

# RDM 54K / 54Kc / 70K / 70Kc

illig®

Machine Types  
Sizes 54 and 70



RDM 54K	(9209304)
RDM 54Kc	(9188305)
RDM 70K	(9209305)
RDM 70Kc	(9188300)

## Modular system (basic machine):

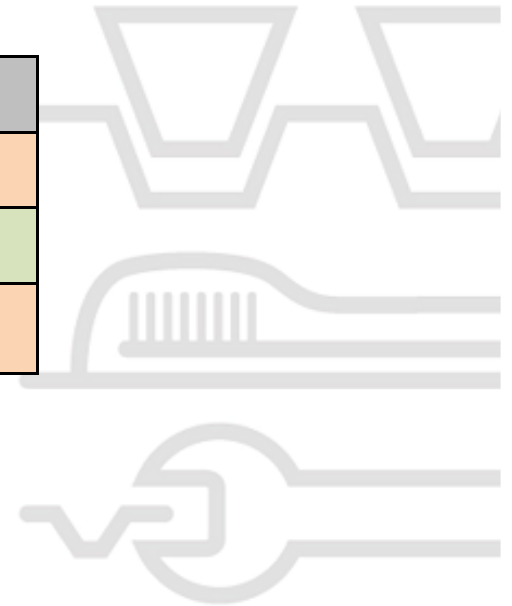
- RDM 54K/70K vs. 2<sup>nd</sup> Gen machines:
  - Benefits 3<sup>rd</sup> Gen Maschine (device, heater, etc.)
  - Increased closing force / extended cutting length
  - New, optimized control & drive technology
  - Many new options available
- RDM 54 Kc/70 Kc vs. 3<sup>rd</sup> Gen machines:
  - New, optimized control & drive technology
  - Many new options available



RDM 54K / 70K  
RDM 54Kc / 70Kc

## Heater control:

Characteristic	Lower heater	Upper heater
015109 (incl.)	Full area control	Longitudinal row control
015110 (option)	Longitudinal row control	Longitudinal row control
017364 (option)	Longitudinal and cross row control	Longitudinal and cross row control

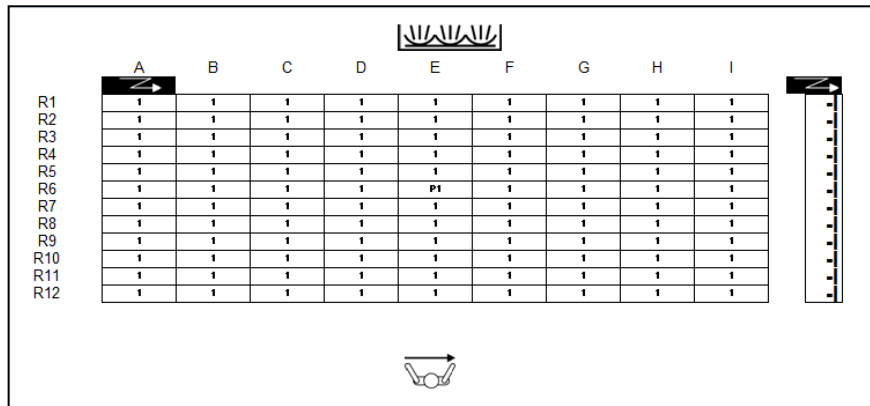


## Heater control „Full area control“ ( 015109):

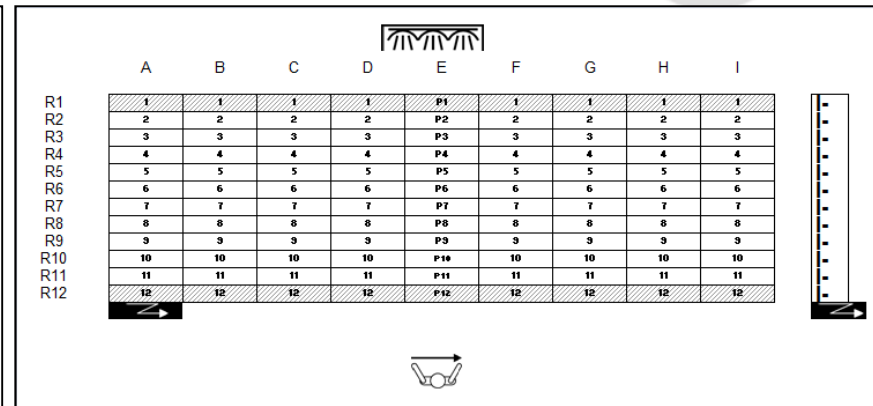
- Basic variant
- Lower heater with full area control (1 pilot heater, elements on edge not reinforced)
- Upper heater with longitudinal row control (1 pilot per longitudinal row, heater elements on edge reinforced)



Lower heater



Upper heater

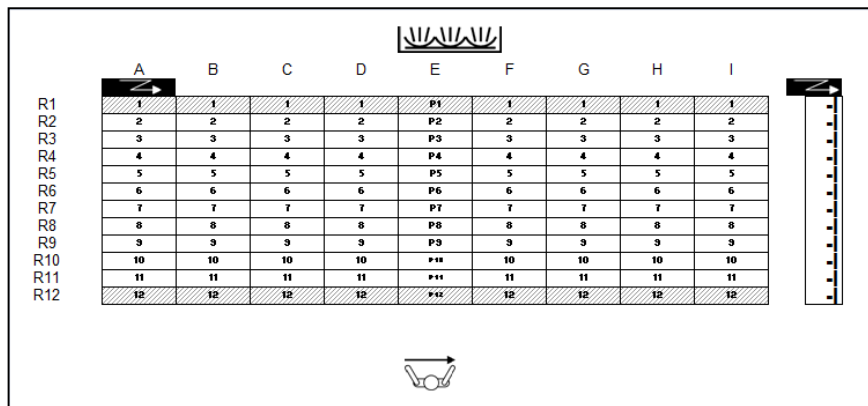


## Heater control „Longitudinal row control“ ( 015110):

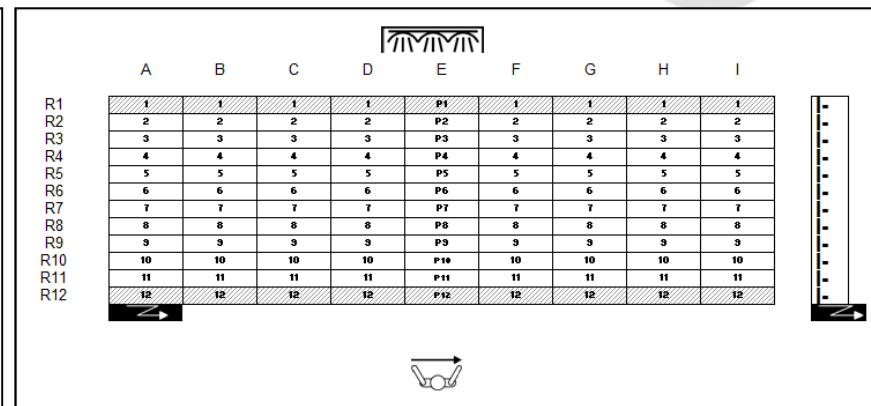
- Lower heater with longitudinal row control  
(1 pilot per longitudinal row, heater elements on edge reinforced)
- Upper heater with longitudinal row control  
(1 pilot per longitudinal row, heater elements on edge reinforced)



