

principium



Wire EDM
Module 1.2
Wire EDM cut parameters

Cut parameters 2

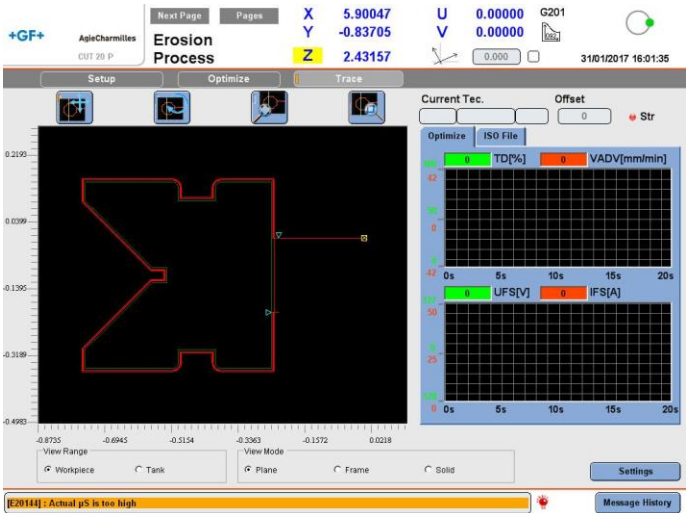
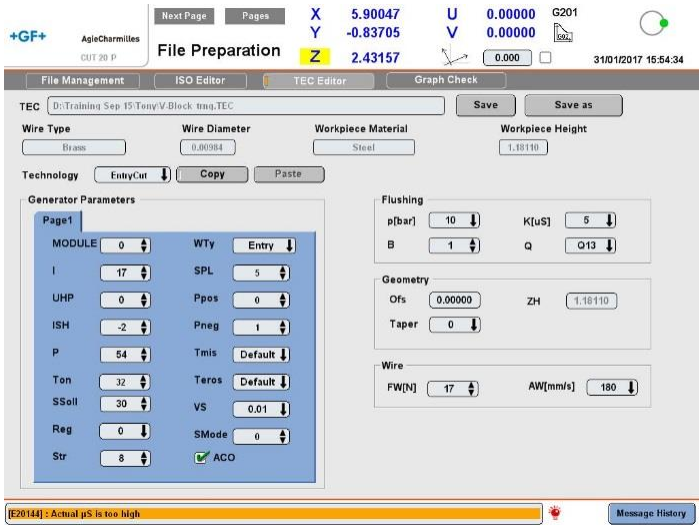
Part of the Erosion process

**Items in this presentation can be referenced in the
AgieCharmilles operator training manual**

Section: user interface

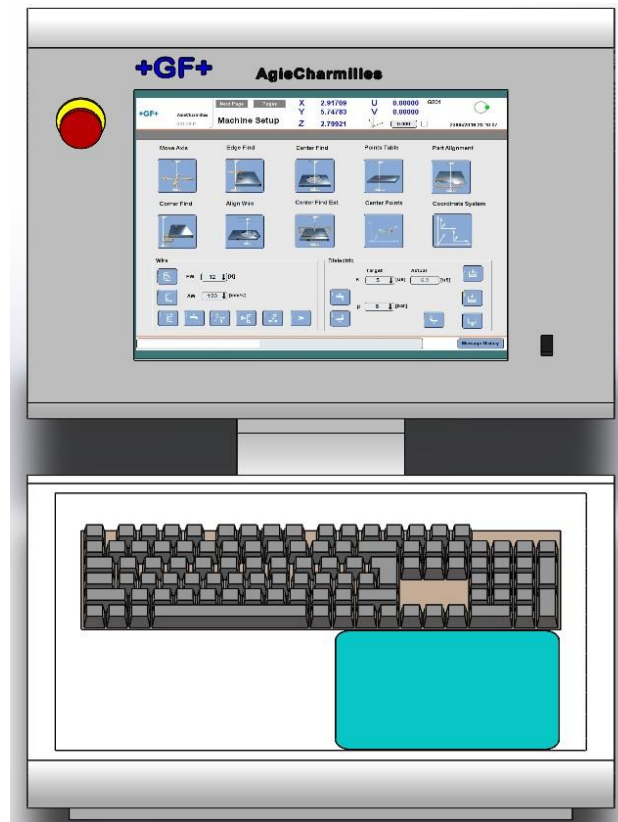
Pages 5 and 6

Parameters for the wire EDM directly affect the *EROSION* process
The parameters are created, stored and modified within the *TEC* file



If you can recall, our CNC controller operates and monitors both the **ISO** and **TEC** files during operation of the EROSION process

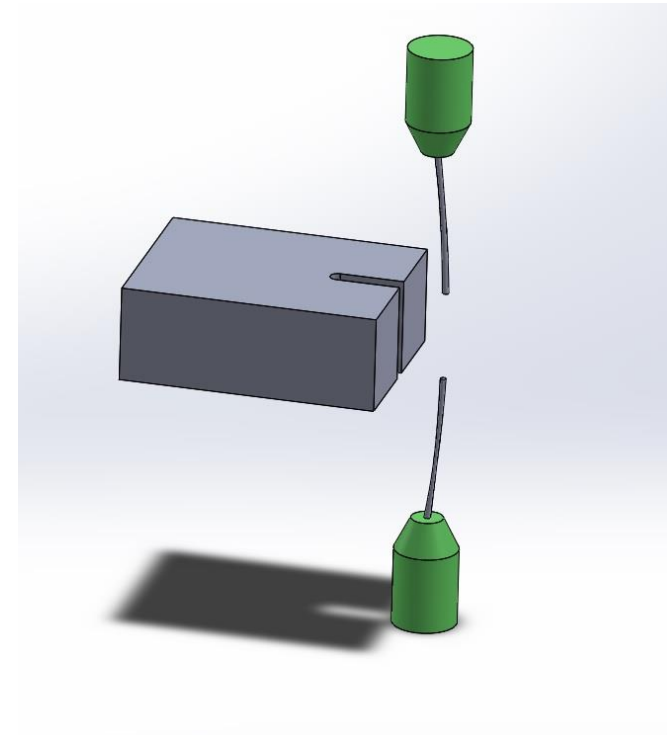
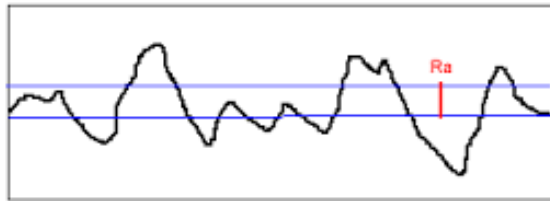
ISO



TEC

The two most revealing factors in the erosion process that would indicate changing parameters are:

- Excessive wire breakage
- Undesired surface finish



These are programmable
and can be modified

These are programmable
and can be modified

Next Page

Pages

X5.90047

Y-0.83705

Z2.43157

U0.00000

V0.00000

G201

G92

0.000

31/01/2017 15:54:34

+GF+

AgieCharmilles

CUT 20 P

File Preparation

File Management

ISO Editor

TEC Editor

Graph Check

TEC

D:\Training Sep 15\Tony\V-Block trng.TEC

Save

Save as

Wire Type

Brass

Wire Diameter

0.00984

Workpiece Material

Steel

Workpiece Height

1.18110

Technology

EntryCut

Copy

Paste

Generator Parameters

Page1

MODULE0

WTyEntry

I17

SPL5

UHP0

Ppos0

ISH-2

Pneg1

P54

TmisDefault

Ton32

TerosDefault

SSoll30

VS0.01

Reg0

SMode0

Str8

ACO

Flushing

p[bar]10

K[uS]5

B1

QQ13

Geometry

Ofs0.00000

ZH1.18110

Taper0

Wire

FW[N]17

AW[mm/s]180

[E20144] : Actual pS is too high

Message History

Look at the four most effective variable parameters to optimize for the Erosion Process:

