



# wstyler

# CPA

**COMPUTERIZED PARTICLE ANALYZER**  
ACCURATE MEASUREMENT  
OF MATERIAL QUALITY



#### ADDRESS

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A Haver & Boecker Company

# PHOTO-OPTICAL PARTICLE ANALYSIS – W.S. TYLER CPA

In the field of conventional particle analysis, W.S. Tyler, alongside parent company Haver & Boecker, has been a market-leading manufacturer of test sieve shakers for decades. As a result, in the early 90s, our accrued expertise and pioneering spirit provided the ideal platform for exploring the next frontier in particle analysis: integration of powerful computing technology.

Our wide product range, consisting of future-oriented, expandable modular units and systems, guarantees flexible solutions for all applications. Our photo-optical systems have proven their worth with hundreds of minerals in various sectors. Whether in the form of standardized laboratory/online units or customized industrial units, from pharmaceuticals, food, and non-metallic minerals to the plastics and fertilizer industries, W.S. Tyler delivers.

## WE DEVELOP THE FUTURE.

Our design department, in-house toolmaking, mechanical engineering, and our own electronics and control specialists ensure every W.S. Tyler CPA system meets the requirements imposed upon it. Engineers develop customized equipment, specialized design solutions, and individual control systems for you and, if required, take care of the connection to the PLC.

We work with our partners from the Haver Group in the development and improvement of CPA technology, including the Machinery Divisions in Münster and Oelde, as well as Haver Engineering GmbH in Meißen, which is recognized as an affiliated institute of the Technical University Mining Academy of Freiburg.

These collaborations have given rise to innovative products and numerous national and international parents. Time and again, methods we have developed have become compulsory norms throughout the industry.

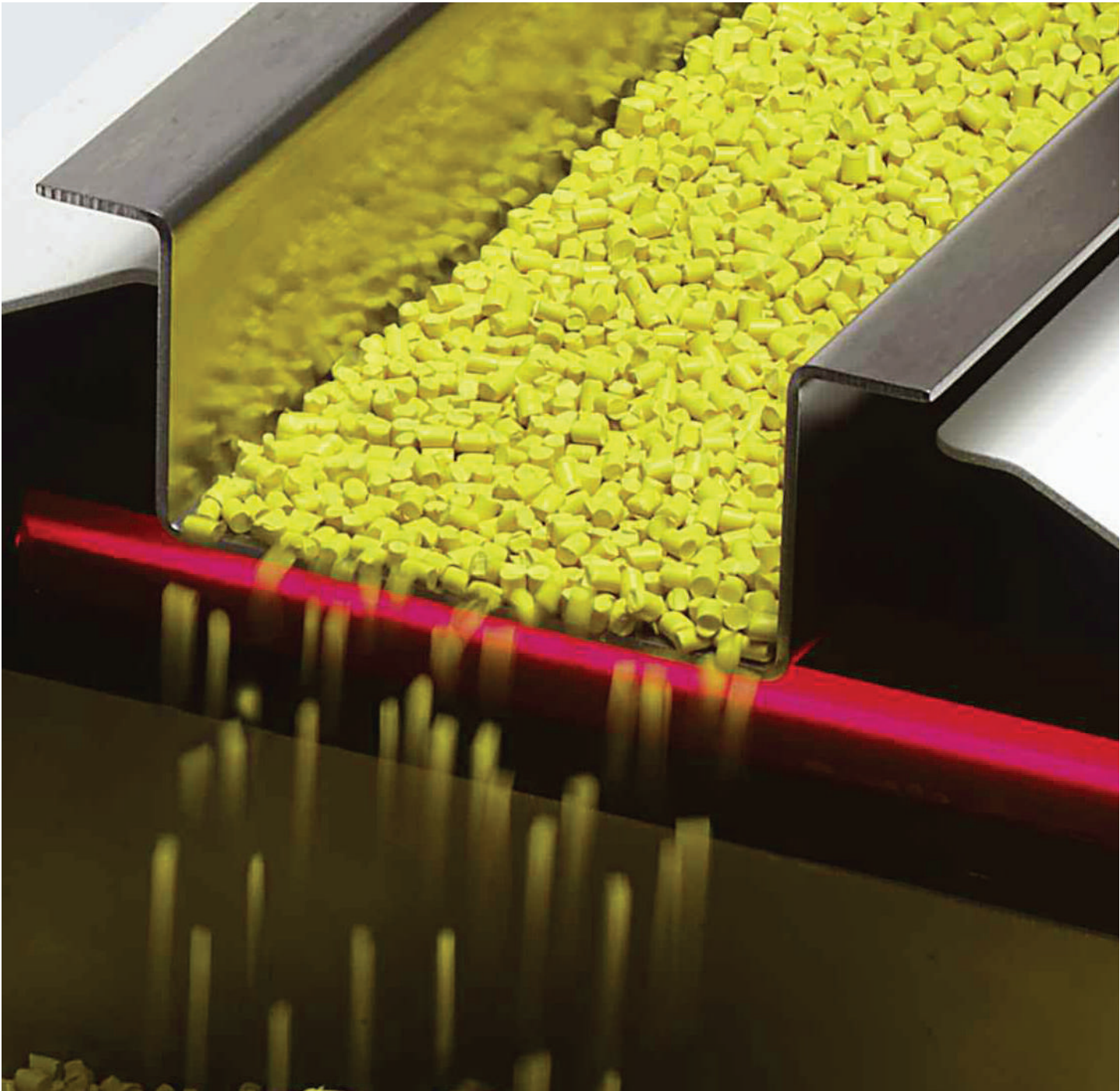
We will also assist in the commissioning of CPA systems and directly provide you with comprehensive after-sales service, from professional maintenance, to subsequent modifications, to software updates, without going through a distributor.



