Named Variable
Key Attribute: Variable Name = VMD-specific **"TIMEDATE"**
Attribute: MMS Deletable= FALSE
Attribute: Type Description = generalizedtime
semantic: time and date
e.g.: 19920921092010.0 means 21.09.1992 9.^{20} and 10 s

Attribute: Access Method
Semantic: Time and date from central computer

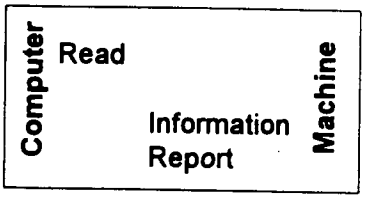


3.2.2.13 Reinitialization of Production Counters after Machine Breakdown



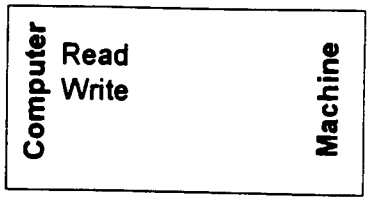
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**REINIT**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = structure
components {
{component Name = "**NTOTCYC**"
component Type = unsigned 32},
semantic:number of total machine cycles
{component Name = "**NMCYCAJO**"
component Type = unsigned 32},
semantic: number of machine cycles of actual job
{component Name = "**NGODPAJO**"
component Type = unsigned 32},
semantic: number of good parts of actual job}
Attribute: Access Method
Semantic: Implicit

3.2.2.14 Actual Material Consumption for Job



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**ACMACJOB**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = array {
numberOfElements - Number of material values (8)
elementType = unsigned 32}
semantic: actual material weight in hundredths of kg / lbs
extruder 1 Array element 0,
extruder 2 Array element 1,
extruder 3 Array element 2,
extruder 4 Array element 3,
extruder 5 Array element 4,
extruder 6 Array element 5,
extruder 7 Array element 6,
extruder 8 Array element 7,
Attribute: Access Method
Semantic: Implicit

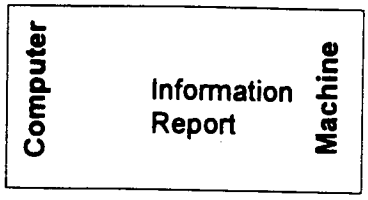
3.2.2.15 Setpoint of Part Quality Parameters



Object: Named Variable
Key Attribute: Variable Name = VMD-specific **"SPOPAQU"**
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -number of Quality Parameters(1-99)
semantic: *Part weight in tenth of g / hundredth of oz* *Array element 0*
Gross weight in tenth of g / hundredth of oz *Array element 1*
Quality parameter 3 *Array element 2*
.
.
.
Quality parameter 99 *Array element 98*
element Type = structure
components {
{component Name = **"SPPAQU"**
component Type = unsigned 32},
semantic: setpoint of part quality parameter
{component Name = **"RELPLUTO"**
component Type = unsigned 16},
semantic: relative plus tolerance of part quality parameter
{component Name = **"RELMINTO"**
component Type = unsigned 16},
semantic: relative minus tolerance of part quality parameter
}}

Attribute: Access Method
Semantic: Implicit

3.2.2.16 Actual Values of Part Quality Parameters



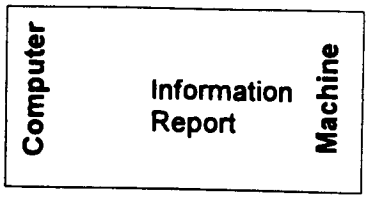
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**AVALPAQU**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = array{
number of Elements -number of Quality Parameters(1-99)

semantic:	*actual part weight quality parameter*	*Array element 0*
	actual gross weight quality parameter	*Array element 1*
	actual quality parameter 3	*Array element 2*
	.	.
	.	.
	.	.
	actual quality parameter 99	*Array element 98*

element Type = structure
components {
{component Name = "**PARTID**"
component Type = unsigned 32},
semantic: part identification code
{component Name = "**ACPARQU**"
component Type = unsigned 32},
semantic: actual part quality parameter
}}

Attribute: Access Method
Semantic: Implicit

3.2.2.17 Actual Values of Process Parameters of Extruder



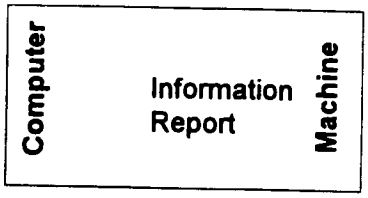
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "AVAPROE"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "EXTRUID"
component Type = unsigned 16},
semantic: *extruder identification*
extruder 1 = 0
extruder 2 = 1
extruder 3 = 2
extruder 4 = 3
extruder 5 = 4
extruder 6 = 5
extruder 7 = 6
extruder 8 = 7
{component Name = "PARTID"
component Type = unsigned 32},
semantic: *part identification code*
{component Name = "PARAMETR"
component Type = array {
number of Elements -number of Parameters (8)

semantic: *melt temperature of extruder in °C / °F*	*Array element 0*
melt pressure of extruder in bar / psi	*Array element 1*
torque of extruder in Nm / Nm	*Array element 2*
screw speed of extruder in min^{-1} / rpm	*Array element 3*
cooling water temperature of feeding zone inlet of extruder in °C / °F	*Array element 4*
cooling water temperature of feeding zone outlet of extruder in °C / °F	*Array element 5*
cooling water flow of feeding zone of extruder in l/min / cfm	*Array element 6*
actual value of throughput per hour of extruder in kg/h / lbs/h	*Array element 7*