- Ton = Time on
- Ssol = Servo load
- P = Power
- I Discharge current

The screenshot displays the +GF+ AgieCharmilles File Preparation software interface. The top status bar shows coordinates (X: 5.90047, Y: -0.83705, Z: 2.43157) and tool status (U: 0.00000, V: 0.00000). The main window is divided into several sections:

- File Management:** Includes buttons for 'Next Page', 'Pages', 'File Management', 'ISO Editor', 'TEC Editor', and 'Graph Check'.
- TEC Editor:** Shows the file path 'D:\Training Sep 15\Tony\V-Block trng.TEC' and buttons for 'Save' and 'Save as'.
- Wire Type:** Set to 'Brass'.
- Wire Diameter:** Set to '0.00984'.
- Workpiece Material:** Set to 'Steel'.
- Workpiece Height:** Set to '1.18110'.
- Technology:** Set to 'EntryCut'.
- Generator Parameters (Page1):** A table of parameters with red arrows pointing to specific values:
 - (I)** points to 'I' (Discharge current) set to 17.
 - (P)** points to 'P' (Power) set to 54.
 - (Ton)** points to 'Ton' (Time on) set to 32.
 - (SSol)** points to 'SSol' (Servo load) set to 30.
- Flushing:** Includes parameters for 'p[bar]' (10), 'K[uS]' (5), 'B' (1), and 'Q' (Q13).
- Geometry:** Includes parameters for 'Ofs' (0.00000), 'ZH' (1.18110), and 'Taper' (0).
- Wire:** Includes parameters for 'FW[N]' (17) and 'AW[mm/s]' (180).

A status bar at the bottom displays the message '[E20144] : Actual pS is too high' and a 'Message History' button.

The electrical energy in the Erosion process is based on pulse technology.

Pulse technology includes a profile of electrical current which 'pulses' in a particular profile.

Components of the 'pulse' will include:

- Time on
- Time off
- Frequency of the pulse
- Current
- Voltage

The screenshot shows the 'File Preparation' window of a Wire EDM software. The 'Generator Parameters' section is highlighted in blue. Red arrows point to the following parameters:

- (I) points to the 'I' (Current) parameter, set to 17.
- (P) points to the 'P' (Pulse width) parameter, set to 54.
- (Ton) points to the 'Ton' (Time on) parameter, set to 32.
- (SSol) points to the 'SSol' (Time off) parameter, set to 30.

Other visible parameters include:

- MODULE: 0
- UHP: 0
- ISH: -2
- Reg: 0
- Str: 8
- WTy: Entry
- SPL: 5
- Ppos: 0
- Pneg: 1
- Tmis: Default
- Teros: Default
- VS: 0.01
- SMode: 0
- ACO: checked
- Flushing: p[bar] 10, B 1, K[uS] 5, Q Q13
- Geometry: OfS 0.00000, Taper 0, ZH 1.18110
- Wire: FW[N] 17, AW[mm/s] 180

At the bottom, a status bar displays the message: [E20144]: Actual μ S is too high.

Time on = the length of time in micro seconds the current moves from the wire to the workpiece through the spark gap.

Material removal rate is directly proportional to the time on and the energy released.

Longer time on increases the amount of vaporization and crater size therefore affecting surface finish.

Ton = Time on

(Ton)

The screenshot shows the 'File Preparation' window of a Wire EDM software. At the top, there are coordinates: X: 5.90047, Y: -0.83705, Z: 2.43157, and U: 0.00000, V: 0.00000. The 'TEC' field is set to 'D:\Training Sep 15\TonyV-Block.tng.TEC'. The 'Wire Type' is 'Brass', 'Wire Diameter' is '0.00984', 'Workpiece Material' is 'Steel', and 'Workpiece Height' is '1.18110'. The 'Technology' is 'EntryCut'. The 'Generator Parameters' section is expanded, showing a list of parameters: MODULE (0), I (17), UHP (0), ISH (-2), P (54), Ton (32), SSoll (30), Reg (0), Str (8), WTy (Entry), SPL (5), Ppos (0), Pneg (1), Tmis (Default), Teros (Default), VS (0.01), SMode (0), and ACO (checked). The 'Flushing' section shows p[bar] (10), K[uS] (5), B (1), and Q (Q13). The 'Geometry' section shows Of (0.00000), ZH (1.18110), and Taper (0). The 'Wire' section shows FW[N] (17) and AW[mm/s] (180). A status bar at the bottom shows the message '[E20144]: Actual pS is too high'.

Frequency = The number of pulses that take place in one second.

Frequency also effects the Material removal rate as more pulses result in more frequent vaporization.

Pulse is measured in megahertz.

P = Frequency

(P) →

The screenshot displays the 'File Preparation' window of a Wire EDM software. The interface includes a top status bar with coordinates (X: 5.90047, Y: -0.83705, Z: 2.43157) and a date/time stamp (31/01/2017 15:54:34). The main window is divided into several sections: 'File Management', 'ISO Editor', 'TEC Editor', and 'Graph Check'. The 'TEC Editor' section contains fields for 'Wire Type' (Brass), 'Wire Diameter' (0.00984), 'Workpiece Material' (Steel), and 'Workpiece Height' (1.18110). Below these are 'Technology' (EntryCut) and buttons for 'Copy' and 'Paste'. The 'Generator Parameters' section is highlighted with a red arrow pointing to the 'P' parameter, which is set to 54. Other parameters in this section include MODULE (0), I (17), UHP (0), ISH (-2), Ton (32), SSoll (30), Reg (0), Str (8), WTy (Entry), SPL (5), Ppos (0), Pneg (1), Tmis (Default), Teros (Default), VS (0.01), SMode (0), and ACO (checked). The 'Flushing' section includes p[bar] (10), K[uS] (5), B (1), and Q (Q13). The 'Geometry' section includes OfS (0.00000), ZH (1.18110), and Taper (0). The 'Wire' section includes FW[N] (17) and AW[mm/s] (180). A status bar at the bottom shows an error message: '[E20144]: Actual pS is too high'.

Discharge current = The current in amperes which travels across the spark gap from the wire to the workpiece. The force of electrical energy delivery between the electrodes.

Higher discharge currents result in larger craters of vaporization.

Higher currents can result in higher material removal rates, less desired surface finish, and wire breakage.