Founded upon the time-honored values of precision and quality, W.S. Tyler began producing woven wire and mesh materials in northeast Ohio in 1872. Today, we continue to grow and refuse to compromise those principles, determined as ever to meet the evolving demands of our customers.

With an experienced staff of experts and a relentless commitment to research and development, W.S. Tyler remains at the forefront of design and engineering. And our trademark blend of tradition and innovation leaves us well-positioned for the future.





# FOCUS ON MAXIMUM PRECISION

The patented W.S. Tyler CPA measuring process is used to analyze the grain sizes and shapes of dry and non-agglomerating particles of bulk materials in the range from 10µm to 400mm. The robust technology is virtually maintenance free; therefore, it is absolutely fail-safe and works reliably, even under extreme conditions. The CPA technology can be used to analyze coarse and fine material, such as gravel, sand, coal, plastic granules, wood chippings, chemical and pharmaceutical products, fertilizers, and much more.

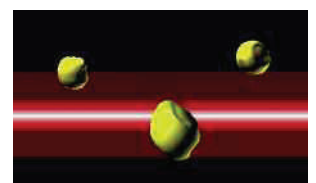
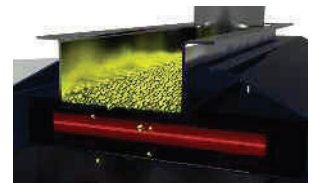
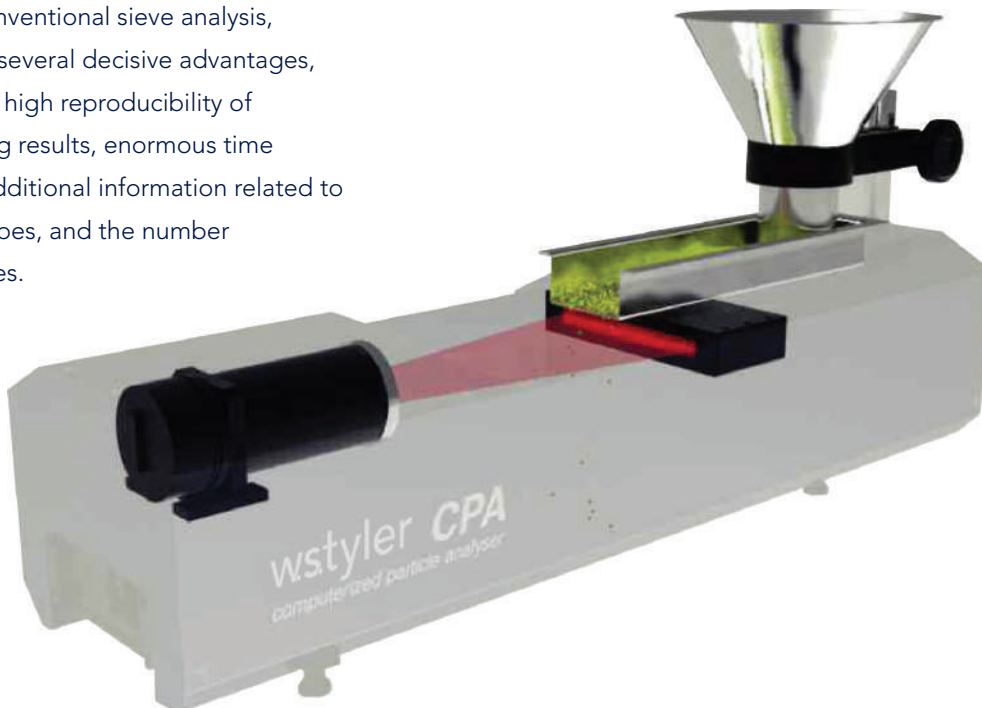
W.S. Tyler CPA systems are based upon energy-saving, low-maintenance technology that minimize operating costs. They are ready to connect to a PLC control system in their standard configuration and can also be integrated into online processes at a later date without modification. The results produced by the device are comparable with a conventional sieve analysis, but offer several decisive advantages, including high reproducibility of measuring results, enormous time saving, additional information related to grain shapes, and the number of particles.