### Lower heater

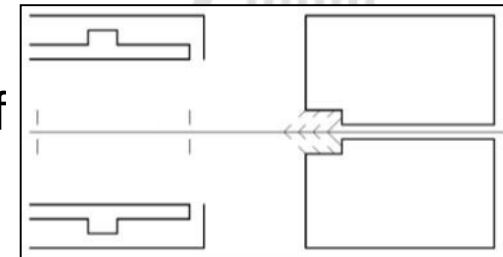


### Upper heater



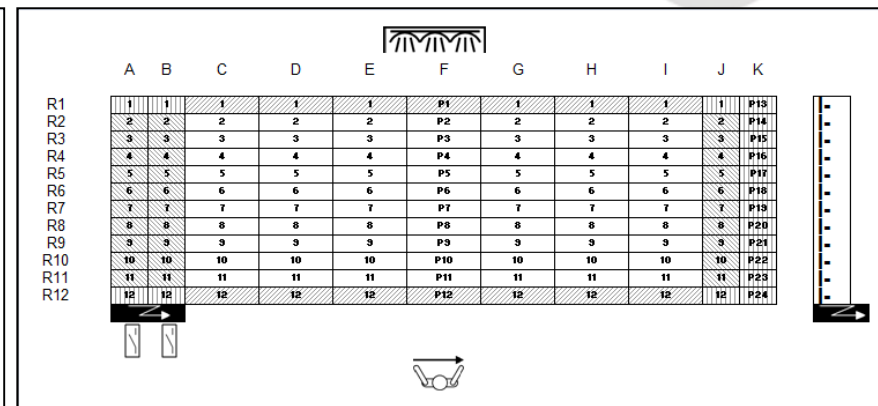
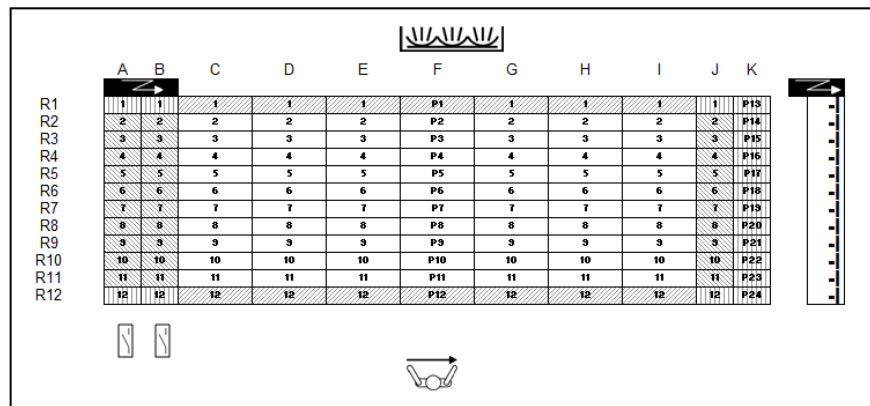
## Heater control „ Longitudinal and cross row control“ ( 017364):

- New heater variant (only available for RDM 54Kc and RDM 70Kc)
- Principally like longitudinal row control
- Last row (outlet) equipped with individually controllable heater elements => Compensation of radiation loss in idle cycle before forming station
- Cross rows A and B on inlet can be switched off => Heater length adjusted to index length