I = Discharge current

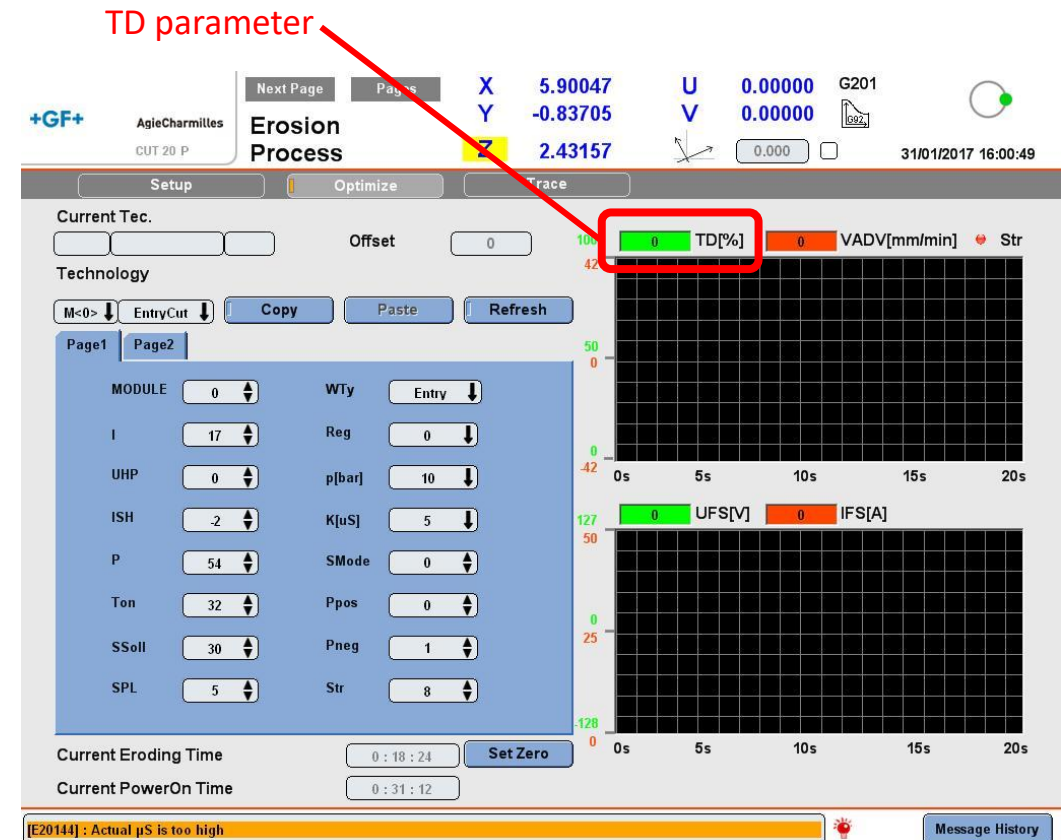
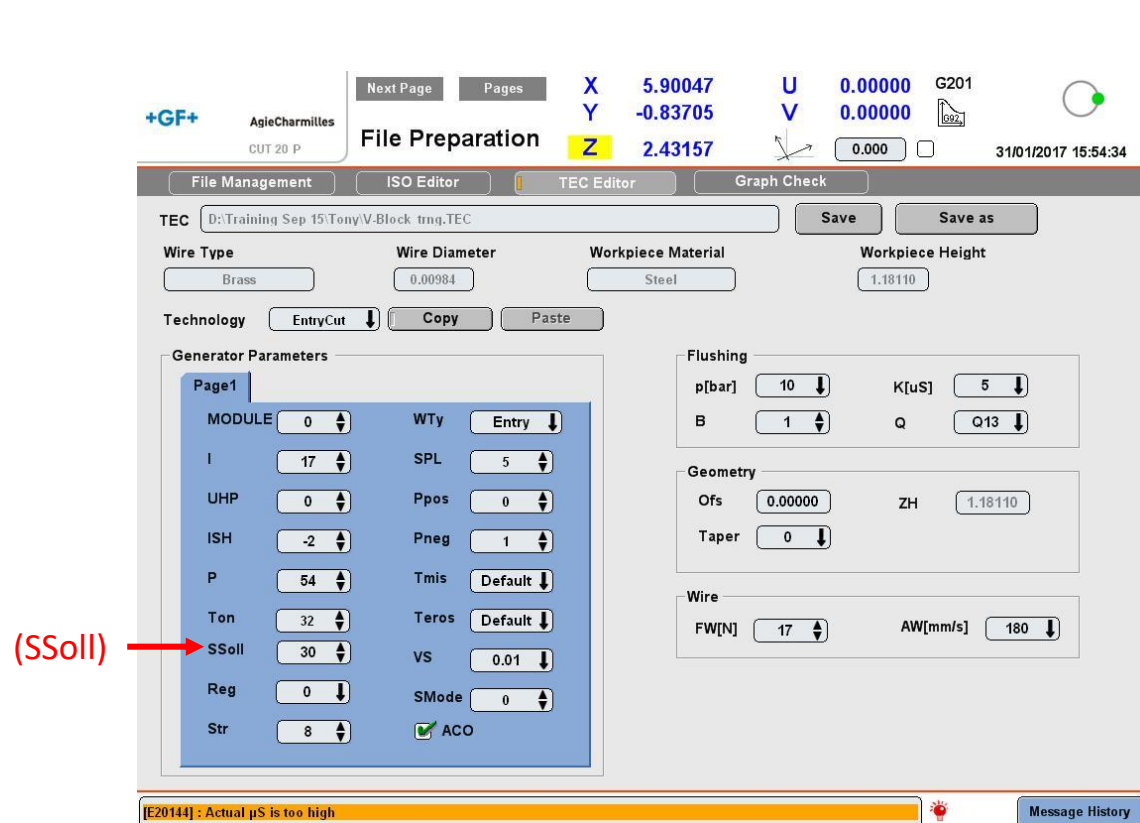
(I) →

The screenshot displays the 'File Preparation' window of a Wire EDM software. At the top, there are coordinate values: X: 5.90047, Y: -0.83705, Z: 2.43157, and U: 0.00000, V: 0.00000. The 'TEC' field is set to 'D:\Training Sep 15\TonyV\Block.tng.TEC'. The 'Wire Type' is 'Brass', 'Wire Diameter' is '0.00984', 'Workpiece Material' is 'Steel', and 'Workpiece Height' is '1.18110'. The 'Technology' is 'EntryCut'. The 'Generator Parameters' section includes 'MODULE' (0), 'WTy' (Entry), 'I' (17), 'SPL' (5), 'UHP' (0), 'Ppos' (0), 'ISH' (-2), 'Pneg' (1), 'P' (54), 'Tmis' (Default), 'Ton' (32), 'Teros' (Default), 'SSoll' (30), 'VS' (0.01), 'Reg' (0), 'SMode' (0), and 'Str' (8). The 'Flushing' section includes 'p[bar]' (10), 'K[us]' (5), 'B' (1), and 'Q' (Q13). The 'Geometry' section includes 'Ofs' (0.00000), 'ZH' (1.18110), and 'Taper' (0). The 'Wire' section includes 'FW[N]' (17) and 'AW[mm/s]' (180). A status bar at the bottom shows the message '[E20144]: Actual pS is too high'.

Servo Soll = English translation = power to;

The reference parameter determining the optimum federate during the Erosion process.

Corresponds to the **TD** parameter displayed on the optimize tab of the Erosion process.



SSoll = Servo Soll; Value preset for the servo; power to the servo

Servo Soll = English translation = power to;