element Type = integer 16}
}}

Attribute: Access Method
Semantic: Implicit

3.2.2.18 Actual Values of Process Parameters of Head



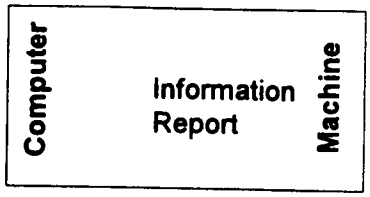
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**AVAPROH**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = structure
components {
{component Name = "**HEADID**"
component Type = unsigned 16},
semantic: Head identification
Head 1 = 0
Head 2 = 1
Head 3 = 2
{component Name = "**PARTID**"
component Type = unsigned 32},
semantic: part identification code
{component Name = "**PARAMETR**"
component Type = array {
number of Elements -number of Parameters (5)

semantic: melt temperature of head in °C / °F	*Array element 0*
melt pressure of head in bar / psi	*Array element 1*
hydraulic pressure of ejection in bar / psi	*Array element 2*
ejection time of head in tenth of s / s	*Array element 3*
ejection volume of head in tenth of l / cu.in.	*Array element 4*

element Type = integer 16}
}}

Attribute: Access Method
Semantic: Implicit

3.2.2.19 Actual Values of Process Parameters of Station



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**AVAPROS**"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure

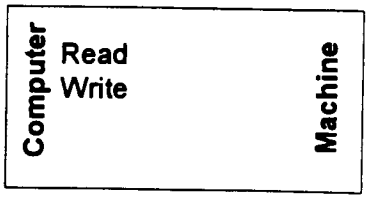
components {
{component Name = "**STATID**"
component Type = unsigned 16},
semantic: Station identification
Station 1 = 0
Station 2 = 1
{component Name = "**PARTID**"
component Type = unsigned 32},
semantic: part identification code
{component Name = "**PARAMETR**"
component Type = array {
number of Elements -number of Parameters (9)

semantic:	*blowing pressure air in bar / psi*	*Array element 0*
	blowing pressure nitrogen in bar / psi	*Array element 1*
	blowing pressure fluorine in bar / psi	*Array element 2*
	blowing pressure CO_2 in bar / psi	*Array element 3*
	hydraulic pressure of clamping unit in bar / psi	*Array element 4*
	cooling water temp. of mould inlet of in °C / °F	*Array element 5*
	cooling water temp. of mould outlet of in °C / °F	*Array element 6*
	cooling water flow of mould in l/min / cfm	*Array element 7*
	cycle time in tenth of s / s	*Array element 8*

element Type = integer 16}
}}

Attribute: Access Method
Semantic: Implicit

3.2.2.20 Limit Values of Process Parameters of Extruder 1



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE1"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -number of Parameters (8)

semantic:	*melt temperature of extruder in °C / °F*	*Array element 0*
	melt pressure of extruder in bar / psi	*Array element 1*
	torque of extruder in Nm / Nm	*Array element 2*
	screw speed of extruder in min^{-1} / rpm	*Array element 3*
	cooling water temperature of feeding zone inlet of Extruder in °C / °F	*Array element 4*
	cooling water temperature of feeding zone outlet of Extruder in °C / °F	*Array element 5*
	cooling water flow of feeding zone of Extruder in °C / °F	*Array element 6*
	actual value of throughput of Extruder in kg/h / lbs/h	*Array element 7*

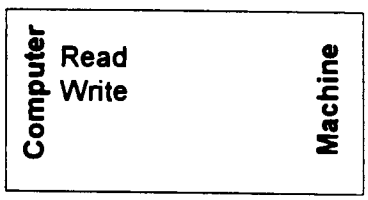
element Type = array{
number of Elements -number of Limit Valus (5)

semantic:	*setpoint*	*Array element 0*
	lower limit vaue	*Array element 1*
	upper limit value	*Array element 2*
	lower warning value	*Array element 3*
	upper warning value	*Array element 4*

element Type = integer 16}}

Attribute: Access Method
Semantic: Implicit

3.2.2.21 Limit Values of Process Parameters of Extruder 2



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE2"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array

... *note: same structure as defined in 3.2.2.20*

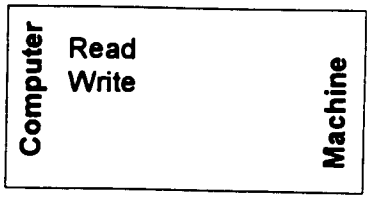
3.2.2.22 Limit Values of Process Parameters of Extruder 3

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE3"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array

... *note: same structure as defined in 3.2.2.20*

3.2.2.23 Limit Values of Process Parameters of Extruder 4

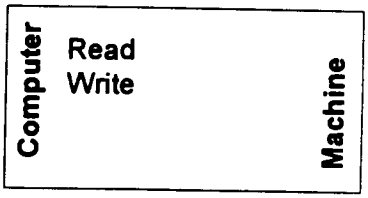
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE4"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array



... *note: same structure as defined in 3.2.2.20*

3.2.2.24 Limit Values of Process Parameters of Extruder 5

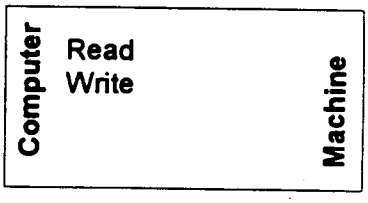
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE5"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array



... *note: same structure as defined in 3.2.2.20*

3.2.2.25 Limit Values of Process Parameters of Extruder 6

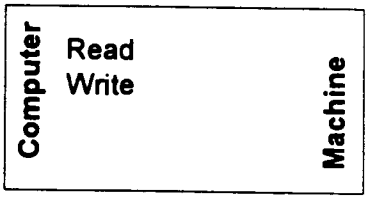
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE6"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array