## THE PRINCIPLE OF CPA MEASUREMENT: STATE-OF-THE-ART INNOVATION.

W.S. Tyler CPA measuring instruments are based on digital image processing. A high-resolution, digital line-scan camera captures the particles in free-falling bulk materials against an LED lighting array. With a recording frequency reaching 28,000 line scans per second, the scanned lines are combined by the CPA to form an endless data record. The shadow projections of the particles are evaluated in real time in parallel with the measuring process. Up to 10,000 particles can be detected, analyzed, and counted every second. Due to a GigE camera interface, the CPA devices can be operated using a notebook without additional hardware modules, such as a camera card. The GigE technology has a high transfer rate of up to 1,000 Mbit per second.

## TAILOR-MADE SOLUTION: CPA CONVEYOR

The CPA CONVEYOR measuring process was specially developed for analyzing elongated materials where results could be falsified due to overlaying and rotation of particles while the image was being tested. During the process, the material sample is fed via a metering channel where it passes onto a faster, running conveyor belt. The resulting difference in speed separates the particles and brings them into a stable orientation (maximum length to maximum width) before the digital image analysis occurs. The CONVEYOR's characteristics virtually eliminate random rotation of particles as they are measured.









id	Image	Equivalent diameter	Circularity	Length/Width	Maximum cut [mm]	Surface [mm <sup>2</sup> ]	Feret diameter	Perimeter [mm]	Sphericity	Martin diameter [mm]
30		8.7579	0.82906	1.6016	7.0611	0.78175	11.405	10.374	11.309	8.3475
34		6.9188	0.88517	1.3653	5.8771	0.76952	8.3385	7.462	8.024	6.3657
38		6.4579	0.90226	1.0481	6.4245	0.74715	7.4086	6.461	6.7335	6.4513
42		6.9691	0.86837	1.457	5.551	0.76533	8.8563	5.187	8.0876	8.0876
43		6.9495	0.87592	1.1189	6.5901	0.70654	8.588	7.371	7.3738	7.1381
45		9.3854	0.80656	1.8235	7.331	0.72807	13.747	8.372	13.368	11.59
46		6.9739	0.84462	1.655	5.6802	0.75706	9.7818	7.644	9.4009	6.8802
59		8.4724	0.88691	1.3957	7.4818	0.76567	10.614	9.828	10.443	7.6553
76		6.7161	0.86457	1.5737	5.7634	0.74342	9.1993	8.554	9.0696	5.9383
77		6.2921	0.85541	1.1841	6.3388	0.68939	7.9316	6.37	7.5061	7.3103
78		8.5802	0.86735	1.2847	7.6665	0.71811	10.509	7.553	9.8493	9.0429
79		9.8552	0.79492	1.5034	8.3727	0.75782	12.875	11.466	12.588	11.236
80		6.0468	0.86322	1.2924	5.8153	0.70329	8.0021	5.824	7.5155	7.9145
83		6.7984	0.79637	1.9194	5.3264	0.74984	10.223	8.281	10.223	6.1946
84		12.454	0.89849	1.2599	11.404	0.74818	14.74	11.284	14.368	12.745
88		9.0165	0.8847	1.1799	8.2009	0.72128	11.394	8.645	9.6763	8.3475
90		9.4557	0.87051	1.4016	8.1486	0.76313	11.593	10.374	11.421	9.5665
96		7.6338	0.86399	1.1479	7.3858	0.71921	9.5189	7.371	8.4785	8.8688
97		7.4998	0.86889	1.1851	7.0167	0.77106	8.5067	6.734	8.3153	8.3475
108		8.5931	0.74665	2.1625	5.9633	0.73379	13.895	4.914	12.895	12.655
109		7.5053	0.83747	2.0685	5.3434	0.76032	11.156	7.371	11.053	8.6079
114		8.9431	0.82756	1.3257	8.7002	0.72533	11.665	8.645	11.534	10.707
115		8.2722	0.85143	1.3095	7.7653	0.71413	10.498	7.644	10.169	9.7414