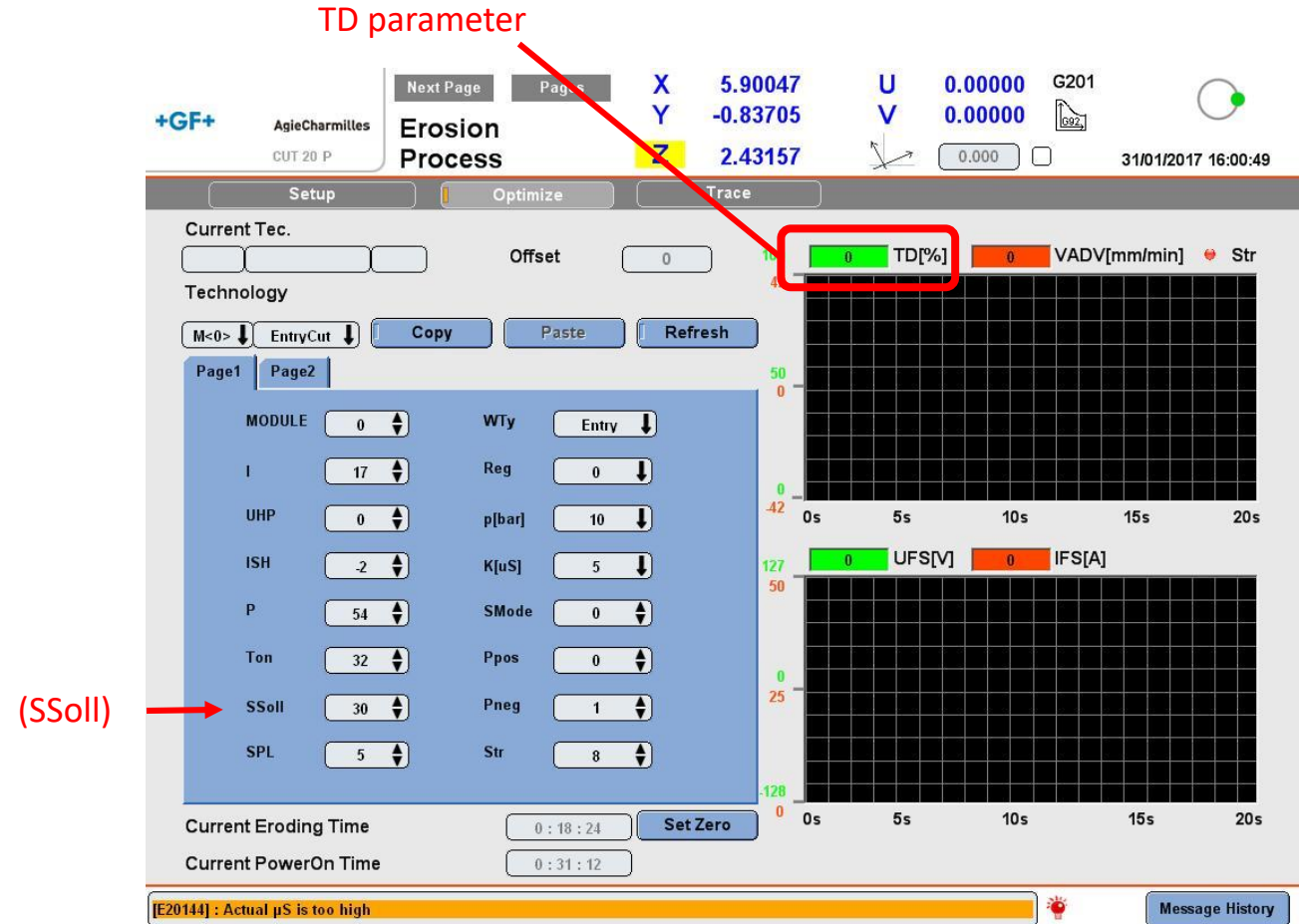
The Ssoll is compared with the TD information (current feed rate) and the result determines an increase or decrease in feed rate.

Effects the cutting speed and process stability.

When Ssoll is decreased, the cutting speed in
INCREASED

When Ssoll is increased, the cutting speed in
DECREASED

Raise the **Ssoll** number if
you are encountering
excessive wire breakage

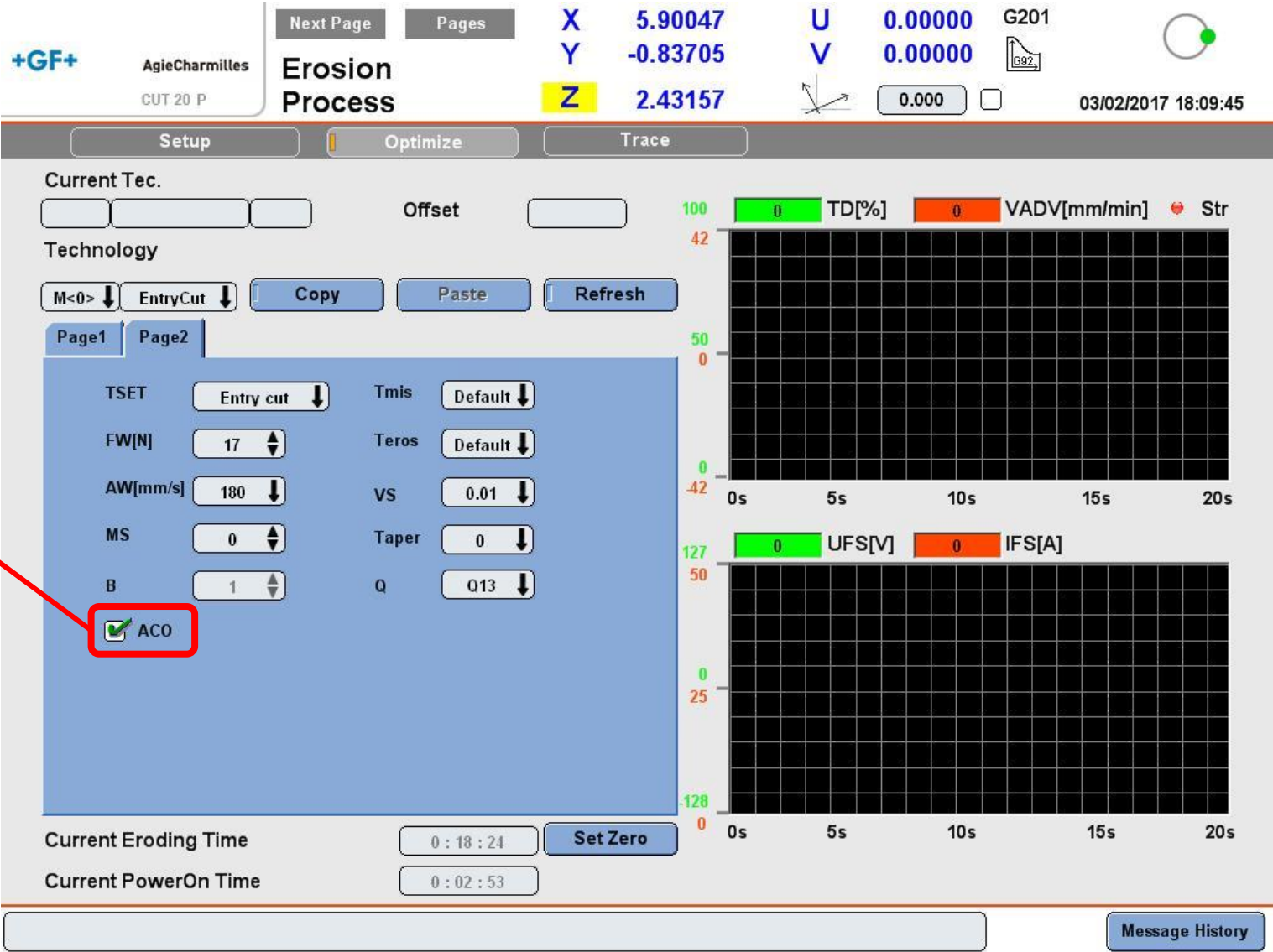


The OPTIMIZE page for the erosion process

ACO = Adaptive Current
Optimization

ACO (Adaptive Current
Optimization)

