# List of variables and their meanings

# Sensor high-frequency data

Each die corresponds to a csv file, which is saved from the moment when the off die starts and ends at the moment when the next die starts.

Example csv file name:

‘mould\_data\_611925088\_56694.csv’

Among them, 611925088 is the time code of the mould, which is the same as ‘spcTime’ in ‘Moulding machine status data’ and ‘versionTime’ in ‘Machine process setting parameters’. ‘versionTime’ in “machine status data” and “machine process setting parameters”; 56694 is the mould number of the mould, and “Id” in “machine status data” and “machine process setting parameters”. 56694 is the mould number of the mould, which corresponds to ‘Id’ in the ‘moulding machine status data’ and ‘machine process setting parameter’.

Each file has 24 columns:

|  |  |  |
| --- | --- | --- |
| Name | Descriptions | Remark |
| SampleTime | sampling time | From the start of mould closure to the start of mould closure of the next mould |
| Phase | Stages of the moulding machine | Action phases, including: 0-idle, 1-closing mould, 2-seating in, 3-injection, 4-pressure holding, 6-melting, 7-backward loosening and retreating, 8-cooling, 9-seating retreating, 10-opening the mould, 11-topping in, 12-topping retreating, 13-16-neutral sub 1~4 in, 17-20-neutral sub 1~4 retreating. |
| Sensor1 | In-mould pressure | In-module sensor signals |
| Sensor2 |
| Sensor3 |
| Sensor5 | In-mould temperature |
| Sensor6 |
| Sensor8 | Mould temperature machine water flow meter actual flow |
| SP | Actual screw position |  |
| IJ | Nozzle tip ejection pressure |  |
| MouldTemp1 | Thermostatic 1 temperature | Actual temperature sensors for mould heaters |
| MouldTemp2 | Thermostatic 2 temperature |
| MouldTemp3 | Cooling water temperature |
| MouldTemp4 | Hot water temperature |
| MouldTemp5 | Return temperature |
| MouldTemp9 | Common Mould Temperature | Molten actual temperature sensor signal |
| MouldTemp10 |
| MouldTemp11 |
| MouldTemp12 | Master Mould Temperature |
| MouldTemp13 |
| MouldTemp14 |
| MouldFlow1 | Total number of cycles | Actual flow value of mould temperature machine supply water |
| MouldFlow2 | Total single-cycle chilled water |
| MouldFlow3 | Total single-cycle hot water |

# Forming machine status data，spc

|  |  |  |
| --- | --- | --- |
| Name | Descriptions | Comment |
| spcTime | Recording time | MES time at the end of the cycle |
| EL\_CYC\_TIME | Cycle time |  |
| EL\_NZL\_MEAN | Average value of temperature |  |
| EL\_CLAMP\_PRESS | Mould clamping pressure | System pressure during high pressure clamping |
| EL\_MOP | Mould opening end |  |
| EL\_PLST\_END\_ERR | Melting endpoint |  |
| EL\_INJ\_START\_STR | Projectile starting point |  |
| EL\_MAX\_INJ\_PRESS | Maximum injection pressure |  |
| EL\_IV\_END\_STR | Switching position |  |
| EL\_IV\_END\_TIME | Switching time | Injection start delay time not included |
| EL\_IV\_END\_PRESS | Switching pressure |  |
| EL\_VPS\_END\_STR | Shotgun end |  |
| EL\_MIN\_INJ\_STR | Minimum injection position |  |
| op\_mode | Operating mode | 1: mould adjustment, 2: manual, 3: semi-automatic, 4: fully automatic |
| EL\_PLST\_TIME | Melting time | Exclusive of slack time |
| EL\_LAST\_COOL\_TIME | Aftercooling time | Cooling time at the end of the melt |
| EL\_MC\_TIME | Mould closing time |  |
| EL\_MO\_TIME | Mould opening time |  |
| EL\_EF\_TIME | Top-in time |  |
| EL\_EB\_TIME | Retirement time |  |
| EL\_IDLE\_TIME | Free time |  |
| EL\_CORE\_IN\_TIME\_<Nr> | Neutron input time | Nr from 0 to 4 |
| EL\_CORE\_OUT\_TIME\_<Nr> | Neutron retirement time | Nr from 0 to 4 |
| EL\_IV\_TIME | Filling time |  |
| EL\_PP\_TIME | Holding time |  |
| EL\_SB1\_TIME | Formosan time |  |
| EL\_SB2\_TIME | Taillight time |  |
| EL\_CF\_TIME | Seating time |  |
| EL\_CB\_TIME | Stand back time |  |
| EL\_BARREL\_MEAN\_<Nr> | Barrel temperature | Nr from 1 to 7. Collected once a second, averaged over the entire cycle |
| EL\_HTRN\_TI\_<Nr> | Hot runner temperature | Nr goes from 0 to 7. end-of-cycle value. |
| EL\_PLST\_BP\_<Nr> | Melt Back Pressure | Nr from 0 to 4.  0.01 is collected once, and the last 0.1 seconds of each phase is averaged to correspond to the steady state value |
| EL\_PP\_STG\_POS\_<Nr> | Holding pressure end position | Nr from 0 to 4, position at the end of each holding pressure segment |
| EL\_IV\_STG\_TIME\_<Nr> | Filling time | Nr from 0 to 4. |
| EL\_EF\_END\_POS | Jacking end position |  |
| EL\_CF\_END\_PRESS | Seating termination pressure |  |
| Id | Module Id | Machine production module |
| remark | remark |  |
| ext\_mold\_temp\_flt\_<Nr> | Mould temperature | Nr from 0 to 4. Collected once a second and averaged over the entire cycle. Separately: thermostat 1, thermostat 2, cold water, hot water, return water. Unit Celsius。 |
| ext\_mold\_flow\_flt\_<Nr> | Mould water flow | Nr from 0 to 3. Values at the end-of-cycle moment. The instantaneous flow rate, the total amount of cold water in a single cycle, the total amount in a single cycle, and the total amount of hot water in a single cycle, respectively, in units of L. The value at the moment of the end of the cycle. |
| ext\_mold\_time\_flt\_<Nr> | Mould water transport time | Nr from 0 to 4 in seconds, respectively: single cycle total time (s), single cycle cold water time (s), single cycle hot water time (s), hot water cut cold water time (s), cold water cut hot water time (s). Value at the end moment of the cycle. |
| rob\_enbl | Robot use |  |