... *note: same structure as defined in 3.2.2.20*

3.2.2.26 Limit Values of Process Parameters of Extruder 7

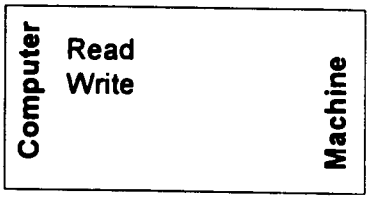
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE7"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array



... *note: same structure as defined in 3.2.2.20*

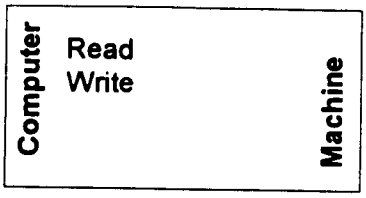
3.2.2.27 Limit Values of Process Parameters of Extruder 8

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROE8"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array



... *note: same structure as defined in 3.2.2.20*

3.2.2.28 Limit Values of Process Parameters of Head 1



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROH1"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -number of Parameters (5)
semantic:

melt temperature of head in °C / °F	*Array element 0*
melt pressure of head in bar / psi	*Array element 1*
hydraulic pressure of ejection in bar / psi	*Array element 2*
ejection time of head in tenth of s / s	*Array element 3*
ejection volume of head in tenth of l / cu.in.	*Array element 4*

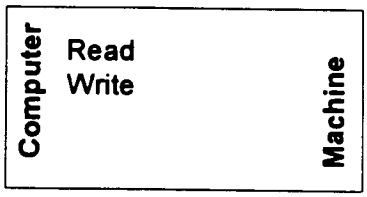
element Type = array{
number of Elements -number of Limit Valus (5)
semantic:

setpoint	*Array element 0*
lower limit vaue	*Array element 1*
upper limit value	*Array element 2*
lower warning value	*Array element 3*
upper warning value	*Array element 4*

element Type = integer 16}}

Attribute: Access Method
Semantic: Implicit

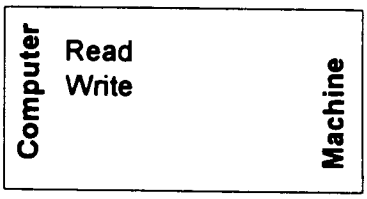
3.2.2.29 Limit Values of Process Parameters of Head 2



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROH2"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array

... *note: same structure as defined in 3.2.2.28*

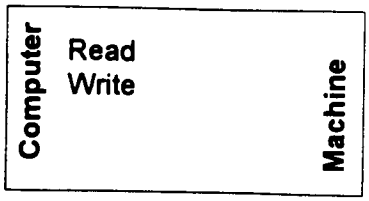
3.2.2.30 Limit Values of Process Parameters of Head 3



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROH3"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array

... *note: same structure as defined in 3.2.2.28*

3.2.2.31 Limit Values of Process Parameters of Station 1



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROS1"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -number of Parameters (9)

semantic: blowing pressure air in bar / psi	*Array element 0*
blowing pressure nitrogen in bar / psi	*Array element 1*
blowing pressure flourine in bar / psi	*Array element 2*
blowing pressure CO_2 in bar / psi	*Array element 3*
hydraulic pressure of clamping unit in bar / psi	*Array element 4*
cooling water temp. of mould inlet in °C / °F	*Array element 5*
cooling water temp. of mould outlet in °C / °F	*Array element 6*
cooling water flow of mould in l/min / cfm	*Array element 7*
cycle time in tenth of s / s	*Array element 8*

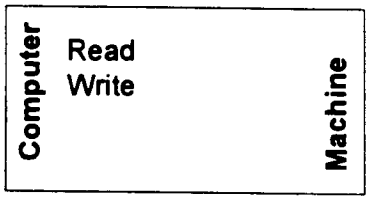
element Type = array{
number of Elements -number of Limit Valus (5)

semantic: setpoint	*Array element 0*
lower limit vaue	*Array element 1*
upper limit value	*Array element 2*
lower warning value	*Array element 3*
upper warning value	*Array element 4*

element Type = integer 16}}

Attribute: Access Method
Semantic: Implicit

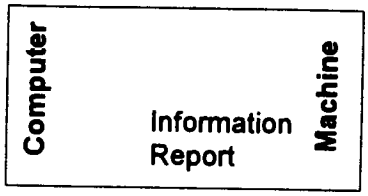
3.2.2.32 Limit Values of Process Parameters of Station 2



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "LVAPROS2"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array

... *note: same structure as defined in 3.2.2.31*

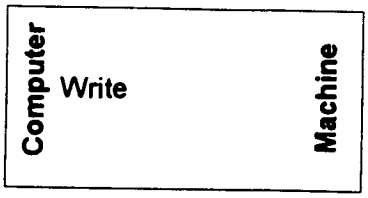
3.2.2.33 Profile y(x) (x equidistant) from Machine



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFE_M"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: *value identification*
actual value = 0
set value = 1
positive tolerance value 1 = 2
positive tolerance value 2 = 3
negative tolerance value 1 = 4
negative tolerance value 2 = 5
{component Name = "PROFID",
component Type = unsigned 16}
semantic: *profile identification*
wall thickness profile (vertical 1) = 0
wall thickness profile (vertical 2) = 1
wall thickness profile (vertical 3) = 2
wall thickness profile (vertical 4) = 3
wall thickness profile (vertical 5) = 4
wall thickness profile (radial 1) = 5
wall thickness profile (radial 2) = 6
ejection profile (head 1) = 7
ejection profile (head 2) = 8
ejection profile (head 3) = 9
{component Name = "PARTID",
component Type = unsigned 32}
semantic: *part identification code*
{component Name = "TIMLNGTH",
component Type = unsigned 16}
semantic: *time in tenth of seconds or length in mm*
{component Name = "PROFILE",
component Type = array {
numberOfElements - Number of profile points (32-128)
elementType = unsigned 16}}
semantic: $y(x)=s_w(t)$, $s_w(l)$, *(wall thickness profiles)*
$y(x)=v_E(l)$, *(ejection profiles)*
(t=cycle time of wall thickness profile, l=ejection stroke)
}