## UNIQUE FEATURES.

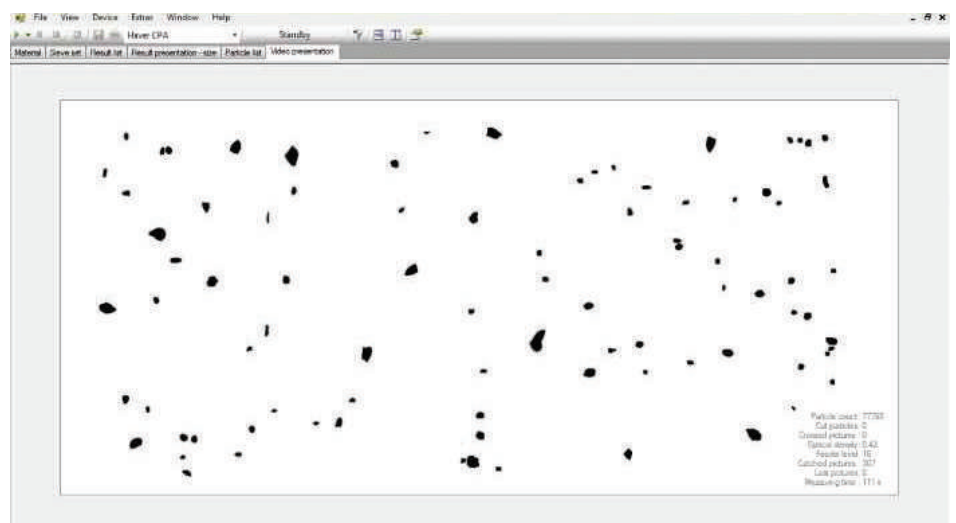
All W.S. Tyler CPA units feature real-time function and work with a single line-scan camera; therefore, every particle in the grain size range can be measured and the results used in size and shape analysis. Double detection due to individual images overlapping is ruled out, as are partial ranges and improper measurements of truncated particles. In addition, the real-time function also enables all CPA units to be used as particle counting devices.

## EACH PARTICLE AT A GLANCE.

The CpaServ software deployed in the W.S. Tyler CPA systems is easy-to-use, responsive, and runs under most Windows operating systems. Owing to

the software, a wide range of particle specifications can be analyzed. The CPA's individual particle memory allows different grain shape values to be evaluated for every particle measured and statistical means to be determined in freely selectable grain size classes.

Each particle is fully scaled and presented in the particle list. The details regarding particular grain sizes and shapes are stored and can be used for further analyses. Input data errors can be minimized given the software's ability to cut and paste into documents or tables, such as Excel. Furthermore, multifarious options for filtration enable a customized presentation of results.