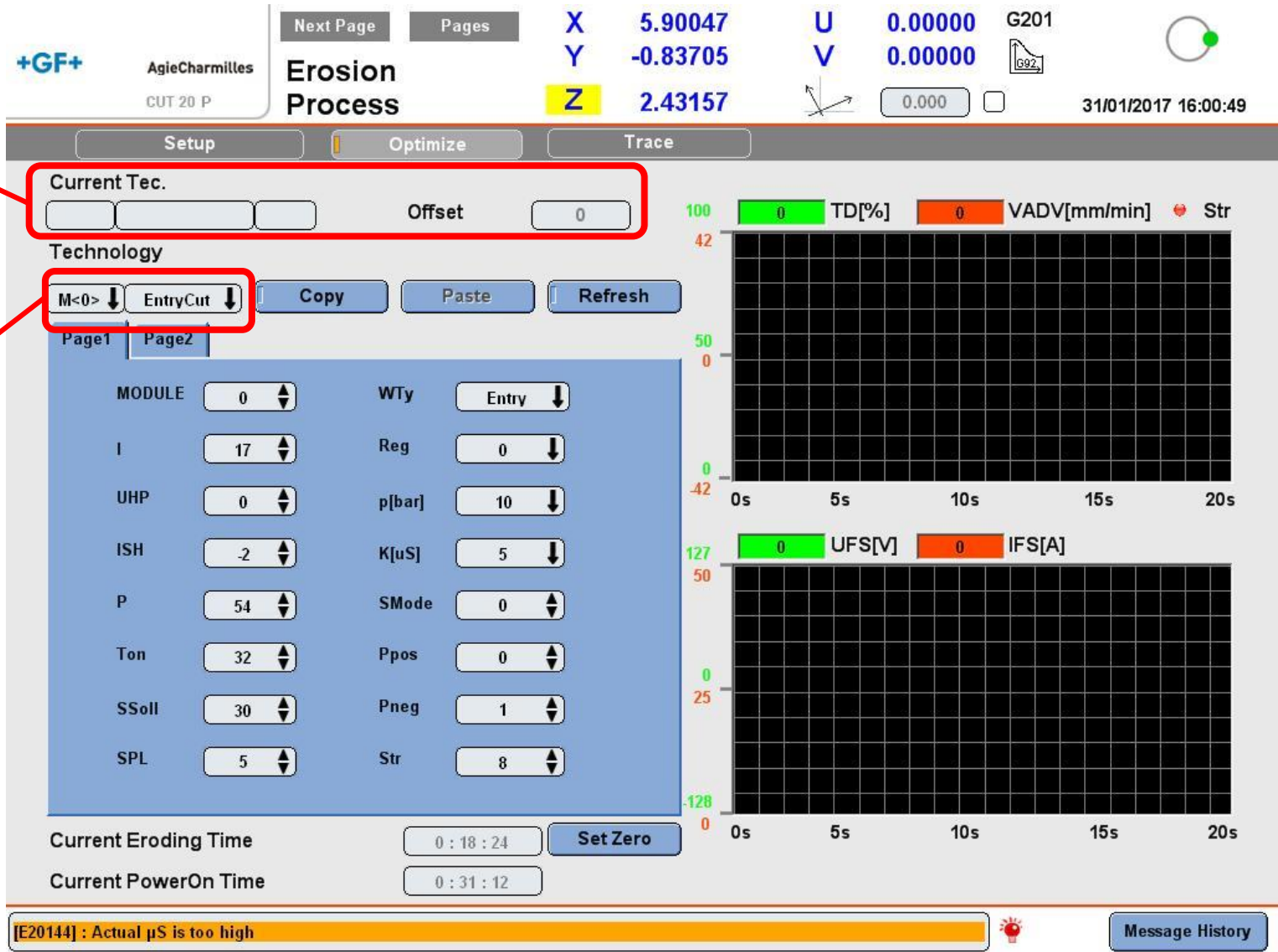
Provides real-time process
monitoring and adapting
during cutting



The OPTIMIZE page for the erosion process

Current technology and
offset information will be
displayed

The current cut will be
displayed. The M<0> is
standard for ISO files
without specialized
Multi-TEC code



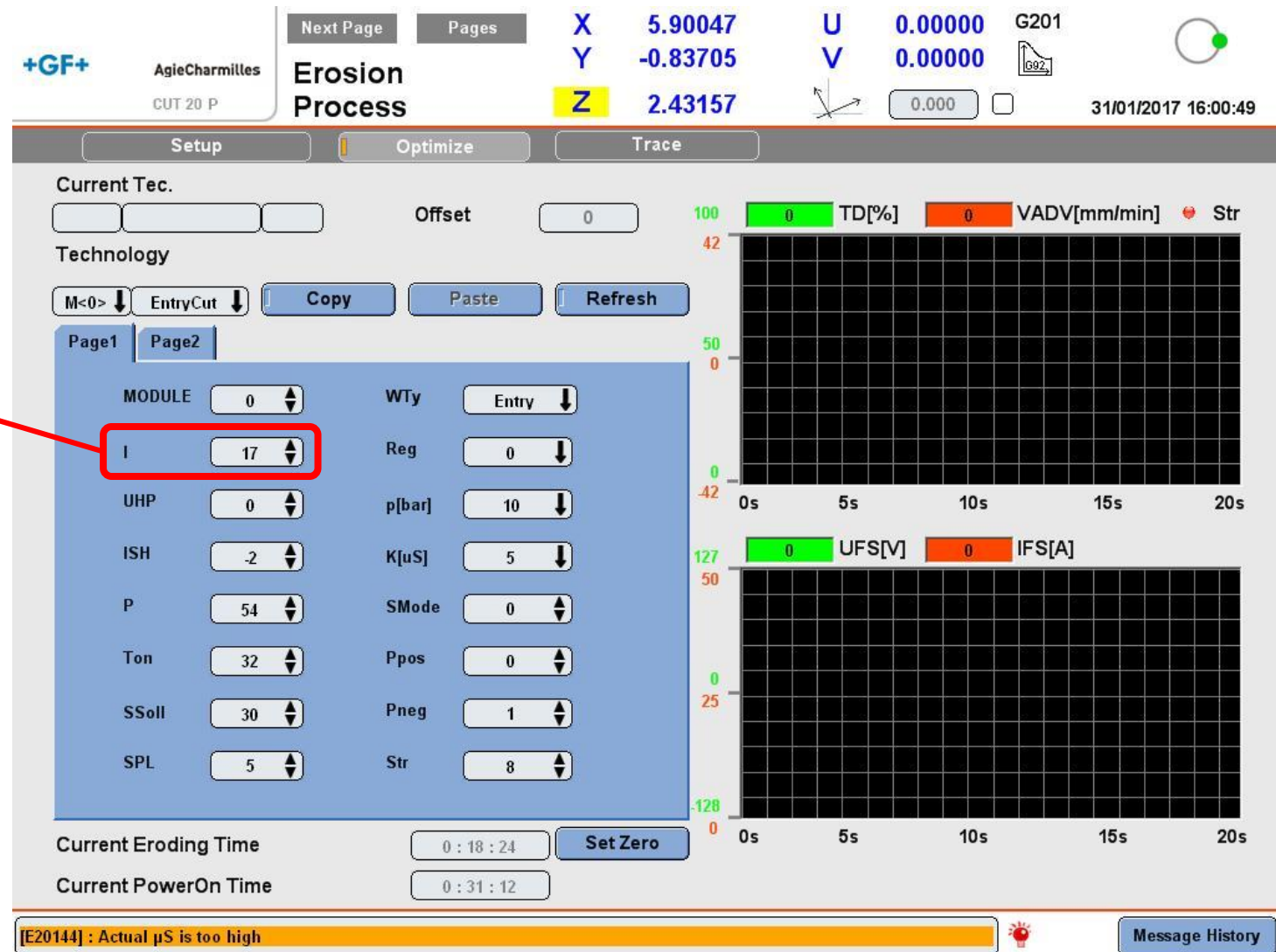
The **OPTIMIZE** page for the erosion process