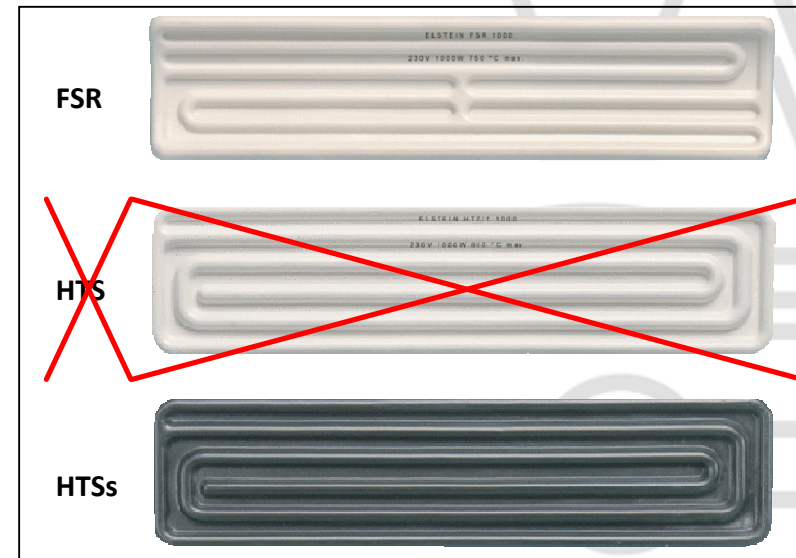
Lower heater

Upper heater



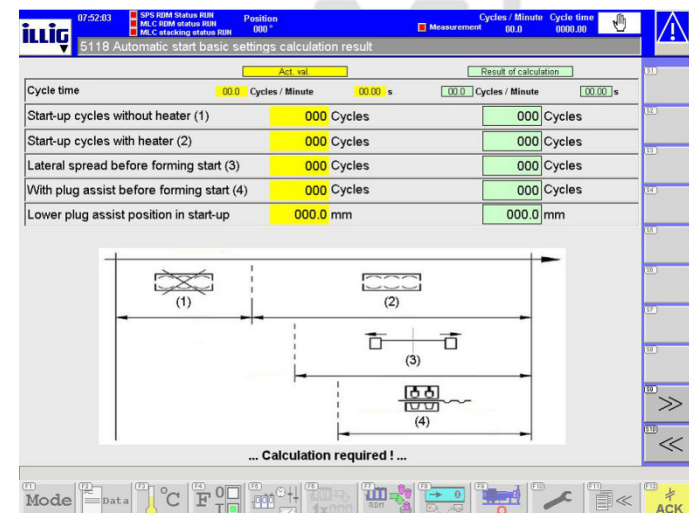
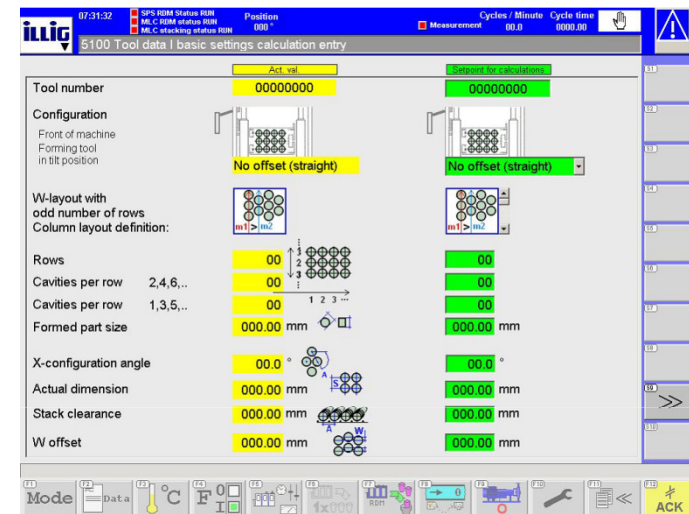
## Heater elements:

- Heater element „FSR“ (011357)
  - Basic machine
- Heater element „HTSs“ (014938)
  - Heater elements with higher energy efficiency
  - Up to 33% less heating energy required than for FSR heater elements



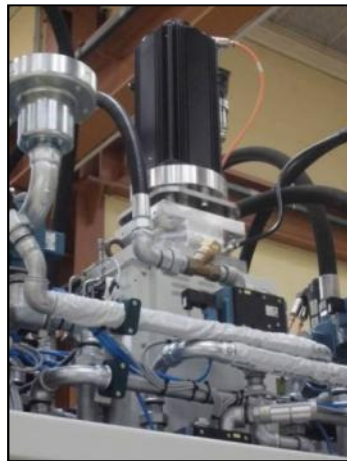
## Calculation of basic setting (in basic machine):

- Calculation of setting parameters for forming machine and heating
- Entry / requirements:
  - Line equipment
  - Tool data
  - Part data
  - Line configuration
  - Information on material
- Calculated values are only displayed
- By pushing a button these values can be accepted as settings





## Pre-stretcher & guided referencing:



RDM 54K / 70K  
(Spindle)

RDM 54Kc / 70Kc  
with and without reduction of forming air  
(Toothed rack)



## Pre-stretcher & guided referencing:

	RDM 54K	RDM 54Kc	RDM 70K	RDM 70Kc
Design	Spindle	Toothed rack	Spindle	Toothed rack
Forming air reduction	-	Optional	-	Optional
Pre-stretcher stroke 160 mm	X	X	X	X
Pre-stretcher stroke 140 mm	Optional	Optional	Optional	Optional
Pre-stretcher stroke 185 mm	-	Optional	-	Optional
Movement time 50 mm	0.22s	0.11s	0.22s	0.11s
Movement time 100 mm	0.28s	0.13s	0.28s	0.13s
Movement time 150 mm	0.35s	0.17s	0.35s	0.17s

## Forming device:

- Devices are based on previous 3<sup>rd</sup> Gen devices

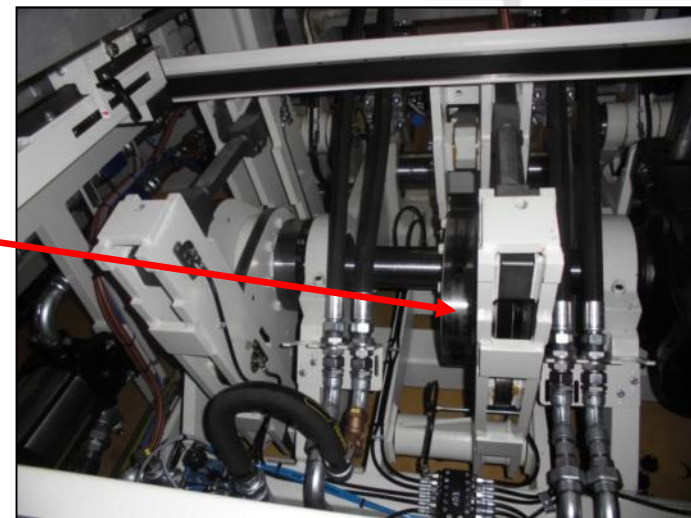
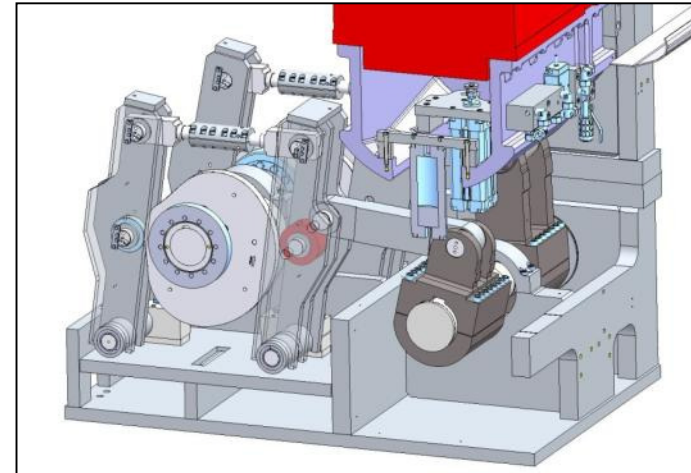
- RDM 70K und RDM 70Kc:

Optimized cam disk geometries:

- More synchronized movements
- Smaller cam angle for forming and transfer area
- Larger cam angle for ascend and descend
- Reduced loads