Attribute: Access Method
Semantic: Implicit

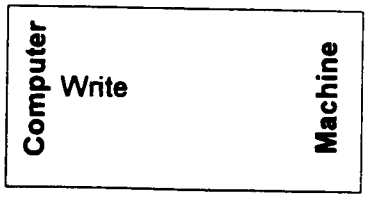
3.2.2.34 Profile y(x) (x equidistant) from Computer



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFE_C"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: value identification
set value = 1
positive tolerance value 1 = 2
positive tolerance value 2 = 3
negative tolerance value 1 = 4
negative tolerance value 2 = 5
{component Name = "PROFID",
component Type = unsigned 16}
semantic: profile identification
wall thickness profile (vertical 1) = 0
wall thickness profile (vertical 2) = 1
wall thickness profile (vertical 3) = 2
wall thickness profile (vertical 4) = 3
wall thickness profile (vertical 5) = 4
wall thickness profile (radial 1) = 5
wall thickness profile (radial 2) = 6
ejection profile (head 1) = 7
ejection profile (head 2) = 8
ejection profile (head 3) = 9
{component Name = "TIMLNGTH",
component Type = unsigned 16}
semantic: time in tenth of seconds or length in mm
{component Name = "PROFILE",
component Type = array {
numberOfElements - Number of profile points (32-128)
elementType = unsigned 16}}
semantic: $y(x)=s_w(t)$, $s_w(l)$, (wall thickness profiles)
$y(x)=v_E(l)$, (ejection profiles)
(t=cycle time of wall thickness profile, l=ejection stroke)
}

Attribute: Access Method
Semantic: Implicit

3.2.2.35 Profile y(x) (x equidistant), Request from Computer



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFE_RQ"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: *value identification*

actual value	*= 0*
set value	*= 1*
positive tolerance value 1	*= 2*
positive tolerance value 2	*= 3*
negative tolerance value 1	*= 4*
negative tolerance value 2	*= 5*

{component Name = "PROFID",
component Type = unsigned 16}
semantic: *profile identification*

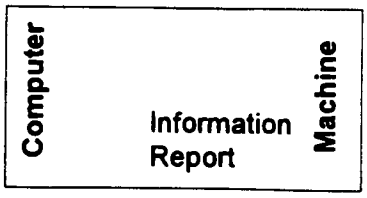
wall thickness profile (vertical 1)	*= 0*
wall thickness profile (vertical 2)	*= 1*
wall thickness profile (vertical 3)	*= 2*
wall thickness profile (vertical 4)	*= 3*
wall thickness profile (vertical 5)	*= 4*
wall thickness profile (radial 1)	*= 5*
wall thickness profile (radial 2)	*= 6*
ejection profile (head 1)	*= 7*
ejection profile (head 2)	*= 8*
ejection profile (head 3)	*= 9*

}

... *note: This variable gives the possibility to read a specific profile from the machine. It is transferred by Information Report 3.2.2.33*

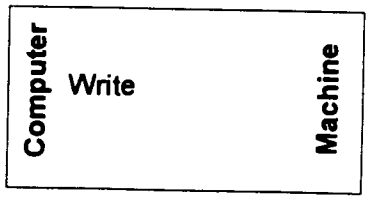
Attribute: Access Method
Semantic: Implicit

3.2.2.36 Profile y(x) from Machine



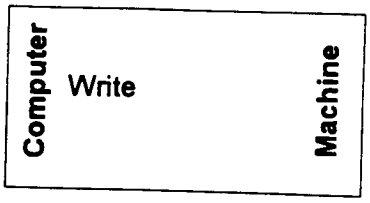
Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFYX_M"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: value identification
actual value = 0
set value = 1
positive tolerance value 1 = 2
positive tolerance value 2 = 3
negative tolerance value 1 = 4
negative tolerance value 2 = 5
{component Name = "PROFID",
component Type = unsigned 16}
semantic: identification of profile
profile of mould closing slow down of station 1 (s(t)) = 0
profile of mould closing slow down of station 2 (s(t)) = 1
profile of mould closing slow down of station 1 (v(s)) = 2
profile of mould closing slow down of station 2 (v(s)) = 3
profile of blow pin movement of station 1 (s(t)) = 4
profile of blow pin movement of station 2 (s(t)) = 5
profile of blow pin movement of station 1 (v(s)) = 6
profile of blow pin movement of station 2 (v(s)) = 7
profile of blowing pressure of station1 = 8
profile of blowing pressure of station2 = 9
{component Name = "PARTID",
component Type = unsigned 32}
semantic: part identification code
{component Name = "PROFILX",
component Type = array {
numberOfElements - Number of profile points x (32-256)
elementType = integer 32}}
{component Name = "PROFILY",
component Type = array {
numberOfElements - Number of profile points y (32-256)
elementType = integer 32}}
semantic: y (x) = s (t) (for profiles s(t))
y(x) = v (s) (for profiles v(s))
y(x) = p (t) (for profiles of blowing pressure)
(s in mm, v in mm/s, p in bar, t in seconds, t = 0 = start of profile)
}
Attribute: Access Method
Semantic: Implicit