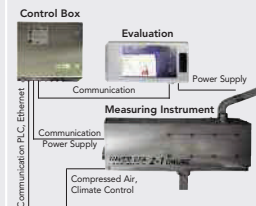




# ALL W.S. TYLER CPA-SYSTEMS AT A GLANCE.

## PHOTO-OPTICAL PARTICLE MEASURING INSTRUMENTS

### W.S. TYLER CPA LABORATORY UNITS



DESIGNATION		CPA 2-1 HR	CPA 2-1	CPA 2 CONVEYOR	CPA 2-1 ONLINE	CPA 4-1
Number of measuring ranges	[-]	1	1	1	1	1
Measuring range	[mm]	0,010 - 4	0,020 - 30	0,036 - 45 non-spherical	0,034 - 25	0,063 - 500
Feeder width / Scanning width	[mm]	18	55	65	65	200
Conveyor width	[mm]	-	-	75	-	-
Hopper volume (approx.)	[l]	0,35	1,5	4	1,5	14
Application	[-]	Laboratory	Laboratory	Online / Laboratory	Online	Online / Laboratory
Light source	[-]	LED	LED	LED	LED	LED
Dimensions (appr.) (LxWxH)	[mm]	730 x 260 x 360	800 x 200 x 355	940 x 260 x 580	850 x 300 x 500 (CPA)	1500 x 790 x 1500
Weight (approx.)	[kg]	17	16	27	80	120
Operating voltage	[V]	230 or 115	230 or 115	230 or 115	230 or 115	230 or 115
Type of protection (standard)	[-]	IP 54	IP 54	IP 54	IP 65	IP 54
Interfaces	[-]	BUS-Ext., GigE, USB	BUS-Ext., GigE, USB	BUS-Ext., GigE, USB	RS 485, RS 232, USB, Profibus (optional)	digital IO-Port, GigE, RS 232
Horizontal resolution	[Pixel]	2048	2927	2048	2048	4096
Pixel frequency	[MHz]	60	100	60	50	60







## PERIPHERALS FOR W.S.TYLER CPA UNITS



DESIGNATION		HSD	HSD-S	DMS	EMZ	DISPERSION SYSTEM
Grain size range	[mm]	2 - 45	0 - 15	0 - 45	0 - 45	-
Hopper volume (approx.)	[l]	23	0.1 (maxi. 100 g)	-	15	-
Application	[-]	for fast drying of moist bulk materials (Online / Laboratory)	for fast drying of moist fine bulk materials (Online / Laboratory) 530 x 330 x 550	for screening out the fine contents of bulk material (Online / Laboratory)	for conveying and dosing bulk materials (Online / Laboratory)	for destruction of agglomerates using sound before CPA (Online / Laboratory)
Dimensions (appr.) (LxWxH)	[mm]	1500 x 700 x 1500	39.5	1000 x 600 x 1300	860 x 700 x 1700	380 x 245 x 400
Weight (approx.)	[kg]	220	230 or 115	127	81	14
Operating voltage	[V]	400	IP 54	230 or 115	230 or 115	230 or 115
Type of protection (standard)	[-]	IP 54		IP 55	IP 55	IP 54
Power	[kW]	18.54	0,5 170	-	-	0,1
max. heating temperature	[°C]	600	-	-	-	-
max. air quantity	[l/min]	3900	-	-	-	-
Number of containers	[pce.]	-	-	-	-	-
Container capacity (standard)	[ml]	-	-	-	-	-



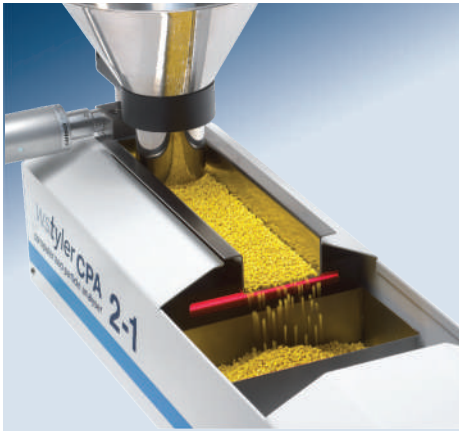
## INDUSTRIAL UNITS.

					
	<b>CPA 4-2</b>	<b>CPA 4 CONVEYOR</b>	<b>CPA 5 CONVEYOR</b>	<b>CPA 4 GRAVIOPT</b>	<b>HAVER CPA 5 GRAVIOPT</b>
	2	1	1	1	1
	0,035 - 15	0,091 - 90	0,4 - 400	0 - 50	0 - 200
	100	320	815	200	450
	-	360	800	-	-
	3,6	14	-	-	-
atory	Online / Laboratory	Online / Laboratory	Inline	Online / Laboratoire	Online
	LED	LED	Fluorescent tube / LED	LED	LED
940	1770 x 810 x 1050	2230 x 830 x 1390	2221 x 1700 x 300	3000 x 790 x 2010	5400 x 720 x 1720
	152	205	167	450	530
5	230 or 115	230 or 115	230 or 115	230 or 115	230 or 115
	IP 54	IP 54	IP 64	IP 54	IP 54
ts,	digital IO-Ports,	digital IO-Ports,	digital IO-Ports,	digital IO-Ports,	digital IO-Ports,
2	GigE, RS 232	GigE, RS 232	GigE, RS 232	GigE, RS 232	GigE, RS 232
	4096	4096	2048 / 4096	4096	4096
	60	50	50 / 60	60	60