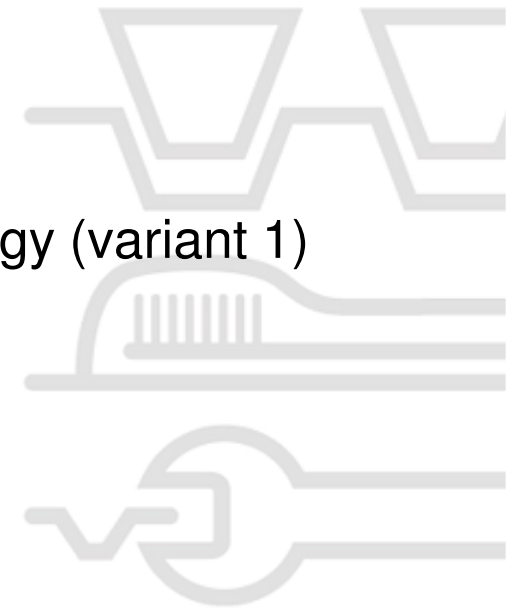
Widened stroke of cam disk:

- More rigid drive mechanics
- Reduction of table vibrations
- Extended service life of cam roll
- Extended service life of tool



## Forming air tank / forming pressure sensor:

- Forming air tubes now larger diameter  
=> Faster build-up of forming pressure
- Forming pressure sensor  
=> Pre-condition for changed forming air technology (variant 1)  
=> Detection of holes in material  
=> Visualization course of forming pressure

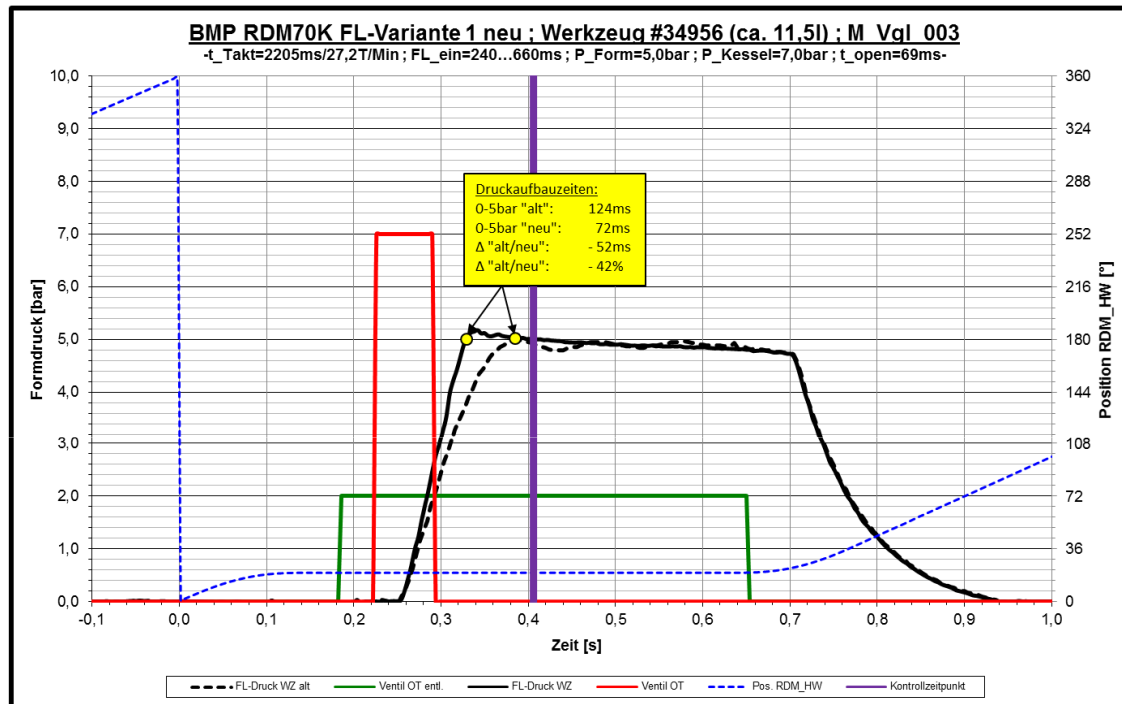


## Forming air-variant 1 (new):

- 2 filling valves & 2 venting valves (new)
- Mains pressure in forming air tank (not set forming pressure)
- Forming air valves are opened with „Forming air on“
- As soon as the pressure sensor detects „Set forming pressure reached“ the forming air valves are closed again
- During forming there is forming pressure trapped between tool and valves
- The venting valves are opened with „Forming air off“



## Forming air-variant 1 (new):



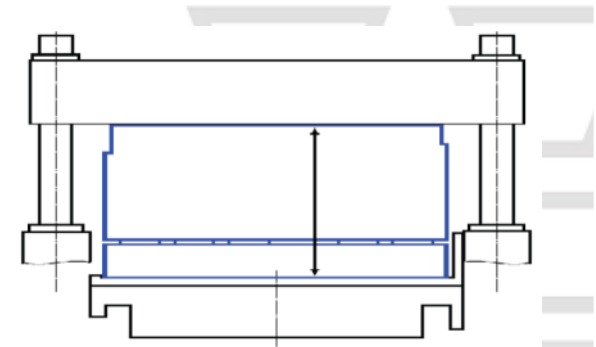
Δt=50 ms is equivalent to:  
 20.0 -> 20.3 c/min  
 30.0 -> 30.8 c/min  
 40.0 -> 41.4 c/min  
 50.0 -> 52.2 c/min

- Reduced build-up times for pressure
- Variant „Valves on upper bridge“ approaches other forming air technologies (pressure build-up time)!
- Good definition achieved even with lower forming pressures



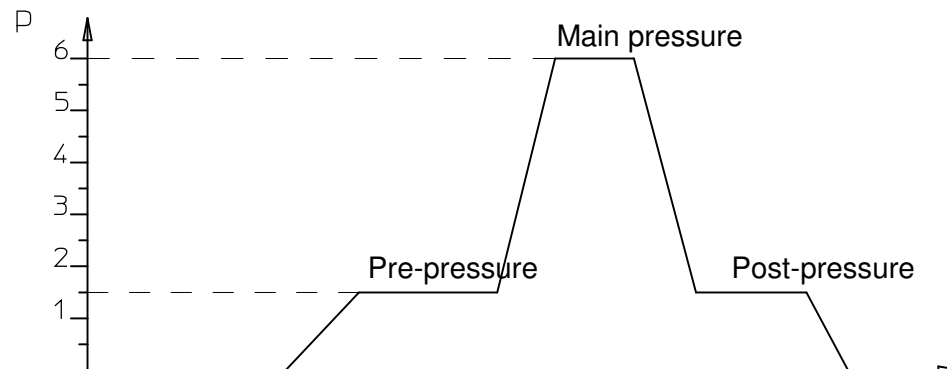
## Tool installation heights:

- RDM 54K:
  - Basic machine: Low pillars (015112)
  - No further price list options available
- RDM 54Kc:
  - Basic machine: High pillars (015113)
  - Optional: Low pillars (015112)
- RDM 70K/RDM 70Kc:
  - Adjustment of upper table by servo motor with long travel distance of upper bridge
  - Upper bridge can be moved to
    - Installation height 2<sup>nd</sup> Gen tools (low)
    - Installation height 3<sup>rd</sup> Gen tools (high)
    - Any installation height in between



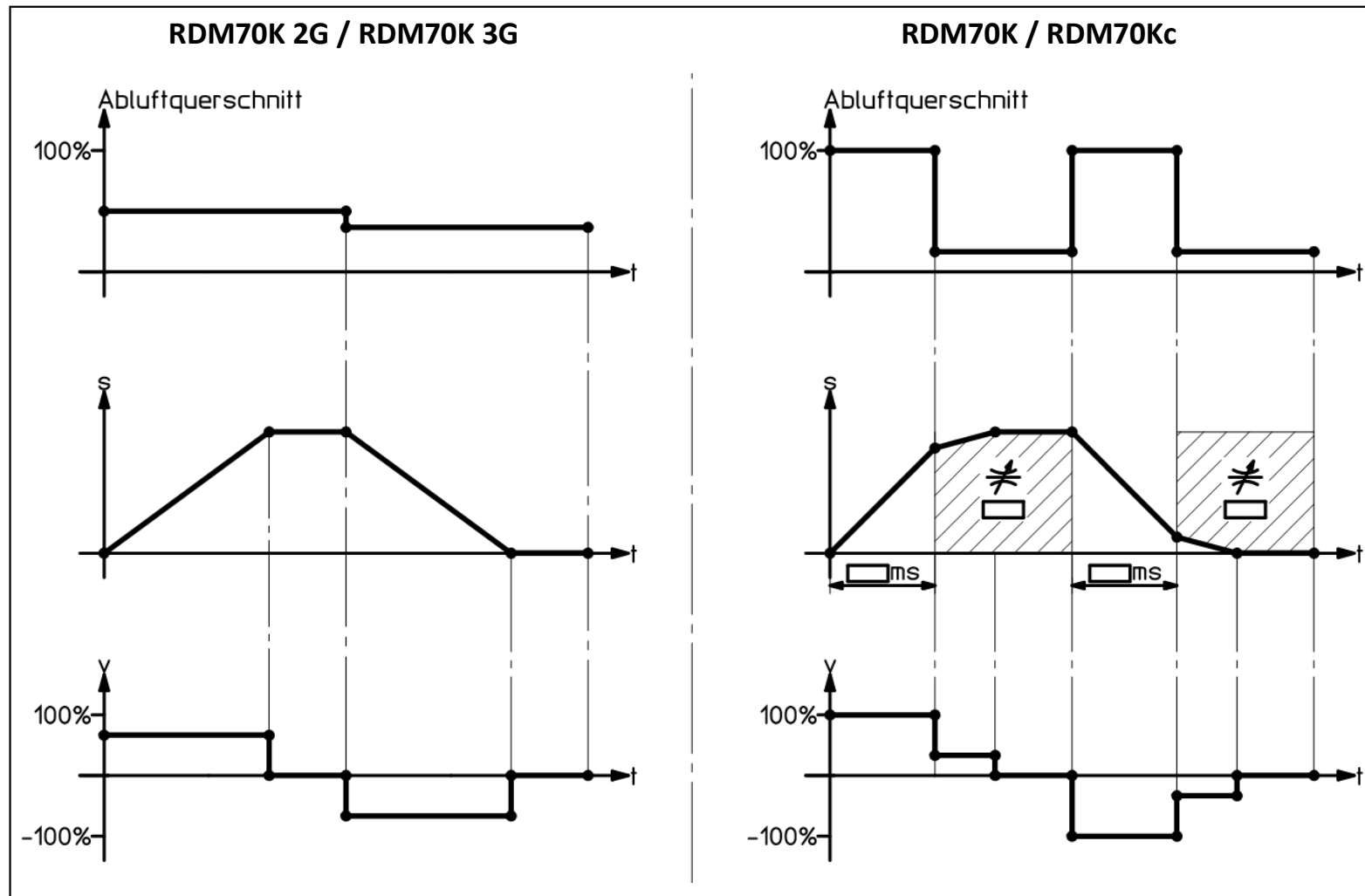
## Downholder:

Characteristic	Manual setting	Electronic display	Pressure level (Pre, main and post pressure)	Pneumatic lifting
017368 (incl.)	X	-	-	-
017369 (option)	-	X	-	-
017370 (option)	-	X	X	-
010751 (option)	-	X	X	X





## Ejector pneumatic-digital (010756):



## Monitoring of ejector end position (017376):

- Detection of ejector end positions by analog sensor
- Visualization time „Ejector out“ / „Ejector back“
- Optimum synchronization of ejector settings to movement of stacking unit
- Thus potential of reduction of transfer time
- Monitoring whether ejectors reach end positions (in time)
- Tool damage prevented (pre-stretcher collides with ejector)