# Machine process setting parameters，dataset

|  |  |  |
| --- | --- | --- |
| Name | Descriptions | Remark |
| techType | Process type | 1.currentValue for the current value, inserted into the dbspc, if the productType for the transfer machine, then insert a line;  2. standardValue is the standard value, standardDeviation is the standard deviation, generated when iMark is submitted;  3. specifiedTimeValue is a specific time, 8am and 8pm  4. realTimeValue is the real-time value. |
| versionTime | Recording time | This value is the same as the spcTime in the spc database |
| remark | remark |  |
| adjust\_reasons | Reason for switching machines | Format ‘scrap number,’, the meaning of scrap number see DBFactoryBadProductType database table, change the table in iMark's Factory Information Definition |
| Id | Module Id (machine production module) | This value is the same as the Id in the spc database |
| mc\_press\_<Nr> | Closing Pressure | Nr is the sub-stage, 0 is the closing mould 1, 1 is the closing mould 2, 2 is the mould protection and 3 is the high voltage. High voltage has no position |
| mc\_speed\_<Nr> | Mould closing speed |
| mc\_pos\_<Nr> | End of mould closing |
| mo\_press\_<Nr> | Mould Opening Pressure | Nr is sub-stage, 2 is unlocked, 3 is high speed, 4 is medium speed, 5 is low speed |
| mo\_speed\_<Nr> | Mould opening speed |
| mo\_pos\_<Nr> | Mould opening end |
| ef\_press\_<Nr> | Pressurisation | Nr is a sub-stage, 0 is a segment, 1 is a second segment, 2 is a third segment |
| ef\_speed\_<Nr> | Ejector speed |
| ef\_time\_<Nr> | Top-in time |
| ef\_pos\_<Nr> | End of jacking position |
| ef\_points | Number of jacking segments |  |
| ef\_times | Number of ejections |  |
| eje\_oprt\_mode | Thimble mode | 0 means ‘no need’; 1 means ‘stay’; 2 means ‘vibrate’; 3 means ‘many times’; |
| phs\_start\_delay\_10 | Start of jacking delay |  |
| eb\_press\_<Nr> | Beat back the pressure | Nr is a sub-stage, 0 is a segment, 1 is a second segment, 2 is a third segment |
| eb\_speed\_<Nr> | Ejector speed |
| eb\_time\_<Nr> | Retirement time |
| eb\_pos\_<Nr> | Checkmate (in chess) |
| eb\_points | Number of backward-looking segments |  |
| phs\_start\_delay\_11 | Top back start delay |  |
| core\_in\_press\_<Nr> | Neutron entry pressure | Nr is the number of termination, 0-3: corresponds to neutron one to four.  Note: Neutron has mode, action position, priority, etc. not added.  mode  Control mode: 0 means time, 1 means limit, 2 means number of teeth. |
| core\_in\_speed\_<Nr> | Neutron entrance velocity |
| core\_in\_mode\_<Nr> | Neutron-entry control mode |
| core\_in\_time\_<Nr> | Neutron entry time |
| core\_out\_press\_<Nr> | Neutron emission pressure |
| core\_out\_speed\_<Nr> | Neutron exit velocity |
| core\_out\_mode\_<Nr> | Neutron-out control mode |
| core\_out\_time\_<Nr> | Neutron emission time |
| cf\_press\_<Nr> | Seating pressure | Nr is a sub-stage, 0 is fast, 1 is slow |
| cf\_speed\_<Nr> | Seating speed |
| cf\_pos\_<Nr> | Seat at the end of the line |
| cf\_ls\_delay | Seating time |  |
