

Università degli Studi di Padova – Dipartimento di Ingegneria Industriale

Corso di Laurea in Ingegneria Meccanica

Determinazione sperimentale di curve tensione-deformazione per acciaio AISI301 a scopo ferroviario

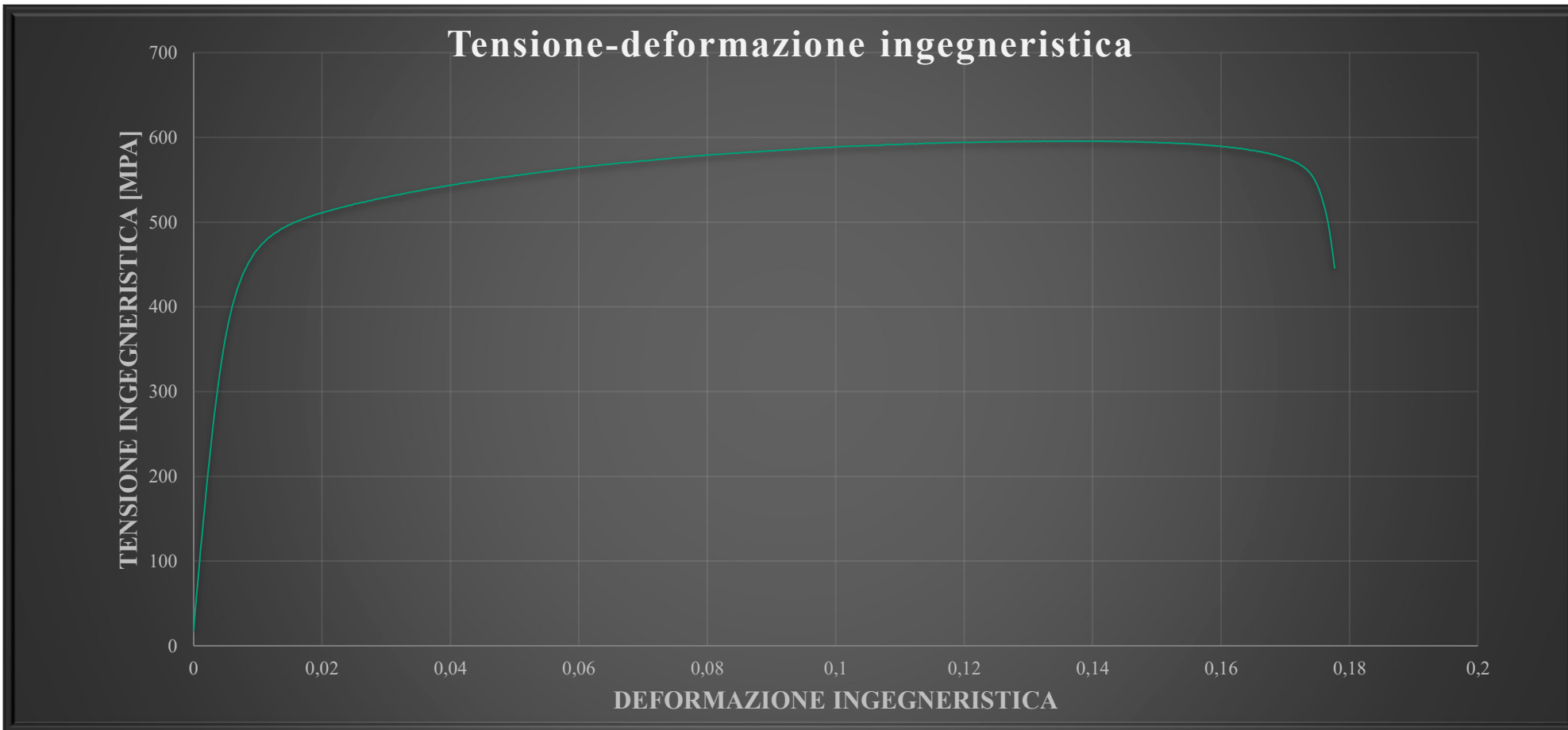
Tutor universitario: Prof. Bruschi Stefania