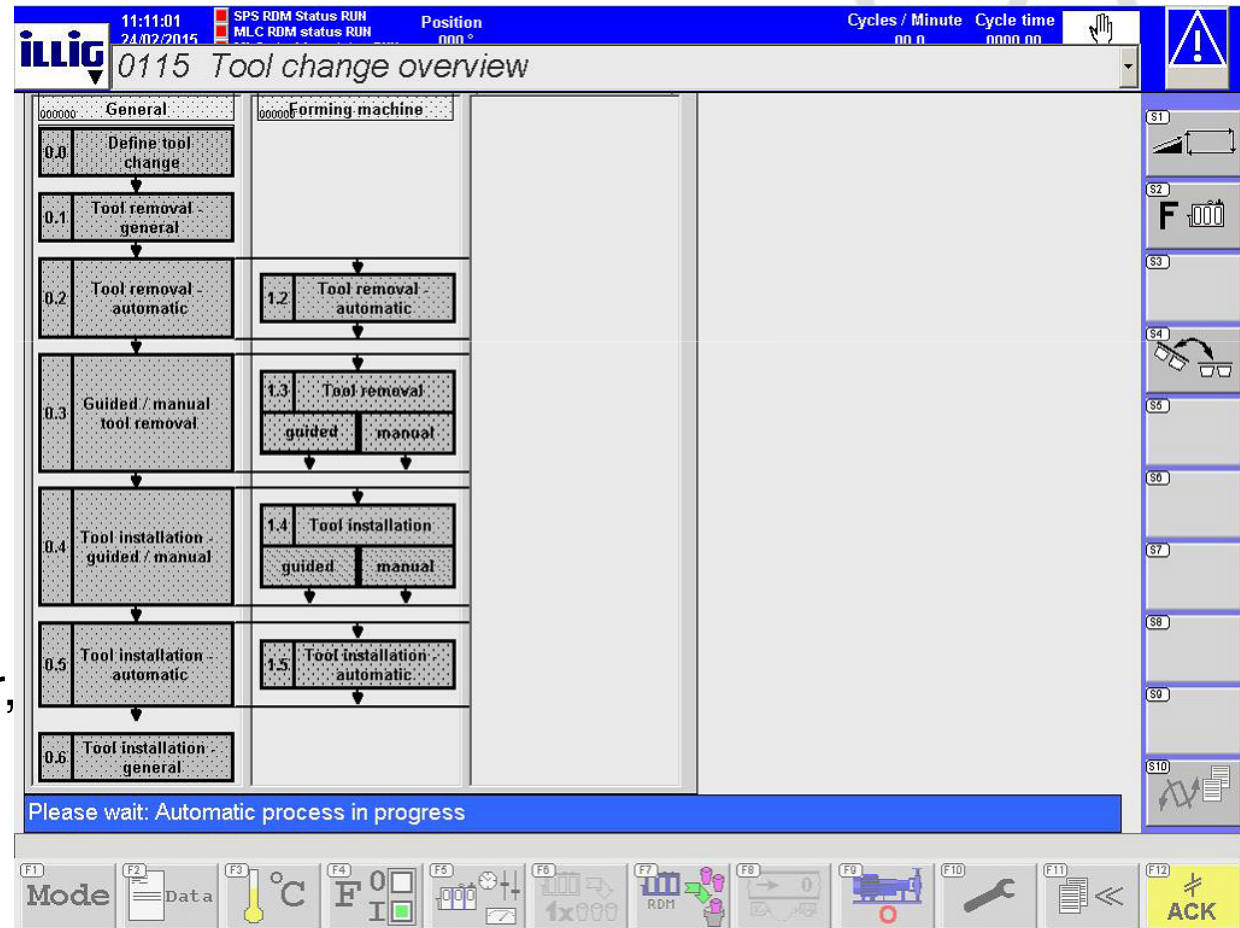
## Interlinkage kits:

<b>Stacking machines</b>				
Interlinkage kit	RDM 54K	RDM 54Kc	RDM 70K	RDM 70Kc
Stacking SZA73c	017377 (incl.)	017377 (incl.)	017377 (incl.)	017377 (incl.)
Stacking PH 54c	017945 (incl.)	017945 (incl.)	-	-
Stacking PH 70c	-	-	017378 (incl.)	017378 (incl.)
Stacking RDML70b	-	-	-	017770 (option)

<b>Skeletal granulators</b>				
Interlinkage kit	RDM 54K	RDM 54Kc	RDM 70K	RDM 70Kc
Skeletal granulator without filed bus	017379 (incl.)	017379 (incl.)	017379 (incl.)	017379 (incl.)
Skeletal granulator with filed bus	015662 (option)	015662 (option)	015662 (option)	015662 (option)

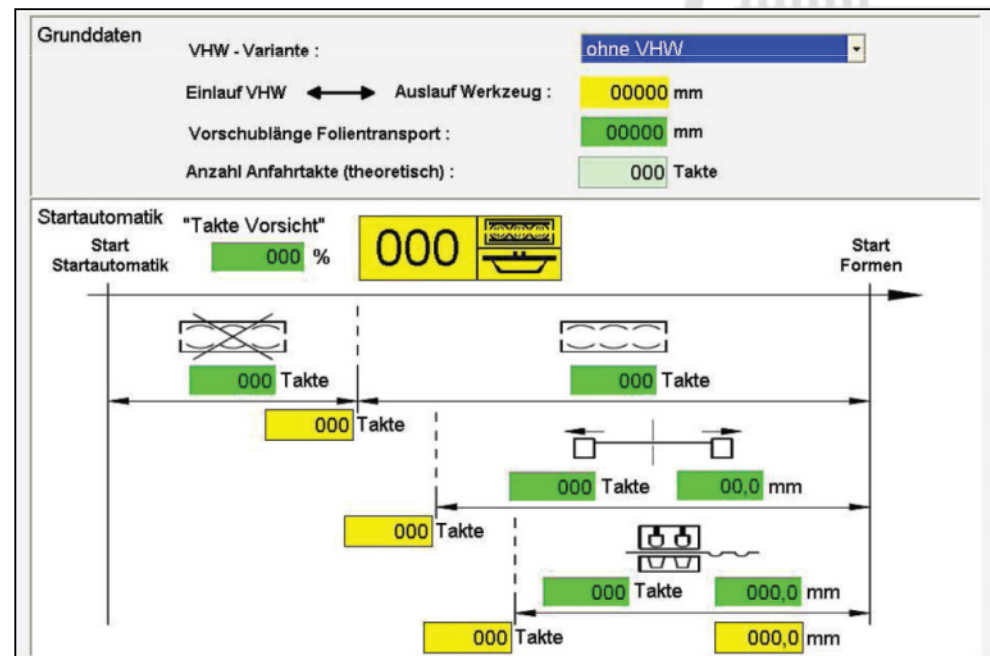
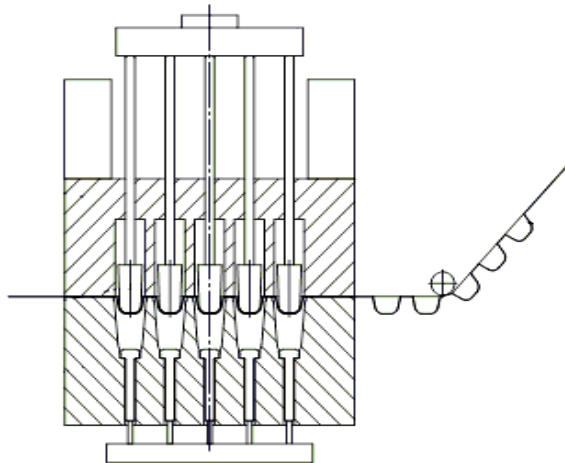
## Guided tool change:

- Flexible tool change with selection options:
  - Guided
  - Semi-automatic
  - Manual
- Time-optimized sequencing
- Optimized & easy operation
- Optimum support for machine operator, regardless of skills