I = has to do with discharge
current during cuts

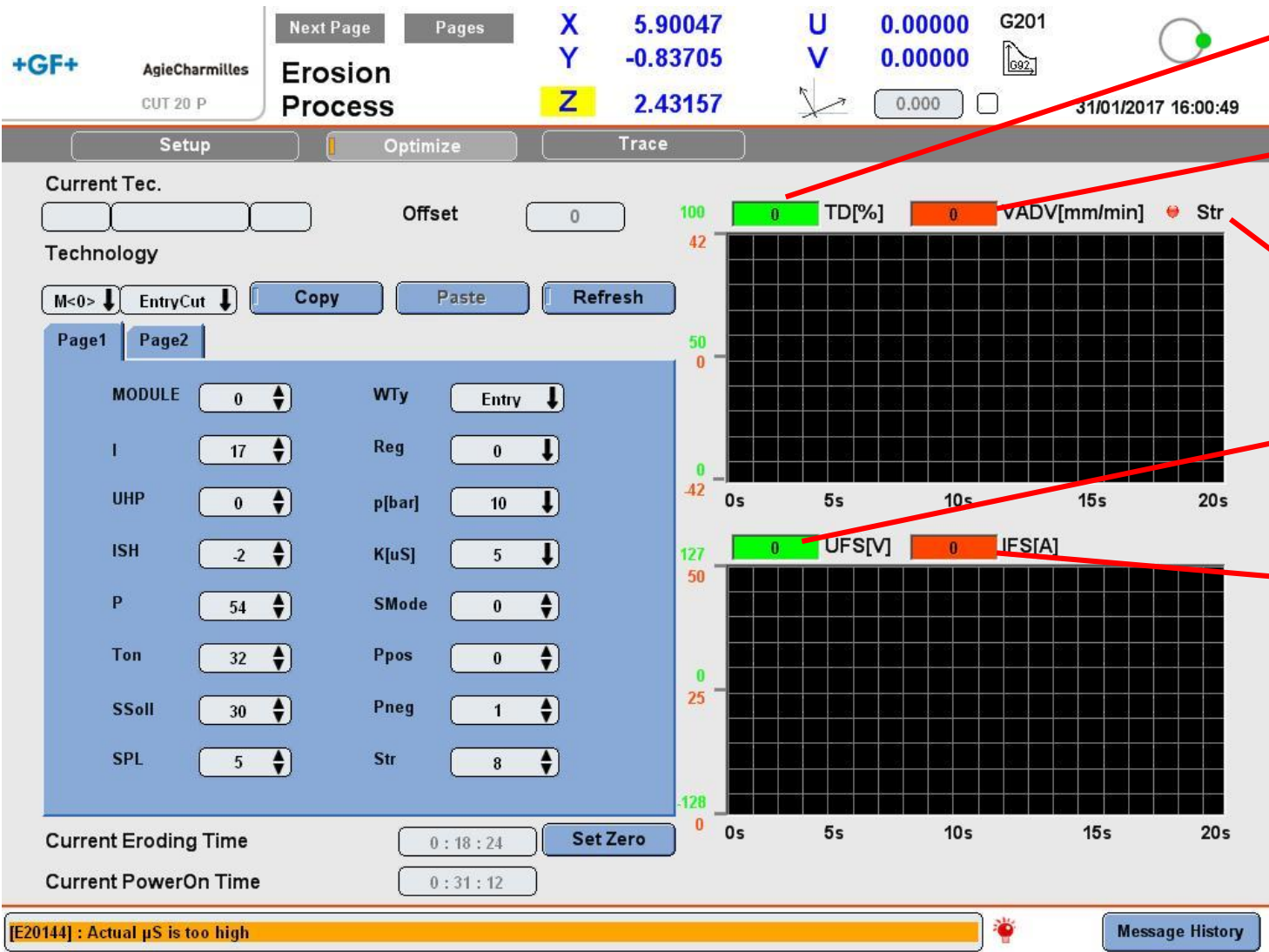
I (Discharge Current)

This can affect:

- 1) Cutting width
- 2) Geometric errors
- 3) Surface finish
- 4) Wire breakage
- 5) Cutting speed



The OPTIMIZE page for the erosion process



Expresses the real value of the servo-control parameter; corresponds with SSOL

Current linear feed in mm/minute

Activate or deactivate corner radii blend strategy

Average voltage between wire and workpiece

Average machining current expressed in red

The **OPTIMIZE** page for the erosion process

SSoll = has to do with
programmed feed rate and
adjustment in real time
Works in conjunction with **TD[%]**
parameter
The lower the SSoll number the
faster the federate
The higher the SSoll number the
slower the federate

SSoll

Raise the **SSoll** number if
you are encountering
excessive wire breakage

Next Page Pages X 5.90047 U 0.00000 G201
Y -0.83705 V 0.00000
Z 2.43157 0.000 31/01/2017 16:00:49

+GF+ AgieCharmilles CUT 20 P Erosion Process

Setup Optimize Trace

Current Tec. Offset 0

Technology M<0> EntryCut Copy Paste Refresh

Page1 Page2

MODULE 0 WTy Entry
I 17 Reg 0
UHP 0 p[bar] 10
ISH -2 K[uS] 5
P 54 SMode 0
Ton 32 Ppos 0
SSoll 30 Pneg 1
SPL 5 Str 8

Current Eroding Time 0 : 18 : 24 Set Zero
Current PowerOn Time 0 : 31 : 12

[E20144] : Actual μS is too high Message History

TD [%]

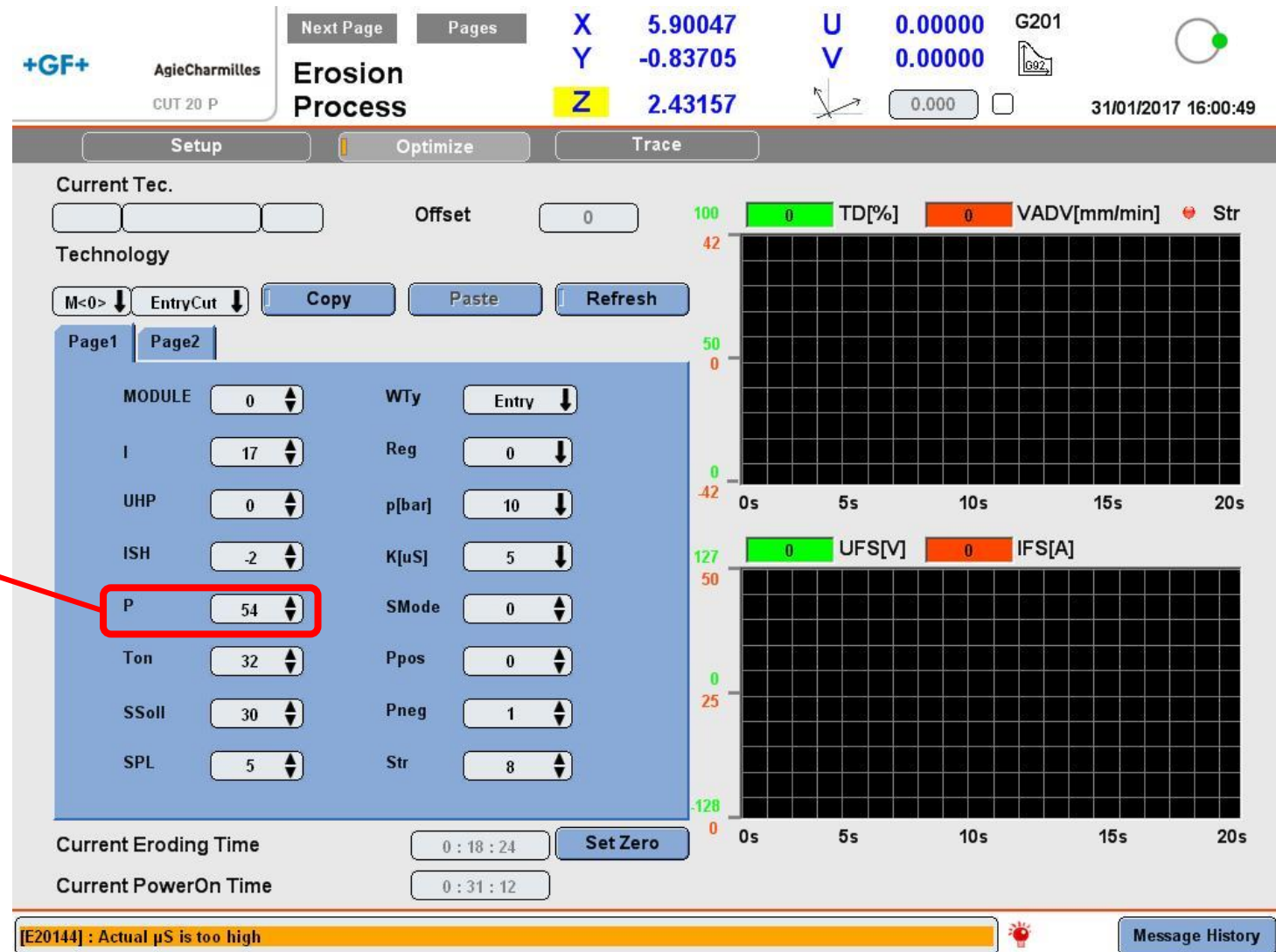
The OPTIMIZE page for the erosion process