				
<b>STEM</b>	<b>AS 6</b>	<b>AS 12</b>	<b>AS 24</b>	<b>CPA CONTAINER</b>
	0 - 30	0 - 30	0 - 30	0 - 50 with CPA 4 GRAVIOPT
	-	-	-	-
n of ng ultra- analysis atory)	for the automatic feeding of CPA units (Online / Laboratory)	for the automatic feeding of CPA units (Online / Laboratory)	for the automatic feeding of CPA units (Online / Laboratory)	"Plug and Play"-Online- solution for integration into existing or newly planned systems (Online)
420	1100 x 400 x 880	1760 x 400 x 1300	1760 x 550 x 1300	4050 x 2170 x 2470
	70	76	90	1250 (incl. fittings)
5	230 or 115	230 or 115	230 or 115	230 or 115
	IP 54	IP 54	IP 54	-
	-	-	-	Air conditioner: 2.14 Rapid heater: 1.00
	-	-	-	-
	-	-	-	-
	6	12	24	-
	500	500	500	-



# FOCUS ON MAXIMUM PRECISION.



## LABORATORY UNITS: CPA 2-1, CPA 2-1 HR, CPA 2 CONVEYOR.

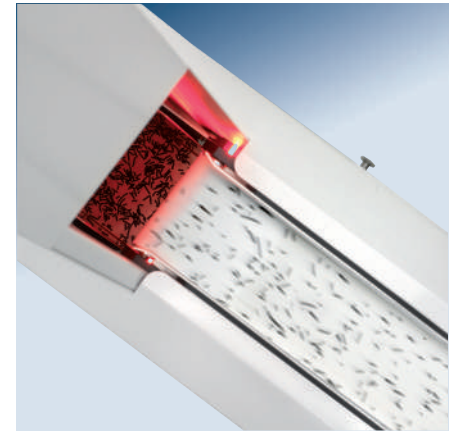
All W.S. Tyler CPA units are equipped with software compatible with most Windows operating systems. Despite its sophistication, the device impresses users with its intuitiveness, menu-driven application, and clear presentation of results. Due to the line-scan camera technology, our units can also be used as a particle counting device. Its consistent, modular design allows them to be combined with all W.S. Tyler peripherals to suit the application needed. The W.S. Tyler CPA 2-1 is suitable for analyzing the grain sizes



### Advantages of the W.S. Tyler CPA 2-1:

- Laboratory unit for particle size and shape analysis in the measuring range from 20µm up to 30mm.
- Newest W.S. Tyler CpaServ software, intuitive handling, variety of analysis options
- Light weight easy to move
- Optimal reproducibility with short measurement times automatic feeder cleaning-LED light source, durable and energy-saving

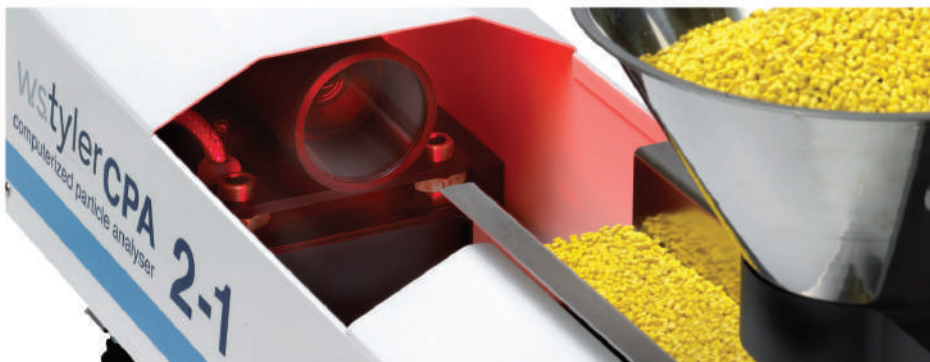
and shapes of fine sample materials from 20µm to 30mm. By using the GigE camera, it can also be operated with a notebook, providing users with a high degree of mobility and flexibility. By utilizing the technologies described above, the W.S. Tyler CPA 2-1 represents an economic base model for the laboratory environment, serving as an easy-to-use alternative to conventional particle analysis.



