Rob Scoville Technology Specialist TRUMPF Application Center Plymouth, MI

# Hot Stamping Experience and Tech Tour

### November 29-30, 2022 Novi, MI



# Agenda

- Preventative Maintenance
- Industry 4.0
- Program Maintenance
- High Stand-off nozzle technology (X-Blast)
- Advancements In Cutting Technology
- Fixture Alignment
- Advancements In Machine Alignment



### **Preventative Maintenance – Personnel and Skills**

#### Make Sure PMs are part production planning

#### Total PMs on a machine may use around 2% of OEE

Much of can be done during normally idle times

#### Personnel and skills required

- 1<sup>st</sup> tier PMs are operator level
  - Basic course
  - Operator Course
- 2<sup>nd</sup> tier PMs require trained maintenance personnel
  - Mechanical Maintenance Course
- 3<sup>rd</sup> tier PM items involving exhaust system fire suppression system
  - Trumpf Technical service only





## **Preventative Maintenance – Systems**

#### Systems that benefit from regular PMs

#### Safety

- Ensure that safety cabin is free from damage
- Safety Scanners
  - Have proper cleaning supplies

#### Scrap conveyors

- Can be very difficult to repair may require removing from machine
- Take care of as soon as issue are known

#### **Fixtures**

- Number 1 cause of downtime
  - Fixture maintenance station outside of machine can allow for PMs and repairs to be done and keep machine running





# **Preventative Maintenance – Systems**

#### Systems that benefit from regular PMs

#### **Dust extractors**

- Fire risk
- Health risk

#### **Axes and Drives**

• Expensive and long down times

#### Chiller

Proper water chemistry and cleanliness supports improved component lifespan

#### **General Machine cleanliness**

• Clean machines are easier to diagnose issues- leaks etc.

#### Assist gas and pneumatics

Protect optics and valves from contamination



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### **Preventative Maintenance – Intervals**

#### Shift, Daily and Weekly

- Mostly quick visual inspections
- May require intervention if inspection fails
  - Usually, brief standard procedures

#### Monthly

Cleaning and diagnostics

#### Semi-annual

- Lubrication system wear items
- More thorough Cleaning and diagnostics

#### Annual/Multi year

- Filters
- System diagnostics
- Wear items/batteries etc.





# **Service Agreements**



With TRUMPF service agreements, routine maintenance by TRUMPF service experts ensures that you get the best possible availability from your machines. Various service agreements are available depending on your production hours and your vulnerability to downtime, and include items like service travel, parts and consumables at an annual flat rate.

Contact the Technical Service department for further details or a quote at: <u>tusd.serviceadmins@us.trumpf.com</u> 1-833-TRUMPF1 or 734-454-7200, 0



Services

Trut Ber Cell 300

# Industry 4.0 Starter Package



TruDisk 3000

TruLaser Cell 8030

www.trumpf.com

# **Productivity**

 $\times$ 

**Production Report** 

# How productive is your <u>machine</u>?

The daily Production Report informs about the possibilities to increase the machine efficiency.



# **Productivity**

and Tech Tour

#### production report



Message	Message text	Number	Loss of time average [min]	Loss of time in total [min]
80100491	PLC: Cutting slugs detected, acknowledgment with RES	SET. 3	1.64	4.93
83100409	Error in the TC_Observeline cycle at block number N94	0 1	2.61	2.61
83100409	Error in the TC_Observeline cycle at block number N11	90 1	1.50	1.50
83100409	Error in the TC_Observeline cycle at block number N44	60 1	0.83	0.83
70100050	ControlLine (1): Nozzle collision during control mode	2	0.22	0.44
80100102	ControlLine error	2	0.22	0.44

#### Program runs per hour and day

- quick overview of the runs of past shifts
- Increase in productivity through identification of gaps
- Comparison of productivity between machines

#### **Error messages**

Easily traceable analysis of errors during downtimes



**Error prioritization** 

# **Productivity**

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#### production report





#### Machine utilization in percent

- **Quick overview of** the production process
- Daily Overviews

#### **Operating status after hour**

- Detailed status about the use of the machine
- Identification of machine downtimes of the past 24 hours

condition monitoring

# **Analysis and monitoring**

Algorithms and TRUMPF experts regularly **analyze sensor data from** your machines and lasers.