P = has to do with pulses in one second

The frequency affects directly the erosion power and indirectly the cutting speed

P (pulse frequency)

Lower the P slightly under difficult cutting conditions and during periods of excessive wire breakage



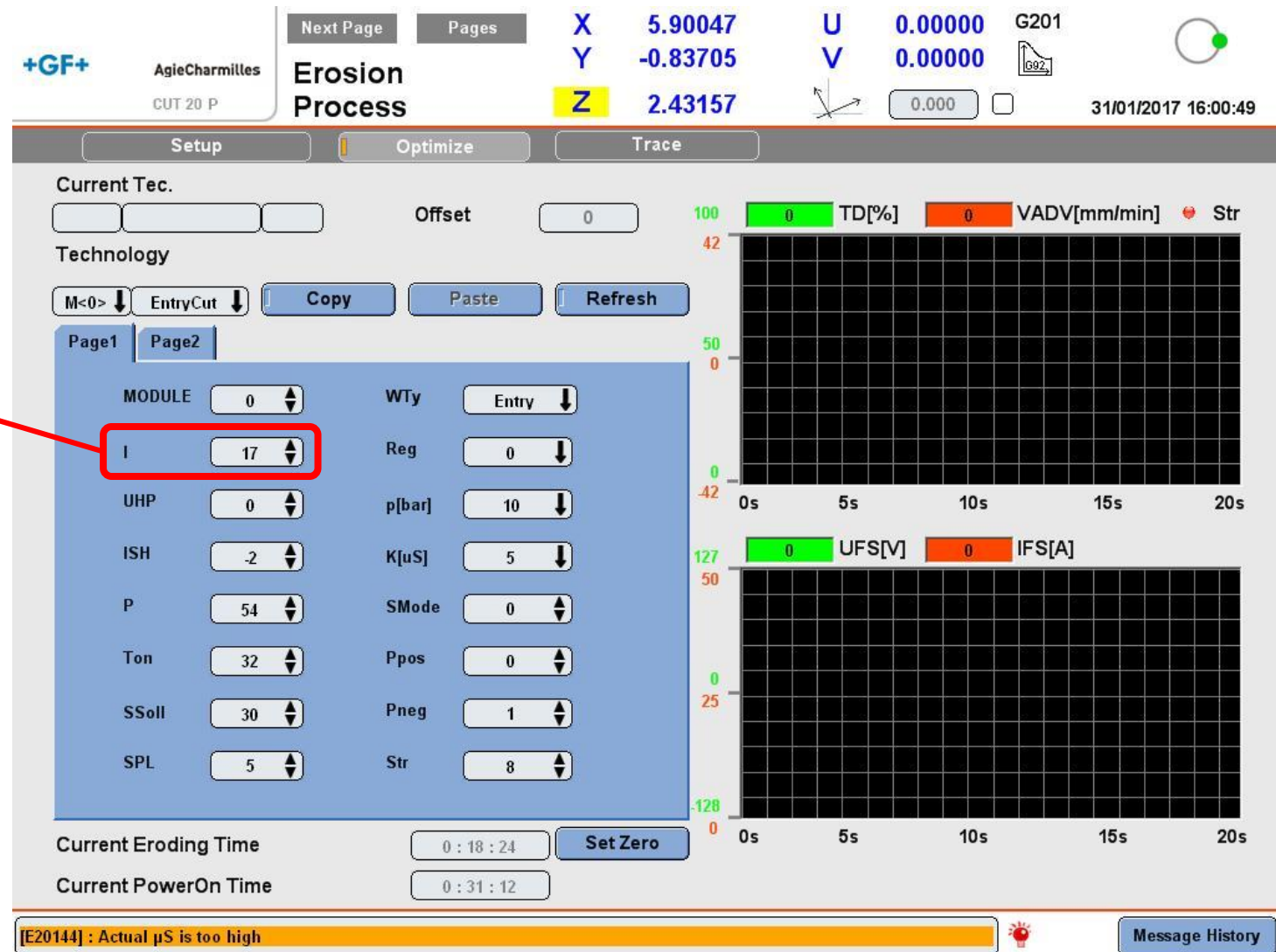
The OPTIMIZE page for the erosion process

I = has to do with discharge
current during cuts

I (Discharge Current)

This can affect:

- 1) Cutting width
- 2) Geometric errors
- 3) Surface finish
- 4) Wire breakage
- 5) Cutting speed

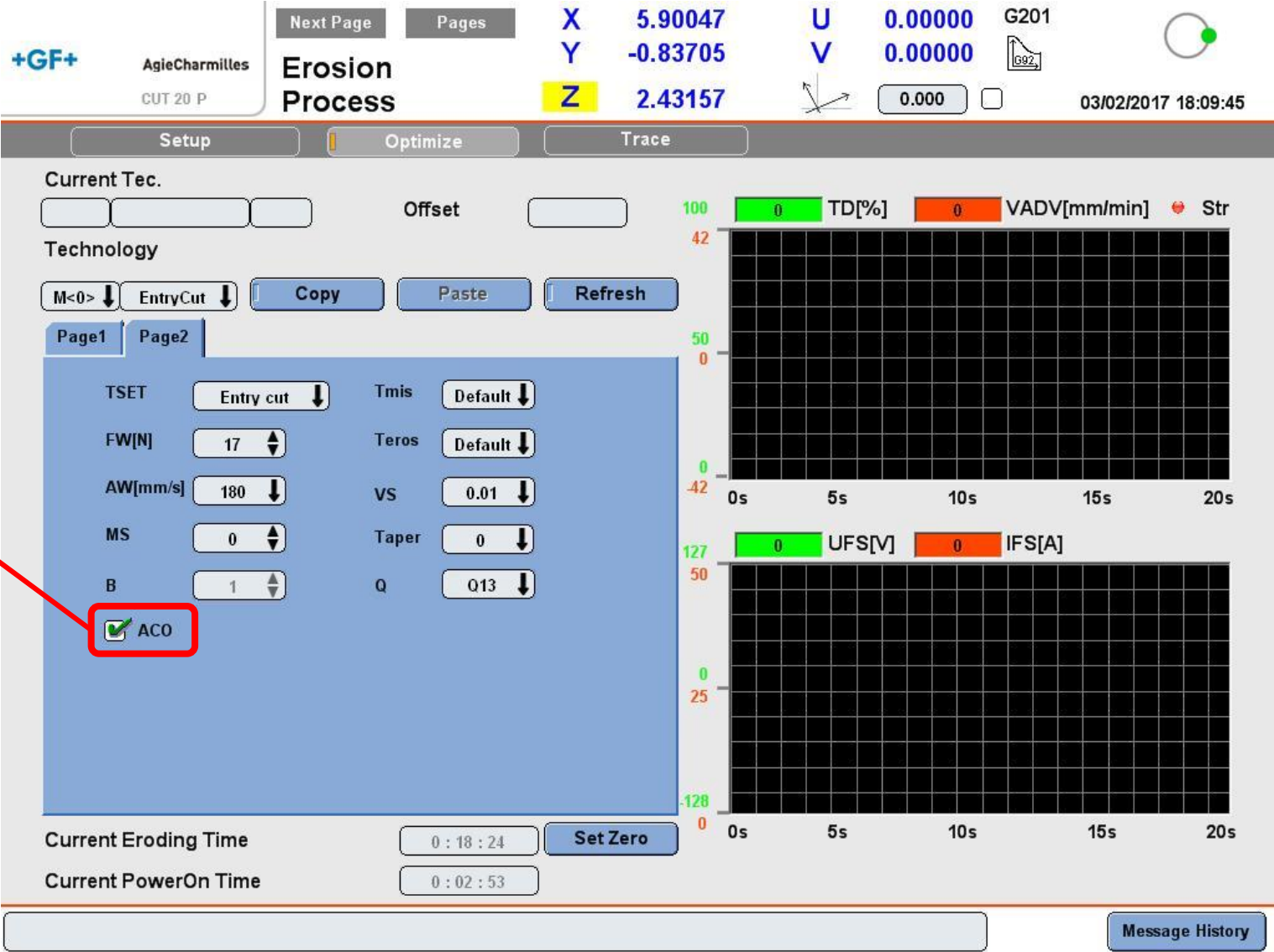


The OPTIMIZE page for the erosion process

ACO = Adaptive Current
Optimization

ACO (Adaptive Current
Optimization)