3.2.2.37 Profile y(x) from Computer



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFYX_C"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: value identification
set value = 1
positive tolerance value 1 = 2
positive tolerance value 2 = 3
negative tolerance value 1 = 4
negative tolerance value 2 = 5
{component Name = "PROFID",
component Type = unsigned 16}
semantic: identification of profile
profile of mould closing slow down of station 1 (s(t)) = 0
profile of mould closing slow down of station 2 (s(t)) = 1
profile of mould closing slow down of station 1 (v(s)) = 2
profile of mould closing slow down of station 2 (v(s)) = 3
profile of blow pin movement of station 1 (s(t)) = 4
profile of blow pin movement of station 2 (s(t)) = 5
profile of blow pin movement of station 1 (v(s)) = 6
profile of blow pin movement of station 2 (v(s)) = 7
profile of blowing pressure of station1 = 8
profile of blowing pressure of station2 = 9
{component Name = "PROFILX",
component Type = array {
numberOfElements - Number of profile points x (32-256)
elementType = integer 32}}
{component Name = "PROFILY",
component Type = array {
numberOfElements - Number of profile points y (32-256)
elementType = integer 32}}
semantic: y (x) = s (t) (for profiles s(t))
y(x) = v (s) (for profiles v(s))
y(x) = p (t) (for profiles of blowing pressure)
(s in mm, v in mm/s, p in bar, t in seconds, t = 0 = start of profile)
}
Attribute: Access Method
Semantic: Implicit

3.2.2.38 Profile y(x), Request from Computer



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "PROFYX_R"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "VALID",
component Type = unsigned 16}
semantic: *value identification*

actual value	*= 0*
set value	*= 1*
positive tolerance value 1	*= 2*
positive tolerance value 2	*= 3*
negative tolerance value 1	*= 4*
negative tolerance value 2	*= 5*

{component Name = "PROFID",
component Type = unsigned 16}
semantic: *identification of profile*

profile of mould closing slow down of station 1 (s(t))	*= 0*
profile of mould closing slow down of station 2 (s(t))	*= 1*
profile of mould closing slow down of station 1 (v(s))	*= 2*
profile of mould closing slow down of station 2 (v(s))	*= 3*
profile of blow pin movement of station 1 (s(t))	*= 4*
profile of blow pin movement of station 2 (s(t))	*= 5*
profile of blow pin movement of station 1 (v(s))	*= 6*
profile of blow pin movement of station 2 (v(s))	*= 7*
profile of blowing pressure of station1	*= 8*
profile of blowing pressure of station2	*= 9*

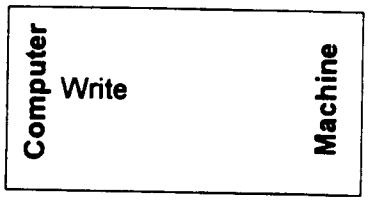
}

... *note: This variable gives the possibility to read a specific profile from the machine. It is transfered by Information Report 3.2.2.36*

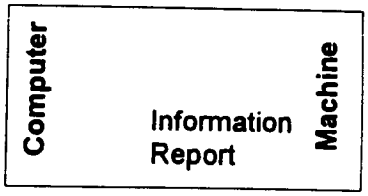
Attribute: Access Method
Semantic: Implicit

3.2.2.39 ASCII Text Transfer

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "ASCII_OU"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = visible-string 2000
semantic: text for output at machine
Attribute: Access Method
Semantic: Implicit

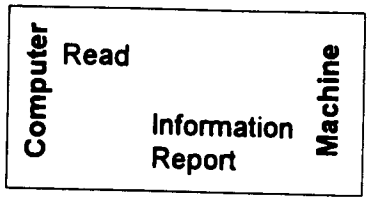


Object: Named Variable
Key Attribute: Variable Name = VMD-specific "ASCII_IN"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = visible-string 2000
semantic: text for input at machine
Attribute: Access Method
Semantic: Implicit



3.2.2.40 Machine Configuration

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "MACHCON"
Attribute: MMS Deleteable = FALSE
Attribute: Type Description = Structure
components{
{component Name="AVAILABL"
component Type=bit-string 176}



semantic:	*machine identification*	*(0)*
	job definition	*(1)*
	job target	*(2)*
	job status 1	*(3)*
	job status 2	*(4)*
	production control command	*(5)*
	production status	*(6)*
	machine status	*(7)*
	ancillary aquipment Status	*(8)*
	alarms	*(9)*
	operator identification	*(10)*
	time and date from central computer	*(11)*
	reinitialisation of production counter	*(12)*
	actual material consumption for job	*(13)*
	setpoint of part quality parameters	*(14)*
	actual value of part quality parameters	*(15)*
	actual values of process parameters of extruder 1	*(16)*
	extruder 2	*(17)*
	extruder 3	*(18)*
	extruder 4	*(19)*
	extruder 5	*(20)*
	extruder 6	*(21)*
	extruder 7	*(22)*
	extruder 8	*(23)*
	head 1	*(24)*
	head 2	*(25)*
	head 3	*(26)*
	station 1	*(27)*
	station 2	*(28)*
	limit values of process paramters of extruder 1	*(29)*
	extruder 2	*(30)*
	extruder 3	*(31)*
	extruder 4	*(32)*
	extruder 5	*(33)*
	extruder 6	*(34)*
	extruder 7	*(35)*
	extruder 8	*(36)*
	head 1	*(37)*
	head 2	*(38)*
	head 3	*(39)*
	station 1	*(40)*
	station 2	*(41)*