| cb\_press | Seating pressure |  |
| cb\_speed | Seat back speed |  |
| cb\_time | Stand back time |  |
| cb\_pos | Abortive terminus (math.) |  |
| pack\_press\_<Nr> | Hold pressure | Nr is a sub-stage, 0~4: corresponding to one to five stages of holding pressure |
| pack\_speed\_<Nr> | Hold speed |
| pack\_time\_<Nr> | Hold time |
| vps\_time | Hold switch time |  |
| vps\_str | Hold switch position |  |
| vps\_prss | Hold switch pressure |  |
| vps\_by\_time\_enbl | Hold switch enable by time |  |
| vps\_by\_str\_enbl | Hold switch enable by position |  |
| vps\_by\_prss\_enbl | Hold switch enable by pressure |  |
| inj\_press\_<Nr> | Injection pressure | Nr is a sub-stage, 0 to 4: corresponds to one to five injections, Nr = 4 has no endpoint and no time |
| inj\_speed\_<Nr> | Injection speed |
| inj\_pos\_<Nr> | Injection endpoint |
| inj\_time\_<Nr> | Injection time |
| inj\_points | Injection segments |  |
| pack\_points | Hold segments |  |
| inj\_ctr\_by\_time\_enbl | Injection segment switch mode | 0 for position, 1 for press time |
| inj\_sn\_func\_<Nr> | Ejector auxiliary valve control mode | Nr for which auxiliary valve, 0 ~ 14, injection boost, injection fast, hydraulic nozzle, holding pressure decompression, injection gas auxiliary, hot runner one to ten  Mode definition: 0 is not used, 1 is time on time off; 2 is time on position off; 3 is position on time off; 4 is position on position off; 5 is position on timing off 5 |
| inj\_on\_time\_<Nr> | Ejector auxiliary valve injection open time |
| inj\_off\_time\_<Nr> | Ejector auxiliary valve injection close time |
| inj\_on\_pos\_<Nr> | Ejector auxiliary valve injection open position |
| inj\_off\_pos\_<Nr> | Ejector auxiliary valve injection close position |
| pack\_on\_time\_<Nr> | Ejector auxiliary valve hold open time |
| pack\_off\_time\_<Nr> | Ejector auxiliary valve hold close time |
| sb<Nr>\_mode | Release mode | Nr for which loose retreat, front loose 1, back loose 2 |
| sb<Nr>\_press | Release pressure |
| sb<Nr>\_speed | Release speed |
| sb<Nr>\_str | Release distance |
| sb<Nr>\_time | Release time |
| plst\_press\_<Nr> | Melt pressure | Nr is a sub-stage, 0 to 4: corresponds to one to five stages of the sol |
| plst\_speed\_<Nr> | Melt screw speed |
| plst\_pos\_<Nr> | Melt endpoint |
| plst\_bp\_<Nr> | Melt back pressure |
| plst\_points | Melt segments |  |
| phs\_start\_delay\_0 | Idle time |  |
| cooling\_mode | Cooling mode | 0 is after shot, 1 is after melt |
| cooling\_time | Cooling time |  |
| fb\_sp\_<Nr> | Barrel temperature | Nr for which segment, 0~7:nozzle, one segment to 7 segments |
| mdt\_sp\_<Nr> | Mold temperature | 0 to 7 correspond to: 0 to 4 for thermostat 1, thermostat 2, cold water, hot water and return water respectively. |
| mdt\_time\_sp\_<Nr> | Mold temperature running time | 0~7 correspond to respectively: 0 indicates chain heating waiting time, 1 indicates chain heating time, 2 indicates drainage time, 3 indicates chain cooling waiting time, 4 indicates chain cooling time. |
| hotruner\_sp\_<Nr> | Hot runner temperature | 0~7 |