Laureando: Marcazzan Nicola 1219746

Padova, 14/07/2022

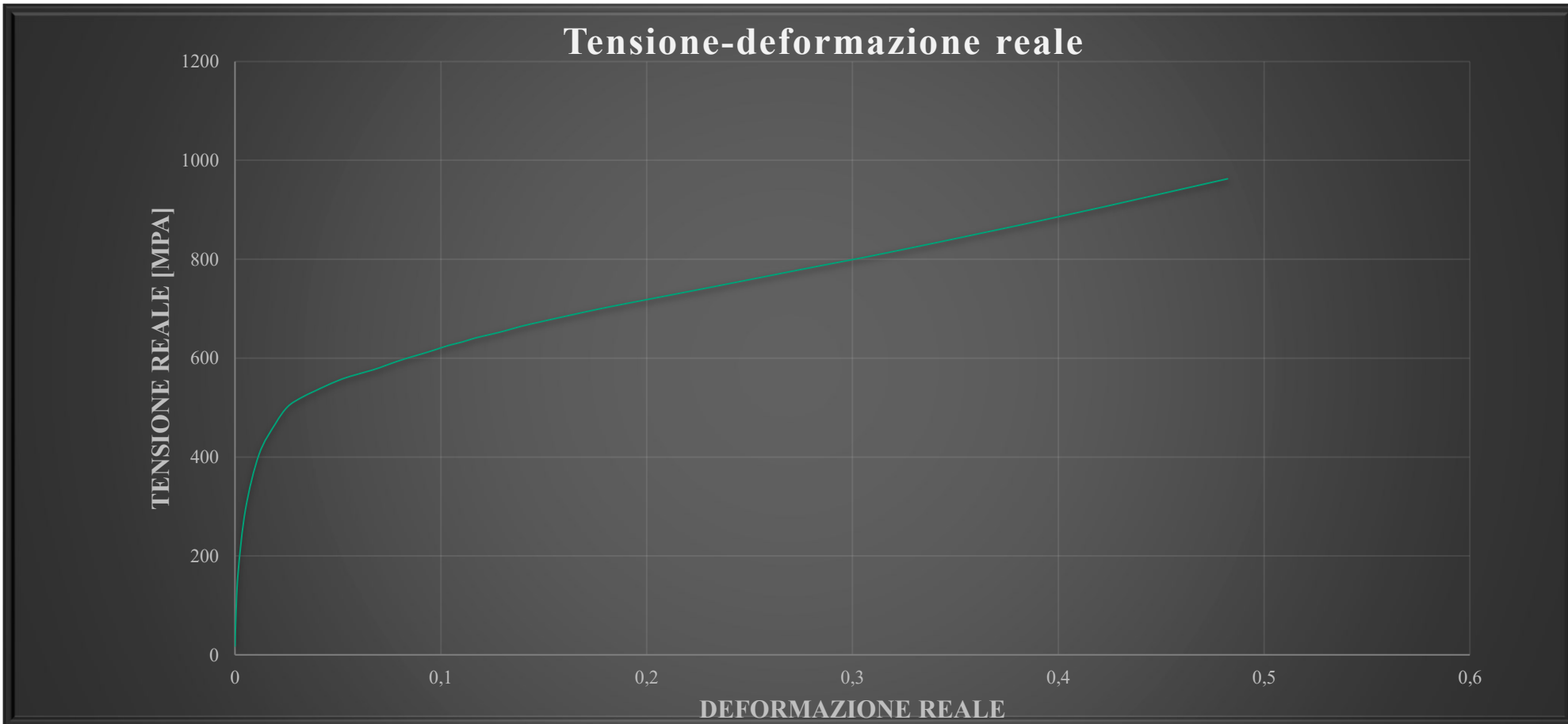
$$\sigma_{ing} = \frac{F}{A_0}$$

$$\varepsilon_{ing} = \frac{\Delta l}{l_0}$$



$$\sigma_t = \frac{F}{A}$$

$$\varepsilon_t = \ln\left(\frac{l}{l_0}\right)$$



HITACHI

Inspire the Next

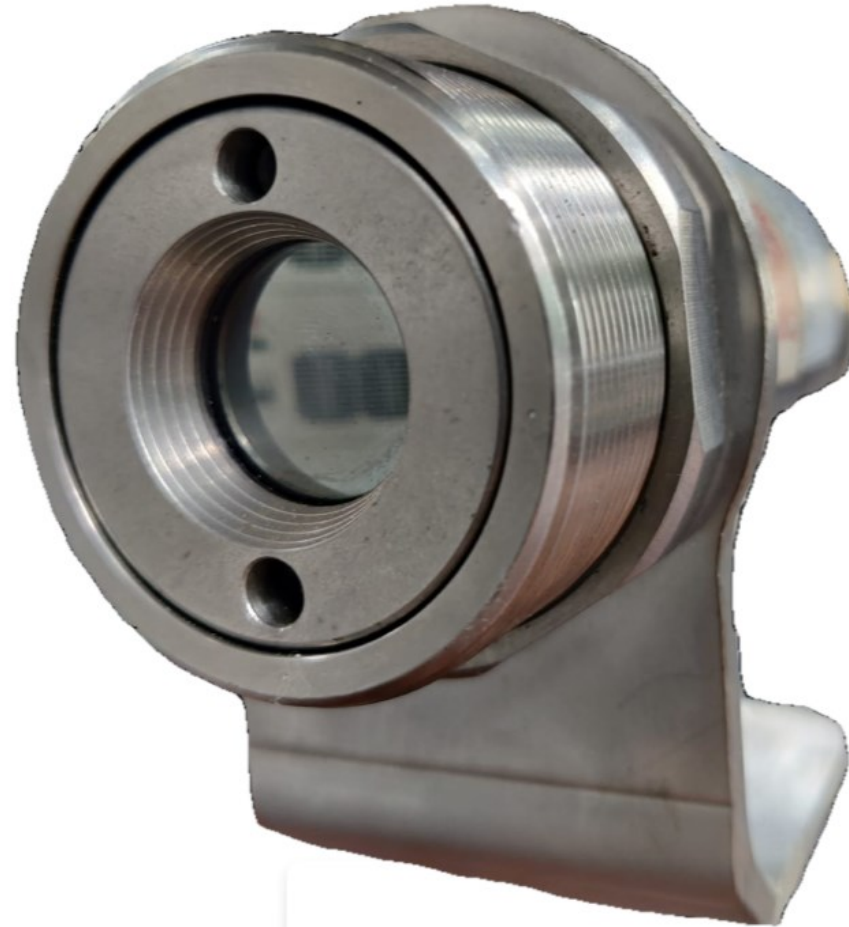




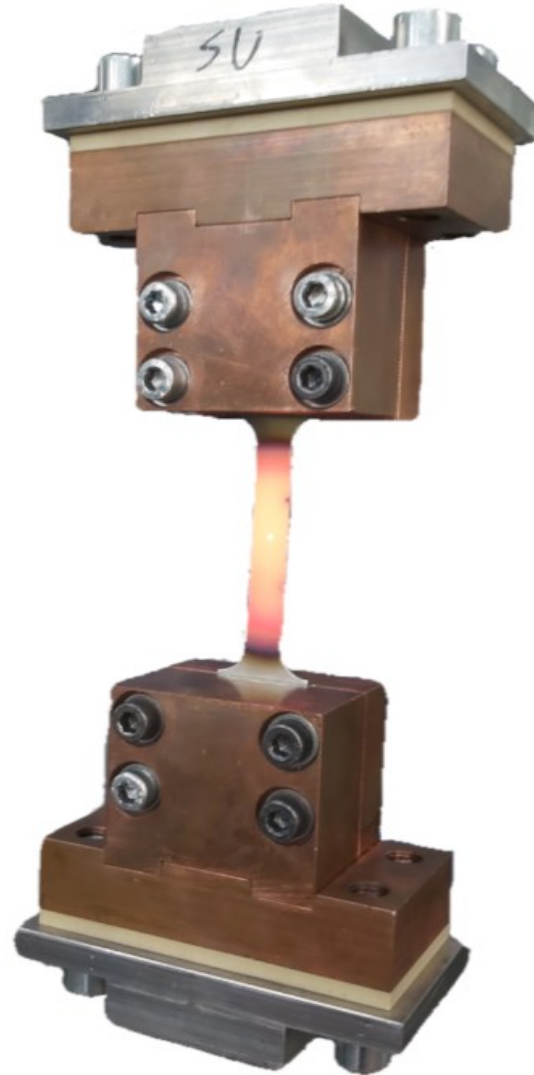
Provino



Fotocamera

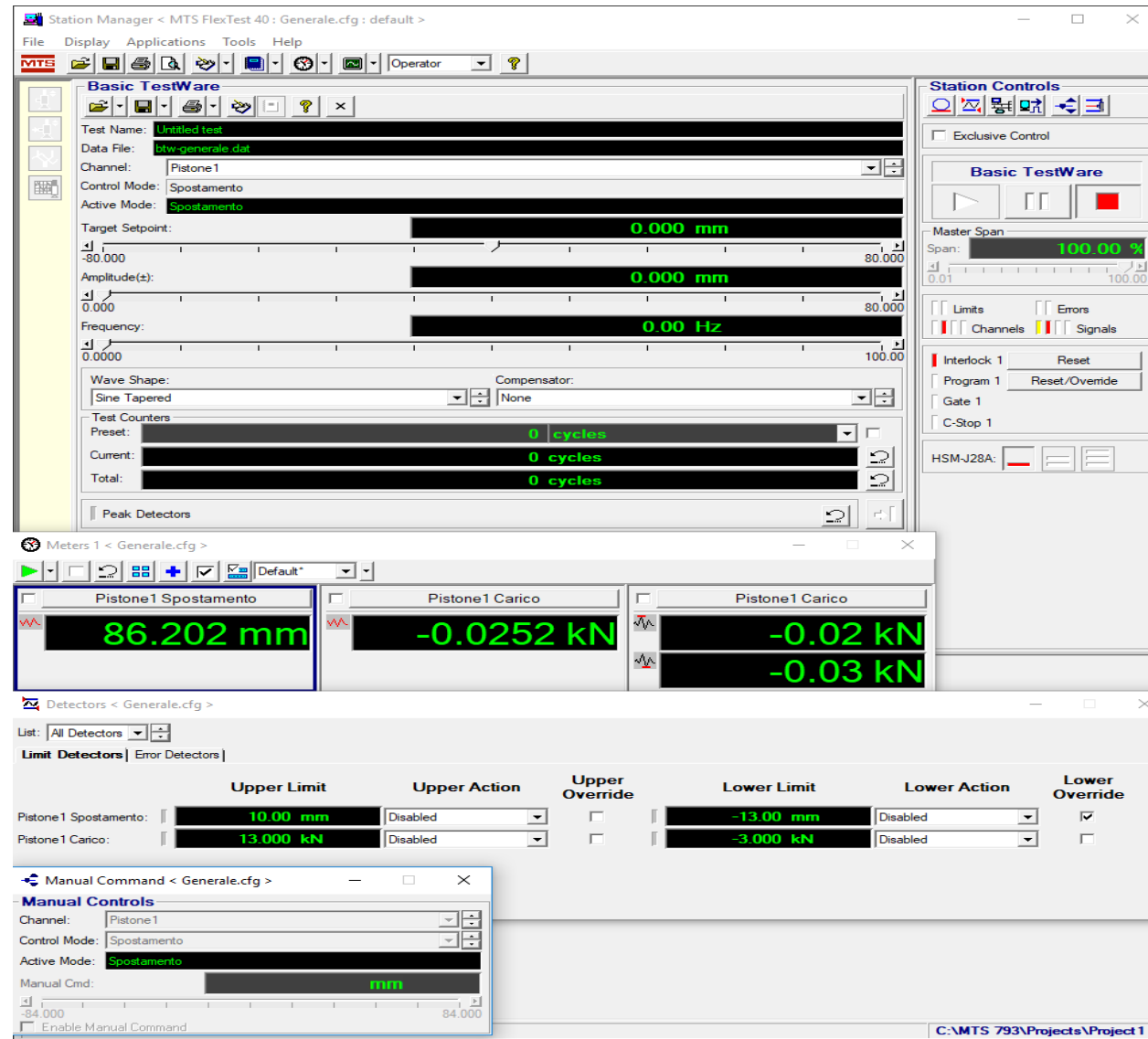