The W.S. Tyler CPA 2-1 High Resolution, or HR, is designed for the analysis of material with a particle size from 10µm. Given its finer resolution, when deployed alongside the dispersion system, the HR variant can evenly convey agglomerating material.

Additionally, we developed the W.S. Tyler CPA 2 CONVEYOR to measure challenging, elongated materials. Sample material from 36µm to 45mm is separated and measured. The unit is also suitable for wood fibers, catalysts, pellets, and extruded synthetic granulates.

All devices, as well as the accompanying software, are prepared for online connection to a PLC system. Standard interfaces allow them to be integrated into the running production process.





## INDUSTRIAL UNITS: CPA 2-1 ONLINE, CPA 4-1, CPA 4-2, CPA 4 CONVEYOR

W.S. Tyler CPA industrial units are built to meet the demands of large-scale production facilities, laboratories, and technical centers. Like our other offerings, the industrial units run on CpaServ software and can be used as particle counting devices with line-scan camera technology. When combined with our peripherals, its modular design also empowers individual online solutions.

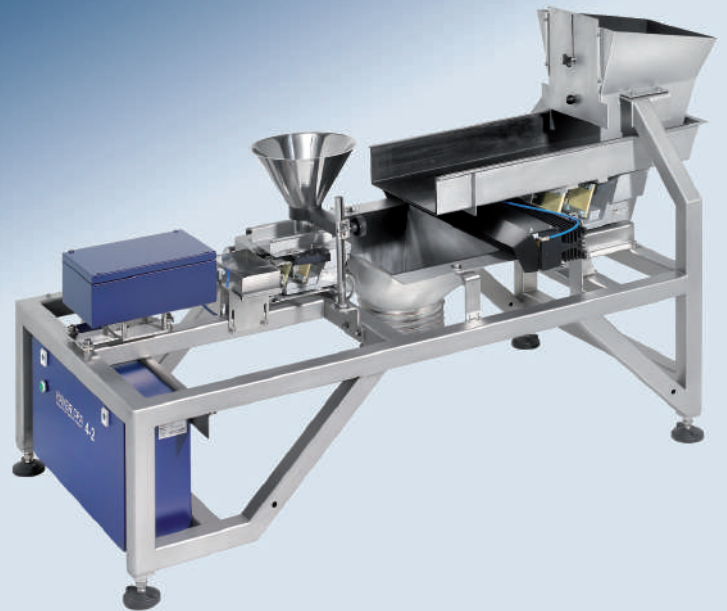
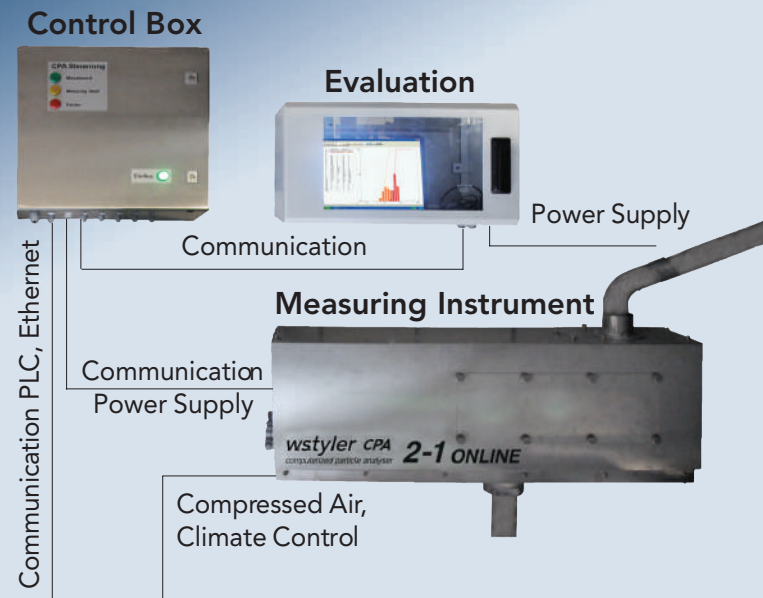
The W.S. Tyler CPA 2-1 ONLINE, which analyzes bulk material in the 34 $\mu$ m to 25mm measuring range, is designed for continuous quality control throughout production.

In a permanent measuring standby mode, the unit analyzes regularly fed samples without interruption. Given its durable construction, it is resistant to adverse conditions, such as heat, dust, or humidity.