profile y(x) for actual value (x equidistant)		
wall thickness	*(vertical 1)*	*(42)*
	(vertical 2)	*(43)*
	(vertical 3)	*(44)*
	(vertical 4)	*(45)*
	(vertical 5)	*(46)*
	(radial 1)	*(47)*
	(radial 2)	*(48)*
ejection profile	*(head 1)*	*(49)*
	(head 2)	*(50)*
	(head 3)	*(51)*
profile y(x) for set value (x equidistant)		
wall thickness	*(vertical 1)*	*(52)*
	(vertical 2)	*(53)*
	(vertical 3)	*(54)*
	(vertical 4)	*(55)*
	(vertical 5)	*(56)*
	(radial 1)	*(57)*
	(radial 2)	*(58)*
ejection profile	*(head 1)*	*(59)*
	(head 2)	*(60)*
	(head 3)	*(61)*
profile y(x) for postive tolerance value 1 (x equidistant)		
wall thickness	*(vertical 1)*	*(62)*
	(vertical 2)	*(63)*
	(vertical 3)	*(64)*
	(vertical 4)	*(65)*
	(vertical 5)	*(66)*
	(radial 1)	*(67)*
	(radial 2)	*(68)*
ejection profile	*(head 1)*	*(69)*
	(head 2)	*(70)*
	(head 3)	*(71)*
profile y(x) for postive tolerance value 2 (x equidistant)		
wall thickness	*(vertical 1)*	*(72)*
	(vertical 2)	*(73)*
	(vertical 3)	*(74)*
	(vertical 4)	*(75)*
	(vertical 5)	*(76)*
	(radial 1)	*(77)*
	(radial 2)	*(78)*
ejection profile	*(head 1)*	*(79)*
	(head 2)	*(80)*
	(head 3)	*(81)*

profile y(x) for negative tolerance value 1 (x equidistant)		
wall thickness	*(vertical 1)*	*(82)*
	(vertical 2)	*(83)*
	(vertical 3)	*(84)*
	(vertical 4)	*(85)*
	(vertical 5)	*(86)*
	(radial 1)	*(87)*
	(radial 2)	*(88)*
ejection profile	*(head 1)*	*(89)*
	(head 2)	*(90)*
	(head 3)	*(91)*
profile y(x) for negative tolerance value 2 (x equidistant)		
wall thickness	*(vertical 1)*	*(92)*
	(vertical 2)	*(93)*
	(vertical 3)	*(94)*
	(vertical 4)	*(95)*
	(vertical 5)	*(96)*
	(radial 1)	*(97)*
	(radial 2)	*(98)*
ejection profile	*(head 1)*	*(99)*
	(head 2)	*(100)*
	(head 3)	*(101)*
profile y(x) for actual value		
mould closing slow down of		
station 1 (s(t))		*(102)*
station 2 (s(t))		*(103)*
station 1 (v(s))		*(104)*
station 2 (v(s))		*(105)*
blow pin movement station 1 (s(t))		*(106)*
blow pin movement station 2 (s(t))		*(107)*
blow pin movement station 1 (v(s))		*(108)*
blow pin movement station 2 (v(s))		*(109)*
blowing pressure of station 1		*(110)*
blowing pressure of station 2		*(111)*
profile y(x) for set value		
mould closing slow down of		
station 1 (s(t))		*(112)*
station 2 (s(t))		*(113)*
station 1 (v(s))		*(114)*
station 2 (v(s))		*(115)*
blow pin movement station 1 (s(t))		*(116)*
blow pin movement station 2 (s(t))		*(117)*
blow pin movement station 1 (v(s))		*(118)*
blow pin movement station 2 (v(s))		*(119)*
blowing pressure of station 1		*(120)*
blowing pressure of station 2		*(121)*

profile y(x) for positive tolerance value 1
mould closing slow down of
station 1 (s(t)) *(122)*
station 2 (s(t)) *(123)*
station 1 (v(s)) *(124)*
station 2 (v(s)) *(125)*
blow pin movement station 1 (s(t)) *(126)*
blow pin movement station 2 (s(t)) *(127)*
blow pin movement station 1 (v(s)) *(128)*
blow pin movement station 2 (v(s)) *(129)*
blowing pressure of station 1 *(130)*
blowing pressure of station 2 *(131)*

profile y(x) for positive tolerance value 2
mould closing slow down of
station 1 (s(t)) *(132)*
station 2 (s(t)) *(133)*
station 1 (v(s)) *(134)*
station 2 (v(s)) *(135)*
blow pin movement station 1 (s(t)) *(136)*
blow pin movement station 2 (s(t)) *(137)*
blow pin movement station 1 (v(s)) *(138)*
blow pin movement station 2 (v(s)) *(139)*
blowing pressure of station 1 *(140)*
blowing pressure of station 2 *(141)*

profile y(x) for negative tolerance value 1
mould closing slow down of
station 1 (s(t)) *(142)*
station 2 (s(t)) *(143)*
station 1 (v(s)) *(144)*
station 2 (v(s)) *(145)*
blow pin movement station 1 (s(t)) *(146)*
blow pin movement station 2 (s(t)) *(147)*
blow pin movement station 1 (v(s)) *(148)*
blow pin movement station 2 (v(s)) *(149)*
blowing pressure of station 1 *(150)*
blowing pressure of station 2 *(151)*

profile y(x) for negative tolerance value 1
mould closing slow down of
station 1 (s(t)) *(152)*
station 2 (s(t)) *(153)*
station 1 (v(s)) *(154)*
station 2 (v(s)) *(155)*
blow pin movement station 1 (s(t)) *(156)*
blow pin movement station 2 (s(t)) *(157)*
blow pin movement station 1 (v(s)) *(158)*
blow pin movement station 2 (v(s)) *(159)*
blowing pressure of station 1 *(160)*
blowing pressure of station 2 *(161)*

	text for output at machine	*(162)*
	text for input at machine	*(163)*
	reserved for EUROMAP	*(164-175)*