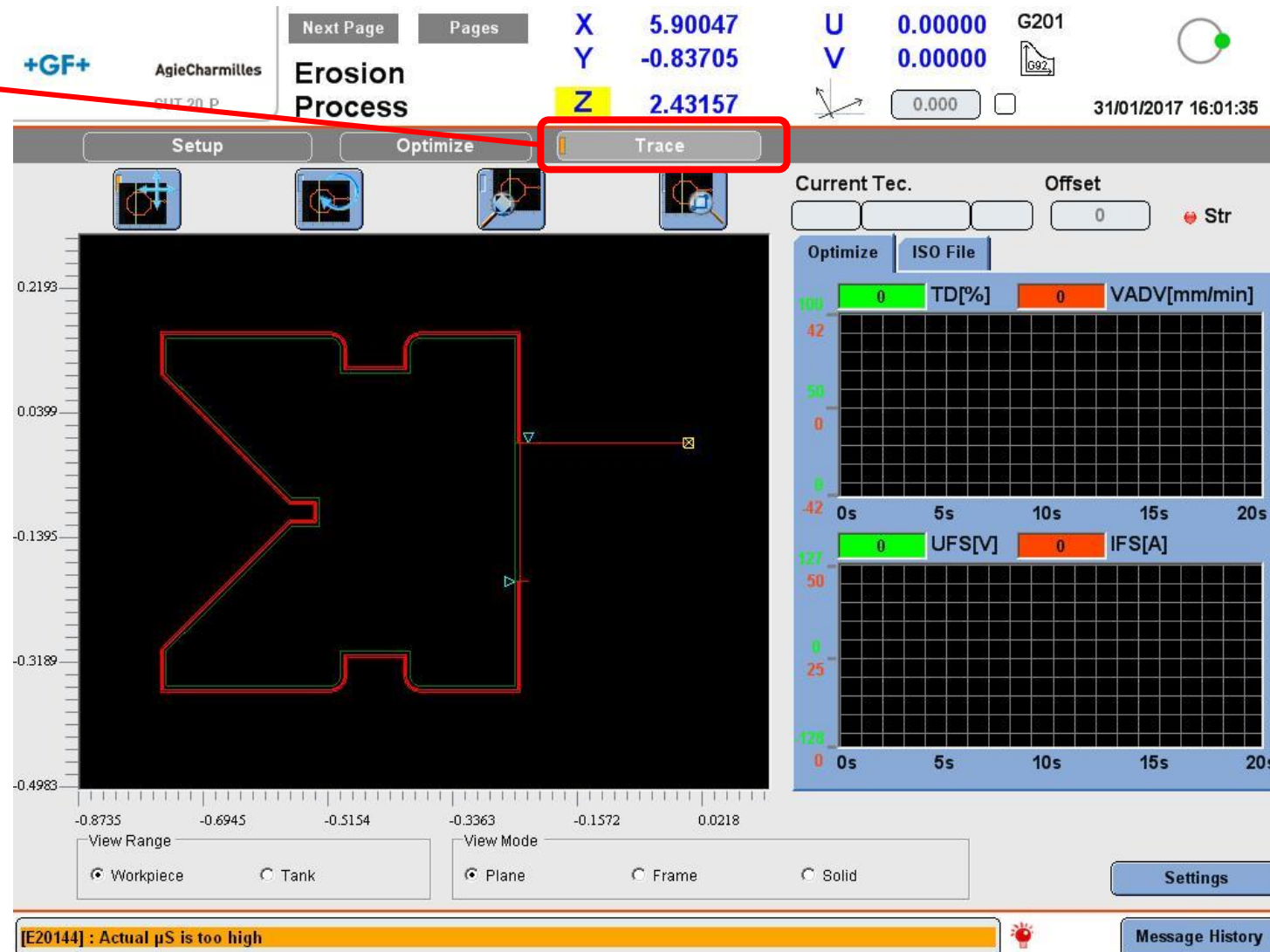
Provides real-time process
monitoring and adapting
during cutting



The **OPTIMIZE** page for the erosion process

In the Erosion page you can trace
the progress of the erosion cut in
real-time

Select trace



The **OPTIMIZE** page for the erosion process

Wire EDM Parameters

Review from erosion PPT

Parameters

OPTIMIZE page for the erosion process

Select trace

By selecting the ISO tab the user can view in real-time the progress of the cut through the ISO file

Select ISO

View the ISO file

ISO File

```
G20;  
H000 = 0;  
H001 = 0.00872;  
H002 = 0.00642;  
H003 = 0.00527;  
H004 = 0.00508;  
( ) (VBLOCK 4PASS);  
G90 G92 X0 Y0;  
M60;  
(ROUGH PRIMARY CUT VBLOCK 4PASS);  
G90 G92 X0 Y0;  
C096;  
G01 X-.1 Y0;  
C001;  
G42 H000;  
G01 X-.25 Y0;  
G42 H001;  
G01 X-.25 Y.15;  
G01 X-.385 Y.15;  
G03 X-.4 Y.135 I0 J-.015;  
G01 X-.4 Y.1;  
G01 X-.5 Y.1;  
G01 X-.5 Y.135;  
G03 X-.515 Y.15 I.015 J0.
```

[E20144] : Actual pS is too high

Technology EntryCut Copy Paste

Generator Parameters

Page1

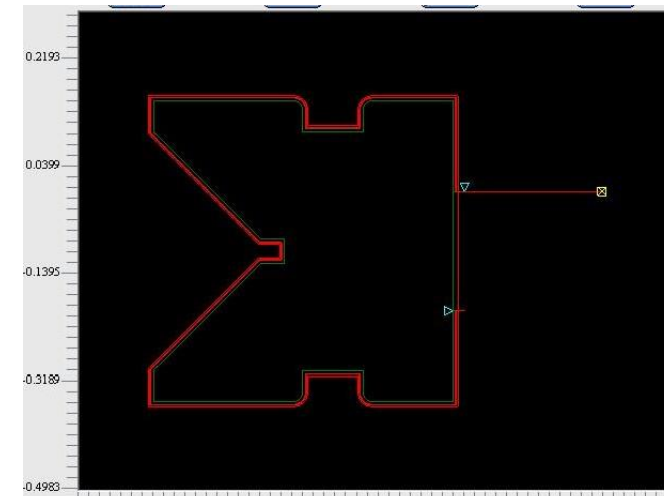
MODULE	0	WTy	Entry
I	17	SPL	5
UHP	0	Ppos	0
ISH	-2	Pneg	1
P	54	Tmis	Default
Ton	32	Teros	Default
SSoll	30	VS	0.01
Reg	0	SMode	0
Str	8	<input checked="" type="checkbox"/> ACO	



Use caution when modifying and resaving files

Use preferred file management skills

Always back up a file before modifying and resaving



FINIS