Pirometro



MTS

MTS: Software per la
prova in controllo di
deformazione

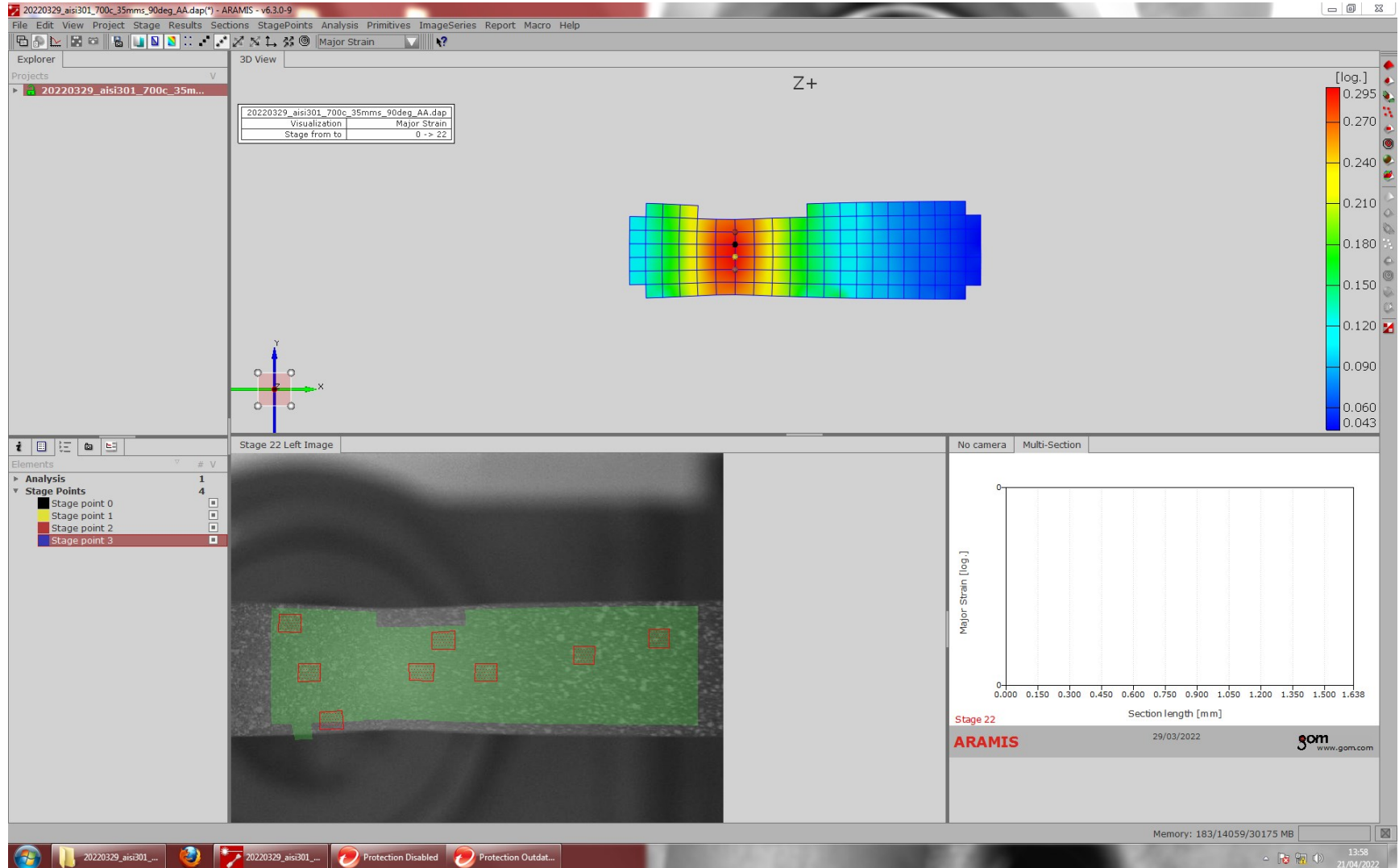


The screenshot displays the MTS FlexTest 40 software interface, which is used for controlling deformation tests. The main window, titled "Station Manager < MTS FlexTest 40 : Generale.cfg : default >", contains several panels:

- Basic TestWare:** This panel shows test parameters:
 - Test Name: Untitled test
 - Data File: btw-generale.dat
 - Channel: Pistone1
 - Control Mode: Spostamento
 - Active Mode: Spostamento
 - Target Setpoint: 0.000 mm
 - Amplitude(±): 0.000 mm
 - Frequency: 0.00 Hz
 - Wave Shape: Sine Tapered
 - Compensator: None
 - Test Counters: Preset (0 cycles), Current (0 cycles), Total (0 cycles)
- Station Controls:** This panel includes:
 - Exclusive Control: unchecked
 - Basic TestWare: Play, Stop, and Run buttons
 - Master Span: 100.00 %
 - Span: 0.01 to 100.00
 - Limits, Channels, Errors, Signals: checkboxes
 - Interlock 1, Program 1, Gate 1, C-Stop 1: checkboxes
 - Reset, Reset/Override buttons
 - HSM-J28A: status indicators
- Meters 1 < Generale.cfg >:** This panel displays real-time data:
 - Pistone1 Spostamento: 86.202 mm
 - Pistone1 Carico: -0.0252 kN
 - Pistone1 Carico: -0.02 kN
 - Pistone1 Carico: -0.03 kN
- Detectors < Generale.cfg >:** This panel shows limit detectors:

	Upper Limit	Upper Action	Upper Override	Lower Limit	Lower Action	Lower Override
Pistone1 Spostamento:	10.00 mm	Disabled	<input type="checkbox"/>	-13.00 mm	Disabled	<input checked="" type="checkbox"/>
Pistone1 Carico:	13.000 kN	Disabled	<input type="checkbox"/>	-3.000 kN	Disabled	<input type="checkbox"/>
- Manual Command < Generale.cfg >:** This panel shows manual controls:
 - Channel: Pistone1
 - Control Mode: Spostamento
 - Active Mode: Spostamento
 - Manual Cmd: mm
 - Manual Cmd range: -84.000 to 84.000
 - Enable Manual Command: unchecked

Aramis: Software per la determinazione della deformazione dalle immagini

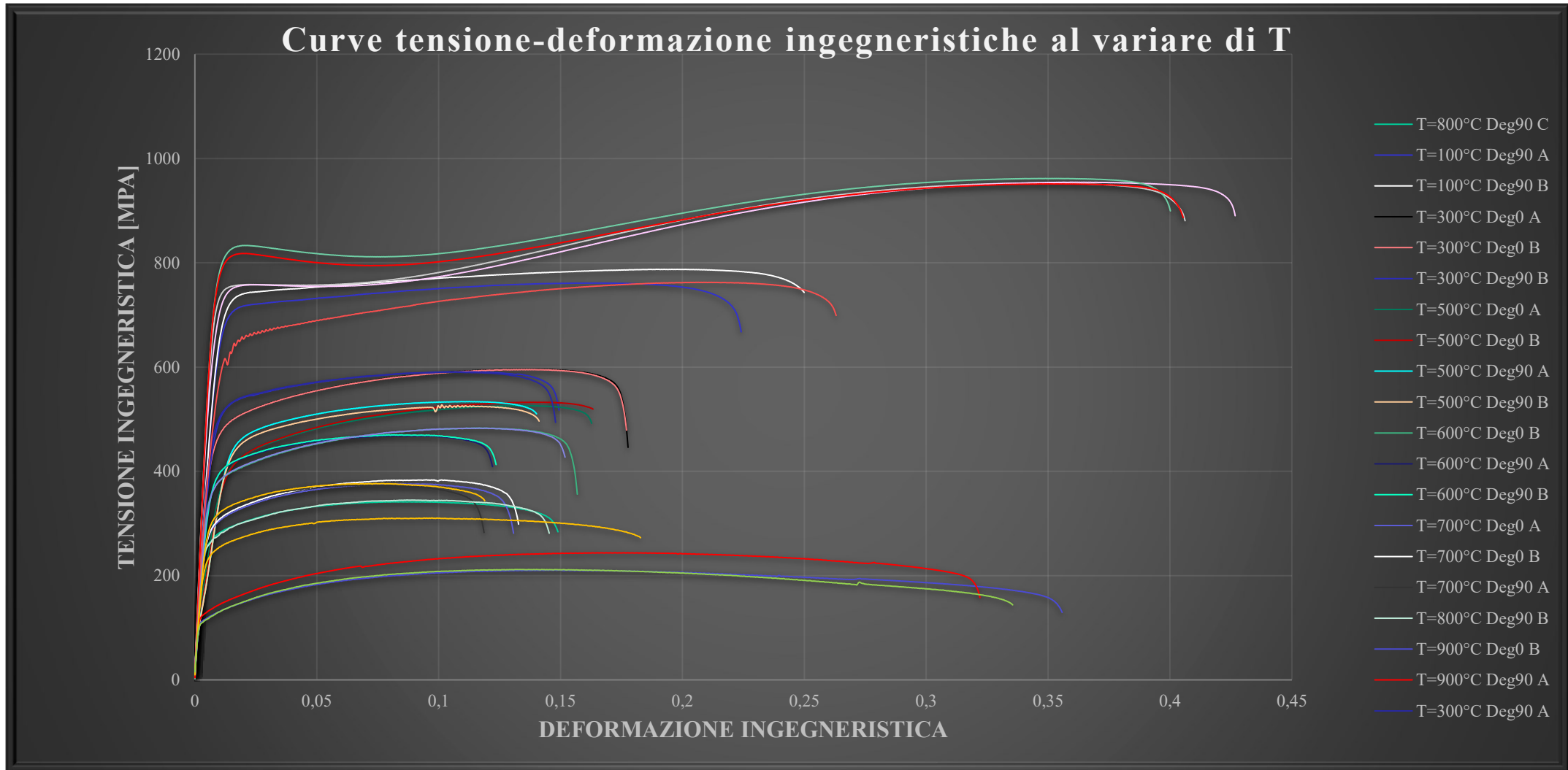


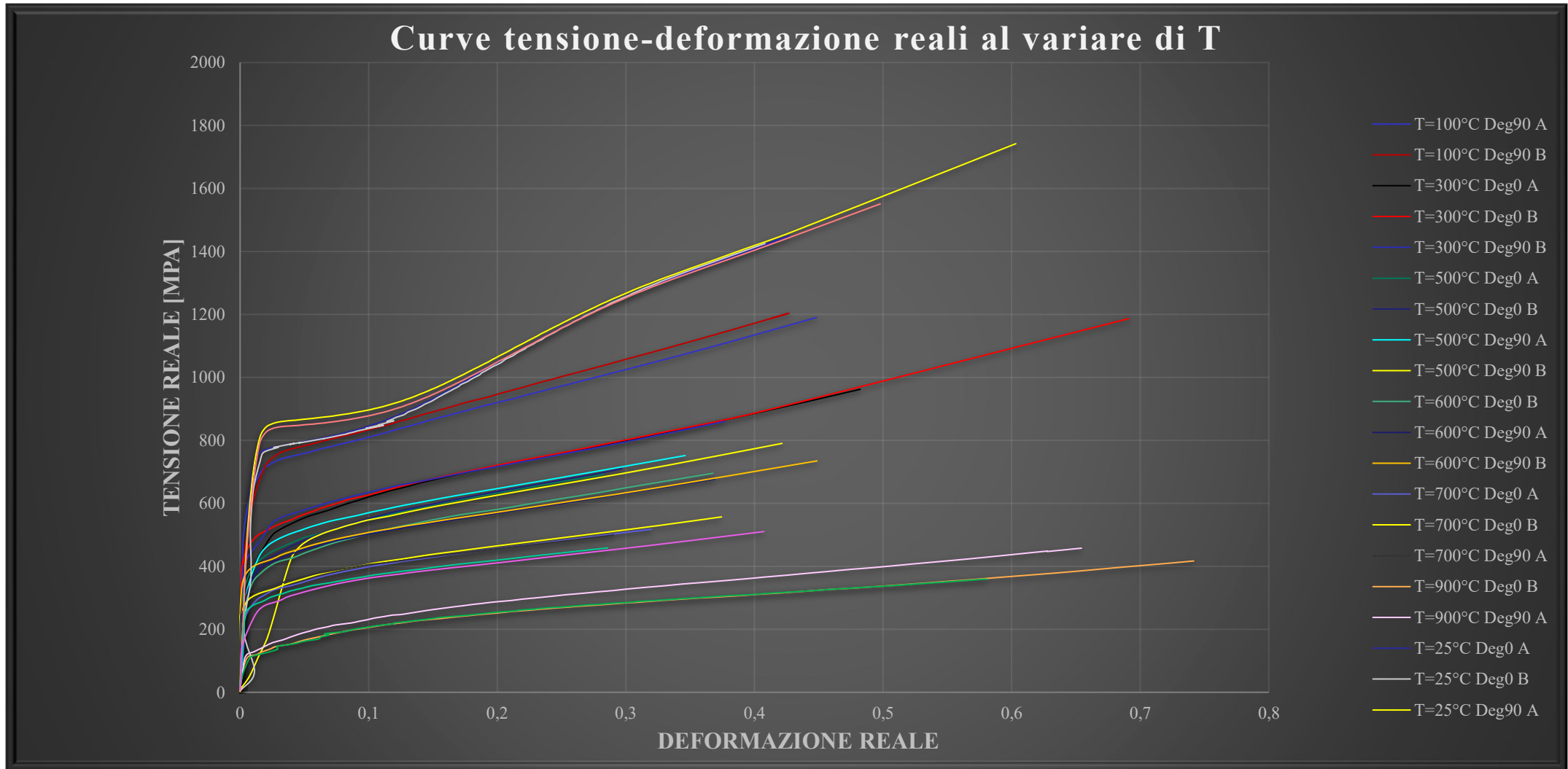
Excel: Per ricavare i grafici a partire dai dati ottenuti dal MTS e da Aramis

The screenshot shows an Excel spreadsheet with the following data tables:

MTS DATA				LABVIEW DATA			
		Frequenza	1024	TOTALE RIGHE MTS:	1561	Lunghezza tratto utile	65
		Max forza [N]	7149,8437	TIME MTS:	3,04 Sec		
		UTS [Mpa]	595,8203083	AREA INIZIALE:	12 mm^2		