{component Name="**MACHID**"
component Type=bit-string 16}

semantic:	*code of extruder 1*	*(0)*
	code of extruder 2	*(1)*
	code of extruder 3	*(2)*
	code of extruder 4	*(3)*
	code of extruder 5	*(4)*
	code of extruder 6	*(5)*
	code of extruder 7	*(6)*
	code of extruder 8	*(7)*
	code of blow head 1	*(8)*
	code of blow head 2	*(9)*
	code of blow head 3	*(10)*
	code of station 1	*(11)*
	code of station 2	*(12)*
reserved for EUROMAP		*(13-15)*

{component Name = "**AVALPAQU**"
component Type = bit-string 112}

semantic:	*actual part weight quality parameter*	*(0)*
	actual gross weight quality parameter	*(1)*
	actual quality parameter 3	*(2)*
	.	.
	.	.
	actual quality parameter 99	*(98)*
	reserved for EUROMAP	*(99-111)*

{component Name = "**AVAPROE1**"
component Type = bit-string 16}

semantic:	*actual value of process parameters of extruder 1*	
	melt temperature of extruder in °C / °F	*(0)*
	melt pressure of extruder in bar / psi	*(1)*
	torque of extruder in Nm / Nm	*(2)*
	screw speed of extruder in min^{-1} / rpm	*(3)*
	cooling water temperature of feeding zone inlet of extruder in °C / °F	*(4)*
	cooling water temperature of feeding zone outlet of extruder in °C / °F	*(5)*
	cooling water flow of feeding zone of extruder in l/min / cfm	*(6)*
	actual value of throughput per hour of extruder in kg/h / lbs/h	*(7)*
	reserved for EUROMAP	*(8-15)*

{component Name = "**AVAPROE2**"
component Type = bit-string 16}

semantic: *actual value of process parameters of extruder 2*

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE3**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 3

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE4**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 4

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE5**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 5

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE6**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 6

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE7**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 7

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROE8**"
component Type = bit-string 16}
semantic: actual value of process parameters of extruder 8

... *note: same structure as* "**AVAPROE1**"

{component Name = "**AVAPROH1**"
component Type = bit-string 16}
semantic: actual value of process parameters of head 1

melt temperature of head in °C / °F	*(0)*
melt pressure of head in bar / psi	*(1)*
hydraulic pressure of ejection in bar / psi	*(2)*
ejection time of head in tenth of s / s	*(3)*
ejection volume of head in tenth of l / cu.in.	*(4)*
reserved for EUROMAP	*(5-15)*

{component Name = "**AVAPROH2**"
component Type = bit-string 16}
semantic: actual value of process parameters of head 2

... *note: same structure as* "**AVAPROH1**"

{component Name = "**AVAPROH3**"
component Type = bit-string 16}
semantic: actual value of process parameters of head 3

... *note: same structure as* **"AVAPROH1"**

{component Name = "**AVAPROS1**"
component Type = bit-string 16}
semantic: actual value of process parameters of station 1

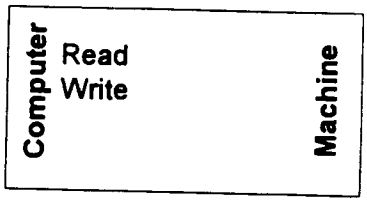
blowing pressure air in bar / psi	*(0)*
blowing pressure nitrogen in bar / psi	*(1)*
blowing pressure fluorine in bar / psi	*(2)*
blowing pressure CO_2 in bar / psi	*(3)*
hydraulic pressure of clamping unit in bar / psi	*(4)*
cooling water temp. of mould inlet of in °C / °F	*(5)*
cooling water temp. of mould outlet of in °C / °F	*(6)*
cooling water flow of mould in l/min / cfm	*(7)*
cycle time in tenth of s / s	*(8)*
reserved for EUROMAP	*(9-15)*

{component Name = "**AVAPROS2**"
component Type = bit-string 16}
semantic: actual value of process parameters of station 2

... *note: same structure as* **"AVAPROS1"**

}

3.2.2.41 Job Configuration

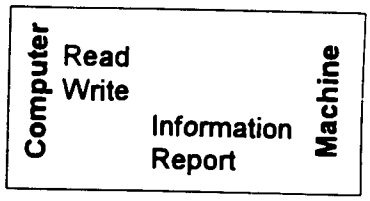


Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**JOBCON**"
Attribute: MMS Deleteable = FALSE
Attribute: Type Description = Structure

... *- note: same structure as defined in 3.2.2.40*

semantic: only bits that are set in **"MACHCON"** *are allowed to change here*

3.2.2.42 Log In

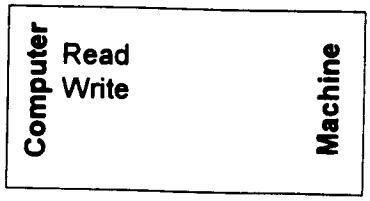


Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**LOGIN**"
Attribute: MMS Deleteable = FALSE
Attribute: Type Description = bit-string 16
Semantic:

log-on command / status of machine	*(0)*
log-off command / status of machine	*(1)*
log-on command / status of central computer	*(2)*
log-off command / status of central computer	*(3)*
When the machine is switched on, the old log-status of the machine before switching off is generated automatically.	
reserved for EUROMAP	(4-15)