## Automatic start:

- => Automatic start FS (forming and punching) and FSS (forming, punching and stacking) in basic machine
- => The first formed parts can already be stacked



## Monitoring of forming pressure (017383):

- Reliable detection and discharge of products with holes in material (stacking does not pick up that cycle)
- No additional equipment required on tool
- Less rejects / scrap
- Only possible with forming air variant 1 (valves on upper bridge)

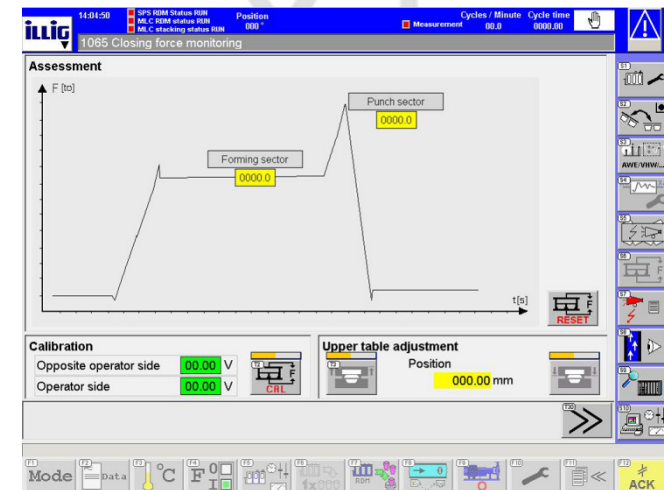
## Monitoring of forming vacuum (017384):

- Detection of holes in material with forming air variant 2 to 5 (forming air reduction, forming air valves on tool or in pre-stretcher)
- Tool must be set up accordingly



## Monitoring of closing force (basic machine):

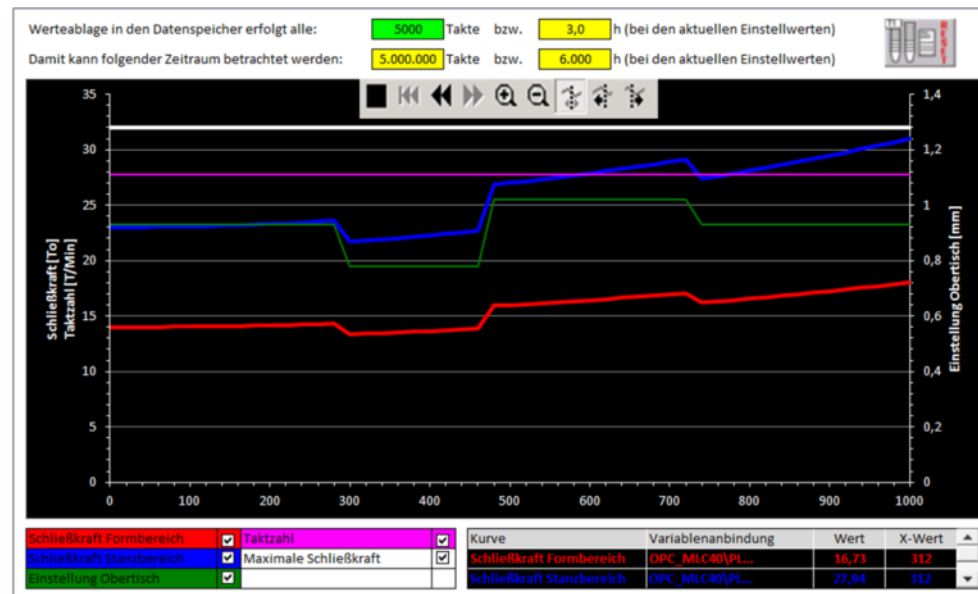
- 2 strain links on the toggle levers
- Machine overload is not possible (protection of machine), tools with excessive cutting length cannot be used
- Reduction of unscheduled standstills
- Switch-off levels:
  - Closing force 100...110%  
→ Switch off after 10 overload cycles
  - Closing force >110%  
→ Immediate switch off





## Trend display of closing force (017385):

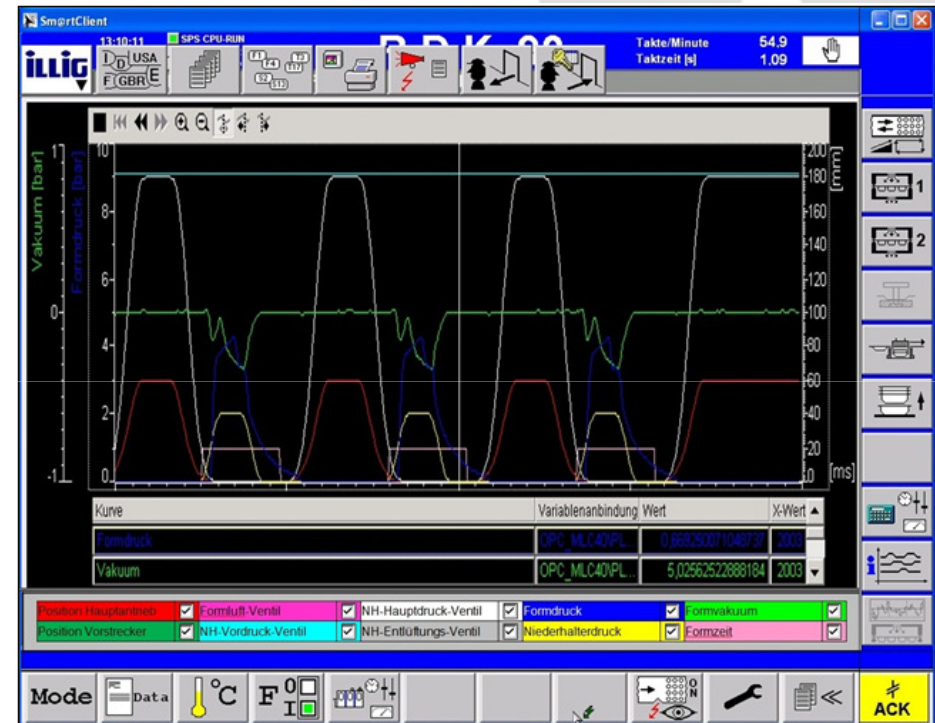
- Development of closing forces can be observed for a longer period of time
  - => Customer can estimate at an early stage when tool has to be reground
  - => Influence of different parameters on closing force is established (optimization of process settings)