Corsa	Forza	Tempo	Forza Vera	Corsa Vera	TEMPERATURA	Tempo MTS	Time pictures	cella Forza corrispondente MTS	parte int	aggancio cella	Forza MTS corrispondente
mm	N	s	N	mm	TC1	s	s				
0,000763	217,51203	0,012695313	217,51203	0	0	300	0	8	8	D8	217,51
0,001579	238,49107	0,013671875	238,49107	0,000816	0,000976562	300	0,000976562	15,168	15	D15	729,29
0,004166	258,90893	0,014648438	258,90893	0,003403	0,000976563	300	0,001953125	22,336	22	D22	1947,95
0,007248	331,00489	0,015625	331,00489	0,006485	0,000976562	300	0,002929687	29,504	29	D29	3515,47
0,01199	409,64371	0,016601563	409,64371	0,011227	0,000976563	300	0,00390625	36,672	36	D36	4803,39
0,01762	517,94642	0,017578125	517,94642	0,016857	0,000976562	300	0,004882812	43,84	43	D43	5498,17
0,023651	609,03907	0,018554688	609,03907	0,022888	0,000976563	300	0,005859375	51,008	51	D51	5867,28
0,03038	729,29472	0,01953125	729,29472	0,029617	0,000976562	300	0,006835937	58,176	58	D58	6039,31
0,039379	856,38928	0,020507813	856,38928	0,038616	0,000976563	300	0,0078125	65,344	65	D65	6152,94
0,050427	1023,8569	0,021484375	1023,8569	0,049664	0,000976562	300	0,008789062	72,512	72	D72	6241,66
0,060486	1186,1095	0,022460938	1186,1095	0,059723	0,000976563	300	0,009765625	79,68	79	D79	6327,13
0,070717	1367,1894	0,0234375	1367,1894	0,069954	0,000976562	300	0,010742187	86,848	86	D86	6388,98
0,084267	1541,3952	0,024414063	1541,3952	0,083504	0,000976563	300	0,01171875	94,016	94	D94	6466,76
0,096752	1740,4077	0,025390625	1740,4077	0,095989	0,000976562	300	0,012695312	101,184	101	D101	6522,59
0,111565	1947,9495	0,026367188	1947,9495	0,110802	0,000976563	300	0,013671875	108,352	108	D108	6579,04
0,126183	2170,9044	0,02734375	2170,9044	0,12542	0,000976562	300	0,014648437	115,52	115	D115	6624,98
0,140785	2385,9568	0,028320313	2385,9568	0,140022	0,000976563	300	0,015625	122,688	122	D122	6674,40
0,157837	2604,8129	0,029296875	2604,8129	0,157074	0,000976562	300	0,016601562	129,856	129	D129	6717,74
0,174709	2824,5053	0,030273438	2824,5053	0,173946	0,000976563	300	0,017578125	137,024	137	D137	6767,35
0,192352	3055,9835	0,03125	3055,9835	0,191589	0,000976562	300	0,018554687	144,192	144	D144	6798,44
0,211624	3291,1689	0,032226563	3291,1689	0,210861	0,000976563	300	0,01953125	151,36	151	D151	6840,67
0,232247	3515,4674	0,033203125	3515,4674	0,231484	0,000976562	300	0,020507812	158,528	158	D158	6869,89
0,25211	3731,9086	0,034179688	3731,9086	0,251347	0,000976563	300	0,021484375	165,696	165	D165	6898,13
0,272629	3937,1905	0,03515625	3937,1905	0,271866	0,000976562	300	0,022460937	172,864	172	D172	6936,63
0,295254	4137,9409	0,036132813	4137,9409	0,294491	0,000976563	300	0,0234375	180,032	180	D180	6964,67
0,317516	4324,0852	0,037109375	4324,0852	0,316753	0,000976562	300	0,024414062	187,2	187	D187	6986,53
0,342026	4501,1616	0,038085938	4501,1616	0,341263	0,000976563	300	0,025390625	194,368	194	D194	7009,19
0,365784	4654,7298	0,0390625	4654,7298	0,365021	0,000976562	300	0,026367187	201,536	201	D201	7031,55
0,390579	4803,3857	0,040039063	4803,3857	0,389816	0,000976563	300	0,02734375	208,704	208	D208	7047,27
0,416298	4929,4143	0,041015625	4929,4143	0,415535	0,000976562	300	0,028320312	215,872	215	D215	7071,91





**Vi ringrazio
per
l'attenzione**