Attribute: Access Method
Semantic:Implicit

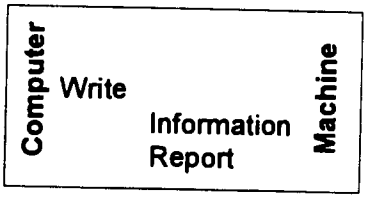
3.2.2.43 Data Set



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**DATASET**"
Attribute: MMS Deletable = FALSE
Attribute: Type Description = structure
components {
{component Name = "**IDDATA**"
component Type = visible-string 20},
semantic: data set identification no.
{component Name = "**BLOCKNO**"
component Type = unsigned 16},
semantic: transfered block number (0... max. block number)
{component Name = "**VALUE**"
component Type = octet string of n },
Semantic: data set values

... *note: length n is manufacturer and machine specific.*
}
Attribute: Access Method
Semantic: Implicit

3.2.2.44 Transfer Task



Object: Named Variable
Key Attribute: Variable Name = VMD-specific "**TRANSFER**"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = structure
components {
{component Name = "**IDDATA**"
component Type = visible-string 20},
Semantic: data set identification no.
{component Name = "**NOBLOCKS**"
component Type = unsigned 16},
Semantic: number of last block
{component Name = "**TASK**"
component Type = unsigned 16},
Semantic: no task, end of task = 0
start upload of processing specific data set initiated by machine = 1
start download of processing specific data set initiated by machine = 2
start upload of machine specific data set initiated by machine = 3
start download of machine specific data set initiated by machine = 4
start upload of processing specific data set initiated by central computer = 5
start download of processing specific data set initiated by central computer = 6
start upload of machine specific data set initiated by central computer = 7
start download of machine specific data set initiated by central computer = 8
{component Name = "**ACKNOWL**"
component Type = unsigned 16},
Semantic: transfer allowed, positive acknowledgement for transfer = 0
wrong operation mode of machine = 1
data set not available at central computer = 2
data set already existing at central computer = 3
wrong data set = 4
uncomplete data set = 5
}
Attribute: Access Method
Semantic: Implicit

4. Normative References

ISO 7498-1:1984, Information Processing Systems - Open Systems Interconnection - Basic Reference Model.

ISO 7498-3, Information Processing Systems - Open Systems Interconnection - Naming and Addressing.

ISO 8326:1987, Information Processing Systems - Open Systems Interconnection - Basic Connection Oriented Session Service Definition.

ISO TR/8509:1987, Information Processing Systems - Open Systems Interconnection - Service Conventions.

ISO 8649:1987, Information Processing Systems - Open Systems Interconnection - Association Control Service Element - Service Definition.

ISO 8650:1987,Information Processing Systems - Open Systems Interconnection - Association Control Service Element - Protocol Specification.

ISO 8822:1987, Information Processing Systems - Open Systems Interconnection - Connection Oriented Presentation Service Definition.

ISO 8824:1987, Information Processing Systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).

ISO/IEC 9506-1:1990, Industrial Automation Systems - Manufacturing Message Specification (MMS). Part 1: Service Definition.

ISO/IEC 9506-2:1990, Industrial Automation Systems - Manufacturing Message Specification (MMS). Part 2: Protocol Specification.

EUROMAP 45 ANNEX	PROTOCOL FOR COMMUNICATION BETWEEN BLOW MOULDING MACHINES AND A CENTRAL COMPUTER

Version 1.0, June 93

Manufacturer Code for Machine Identification

Object: Named Variable
Key Attribute: Variable Name = VMD-specific "MACHID"
Attribute: MMS Deletable= FALSE
Attribute: Type Description = array{
number of Elements -Number of Codes (16)

semantic:	*EUROMAP-Protocol version*	*Array element 0*
	manufacturer code	*Array element 1*
	machine code	*Array element 2*
	code of extruder 1	*Array element 3*
	code of extruder 2	*Array element 4*
	code of extruder 3	*Array element 5*
	code of extruder 4	*Array element 6*
	code of extruder 5	*Array element 7*
	code of extruder 6	*Array element 8*
	code of extruder 7	*Array element 9*
	code of extruder 8	*Array element 10*
	code of blow head 1	*Array element 11*
	code of blow head 2	*Array element 12*
	code of blow head 3	*Array element 13*
	code of station 1	*Array element 14*
	code of station 2	*Array element 15*

element Type = visible string 4}
Attribute: Access Method
Semantic: Implicit...
note: semantic of manufacturer code as follows:

name of manufacturer	*manufacturer code*	*name of manufacturer*	*manufacturer code*
A. D. S.	*0001*	*Serta*	*0016*
Automa	*0002*	*Sidel*	*0017*
Battenfeld Fischer	*0003*	*Sinco Engineering*	*0018*
Bekum	*0004*	*Sipa*	*0019*
Krupp Kautex	*0005*	*Stec*	*0020*
Lenzing	*0006*	*Techne*	*0021*
Luxber	*0007*	*Uniloy*	*0022*
Magic MP	*0008*	*Urola S. Coop.*	*0023*
Mateu Y Sole	*0009*	*Vogel*	*0024*
Meccanoplastica	*0010*	*Vogel + Noot Technologie*	*0025*
Meico	*0011*	*Wess*	*0026*
Plamasa	*0012*		
Plastimac	*0013*		
Procrea	*0014*		
P. T. M. - Ingenieria	*0015*		

EUROMAP

Europäisches Komitee der Hersteller von Kunststoff- und Gummimaschinen

European Committee of Machinery Manufacturers for the Plastics and Rubber Industries

Comité Européen des Constructeurs de Machines pour Plastiques et Caoutchouc

Comitato Europeo Costruttori Macchine per Materie Plastiche e Gomma

See you again

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