TRUMPF makes suggestions for maintenance and repair measures to **minimize** the **risk of failure**.

TRUMPF

Condition Monitoring Center



condition monitoring

# Proactive reporting by TRUMPF

- Proactive notification of impending machine downtimes
- Reduction of downtimes

- Periodically evaluate programs to ensure that they are properly adjusted to the actual surface of the part
- With a TRUMPF machine we would recommend that the surface doesn't deviate more than 4mm, less than 1.5 is ideal



Display screen	Description
	Geometry deviation function is not active.
	The measured geometry deviation is within the permissible tolerance.
	The measured geometry deviation has reached the threshold value (warning level). The work- piece surface is lower in the beam direction than the programmed contour.
	The measured geometry deviation has reached the threshold value (warning level). The work- piece surface is higher in the beam direction than the programmed contour.
	The measured geometry deviation is outside the permissible tolerance. The workpiece surface is lower in the beam direction than the programmed contour.
	The measured geometry deviation is outside the permissible tolerance. The workpiece surface is higher in the beam direction than the program- med contour.

• With a graphical view of your programs some of these errors can be seen as deformations in the shape of the geometry.



- Capacitive sensors are not as accurate when sensing inside and outside corners.
- Using H command, a better condition can be achieved for negotiating the corner by raising the height







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- Using H command, a better condition can be achieved for negotiating the corner by raising the height



NC Group NC programs Layer	
NC program: PN001 / Plattform.SAT	
N1340 TC_LASER_ON(11,"ST015MDAIH-0",0,300) N1350 G01 X = 1126.91 Y = 698.46 Z = 49.00 B = 70.13 C = 90.00 H0.75	
N1360 CIP I1 = 1126.91 J1 = 698.70 K1 = 47.45 X = 1126.91 Y = 699.92 Z = 45.46 B = 45.00 C = 90.00 H N1370 CIP I1 = 1126.91 J1 = 701.19 K1 = 44.54 X = 1126.91 Y = 703.46 Z = 44.00 B = 21.00 C = 90.00 H	0.50 0.75
N1380 G01 X = 1126.91 Y = 716.64 Z = 44.00 B = 11.73 C = 90.00 N1390 TC_LASER_ON(11,"ST015MDAIH-0",0,100)	
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## High Stand-off nozzle technology (X-Blast)





	State of the art	BrightLine Speed
Laser	Typ. TruDisk 3001	TruDisk 3000
Incoupling	Single core	Beam switch
Laser light cable	Single core	BrightLine Speed fiber
Cutting head	Standard	Standard
Beam profile		PLILE LUI PROPERT







#### Laser technology for BrightLine Speed

Laser technology is provided for the is increased by > +50% - compared to following material combination with the TRUMPF X- of BrightLine Speed and X-Blast Blast-technology. Due to X-Blast nozzle design, the stand-off distance consumption.

thickness in standard nozzle-design. Combination Nozzle shows reduced gas

	BrightLi	neSpeed
Mild Steel	TruDisk 3000	
Material Thickness [mm]	N2	AIR
1	X12	X12
2	X12	X12
3	X12	-
4	X12	-





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	Nitrogen		
Thickness [mm]	BLS vs STD 3kW	BLS vs STD 4kW	
1.0	33%	20%	 
2.0	48%	34%	
3.0	59%	45%	Sumernar * * *
4.0	57%	38%	PROPERT



Compressed Air				
Thickness	BLS vs STD	BLS vs STD		
[mm]	3kW	4kW		
1.0	33%	14%		
2.0	60%	47%		
2.5	63%	48%		





- Has the potential to reduce compressed air requirement from 21cfm to 13cfm
- Top performance issue for our customers who cut with air is maintaining volume and pressure



# **Fixture Alignment**

- Integrated Functions and Utilities
- Measurement capabilities using capacitive sensor or optional touch probe
  - CP\_Fixture set-up can be used to verify alignment on set-up and allow for easy fixture movement between multiple machines.





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### **Machine Alignment**





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# Thank you for your attention Please feel free to ask any questions you may have

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