## Process visualization (basic machine):

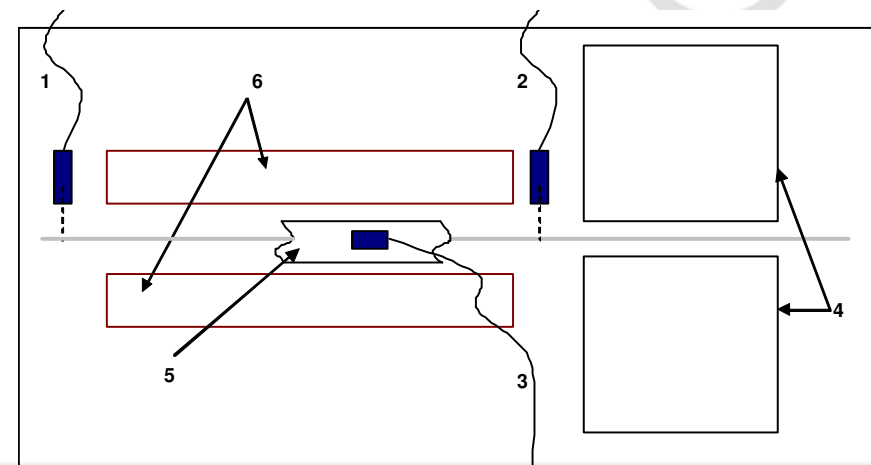
- Display / visualization of different process parameters:
  - Forming pressure
  - Downholder pressure
  - Position main drive
  - Position pre-stretcher
  - Valve switch cams
- Thus separate process optimization possible without any additional measuring technology and costs, neither in machine nor tooling
  - => Improved cycle speed and/or quality



## Temperature compensation (014903):

- Relevant measuring values: Temperatures of material feed and stand
- Measuring of material outlet temperature only for plausibility check
- Deviations from teach value are compensated by adaptations of radiation heater
- Adaptation of whole level
- Measuring value (before heater)  $\neq$  control value (heater)

=> Open loop since there is no feedback on the result of the control



## a) Heater control:

- Function of higher benefit than temperature compensation, cannot be combined
- Measuring values: Material outlet temperature & pre-stretcher energy
- Deviations from teach value are compensated by adaptation of the radiation heater
- Longitudinal row adaptation possible (line scanner)
- Measuring value (after heater) = control value (heater)  
=> Closed loop, since direct feedback by result of control

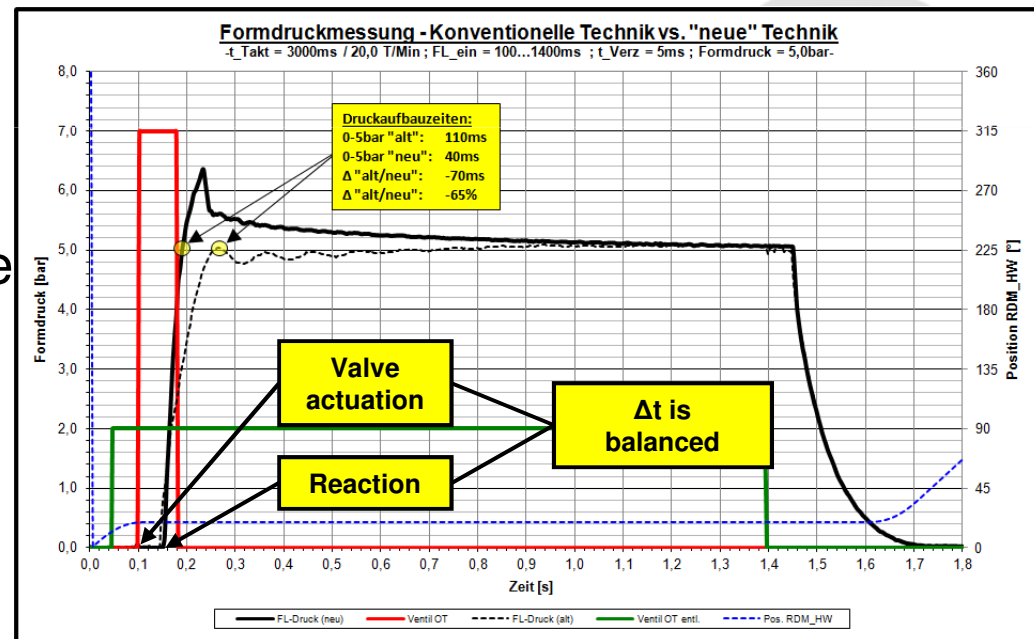


## b) Compensation of switching times:

- Pressure build-up is measured by sensors in machine
- Established processing and switching times are compensated
- Goal: Set time corresponds to reaction, not to valve switching moment

- Available for:
  - Forming pressure
  - Downholder pressure

- Benefits:
  - Transparency
  - Understanding of process
  - Consistent process / quality when valve ages (changed switching times)



## RDM-K vs. RDM 2<sup>nd</sup> Gen (basic machine):

- Longer cutting lengths (higher punching force; 25->32 to)
- Increase in cycle speed (optimized forming air technology ;  $\Delta 50$  ms)
- Better part quality (longer heaters; 1750->2250 mm)
- Operator support (calculation of basic setting, visualization of process data, optimized tool change)
- Reduction of unscheduled standstills (monitoring of closing force and flow rate)
- Reduction of start-up scrap (automatic start like before only for 3<sup>rd</sup> Gen)
- Improved drive mechanics (more stable device, servo drives, optimized cam disks)
- Reduction of pressure fluctuations (larger forming air tank; 200 l -> 340 l)



## RDM-K vs. 2<sup>nd</sup> Gen (new options):

- Scrap reduction
- Simple process optimization
- Cost reduction
- Optimized ejector movement

(monitoring for forming process / holes in material)



(damping of ejector end position)

(movable filling and emptying device)

(changed sequencing with variable switching on of damping level)

## RDM-Kc vs. RDM 3<sup>rd</sup> Gen (basic machine):

- Higher cycle speed
- Operator support
- Reduction of unscheduled standstills

(optimized forming air technology,  $\Delta 50$  ms)

(calculation of basic setting, visualization of process data, optimized tool change)

(monitoring of closing force and flow rates)



## RDM-Kc vs. RDM 3<sup>rd</sup> Gen (new options):

- Scrap reduction
- Simpler process optimization
- Cost reduction
- More consistent part quality, reduction material thickness
- Optimized ejector movement

(monitoring for forming process / holes in material)

(damping of ejector end position)

(movable filling and emptying device)

(process control)

(changed sequencing with variable switching on of damping level)





**Thank you very much for your attention!**



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