The W.S. Tyler CPA 4-1 analyzes grain sizes and shapes in the measuring range from 63 $\mu$ m to 50mm. The unit's robust design lends itself to large sample quantities.

The W.S. Tyler CPA 4-2, featuring two measuring ranges in the same unit, separately analyzes grain sizes and shapes of fine and coarse materials. Examples include sand and grit from 35 $\mu$ m to 15mm or gravel and crushed stone from 91 $\mu$ m to 90mm.

The W.S. Tyler CPA 4 CONVEYOR functions like the CONVEYOR measuring process, but was designed to handle coarser, elongated up to 220mm. It is particularly valuable in the analysis of the lengths and widths of wood chips.



# PERFECTION DOWN TO THE PERIPHERALS

The range of W.S. Tyler CPA units is complemented by various peripheral devices. Moist materials, for example, must be dried before undergoing photo-optical particle analysis. For that reason, we have developed the W.S. Tyler HSD, or high-speed dryer, which dries mineral bulk material in a minimal amount of time. Conveyor speed and heating temperatures can be adjusted to suit the material. The high heating capacity and air quantity also guarantees optimal flow rates. The HSD is frequently used for pre-drying wet gravel before conducting analysis with the W.S. Tyler CPA 4-1; however, it can be used in tandem with all CPA units or separately for the hasty drying of bulk material.

The W.S. Tyler DMS is a double-deck screening machine for pre-screening with two separating cuts. By cutting the material in two places, the feed material can be divided into three fractions. The two screens can be individually designed and tensioned by our screening service. Rubber balls or special, ultrasonic modules can

implement ultra-fine separating cuts and enable automatic cleaning of the screen. The pre-screening function of the W.S. Tyler DMS is used in combination with a CPA particle-measuring unit to screen the fine content from a material sample, leading to significantly reduced measuring times. In order to achieve optimum utilization of the classification area, we recommend additional pre-dosing with the magnetically driven W.S. Tyler EMZ feed trough. Its large material hopper makes it the ideal buffer for downstream processes and, in step mode, it conveys all kinds of bulk material.

As part of continued time-saving measures, we developed the W.S. Tyler AS (auto sampler) to automatically feed CPA devices with material samples. Six, twelve, or twenty-four samples, corresponding to our AS 6, AS 12, and AS 24 models, can be measured around the clock without compromising capacity. The W.S. Tyler AS is controlled with our CpaServ software via an interface. The device can also be used to collect retain samples and as a laboratory or technical center unit.





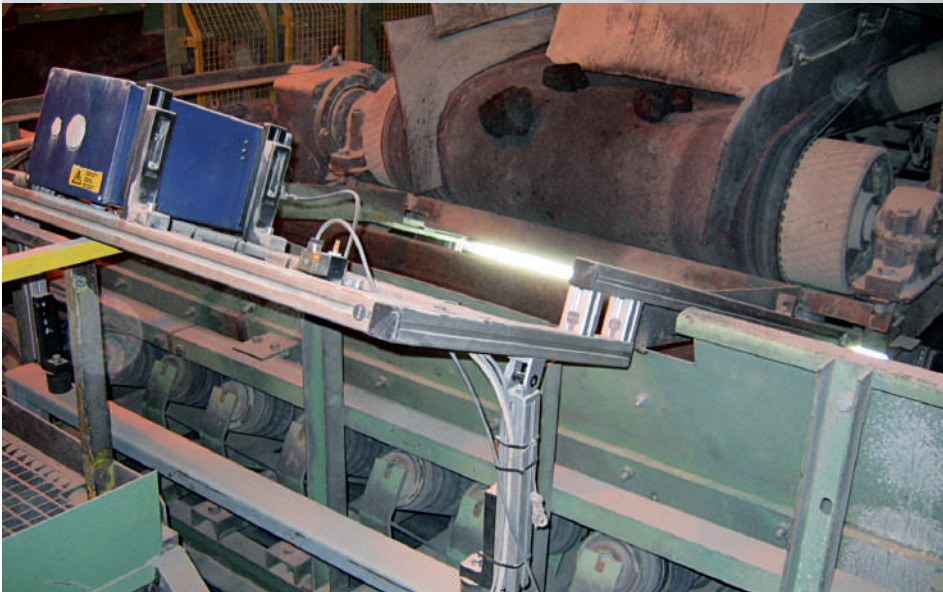




# SPECIAL SOLUTIONS FOR SPECIAL TASKS

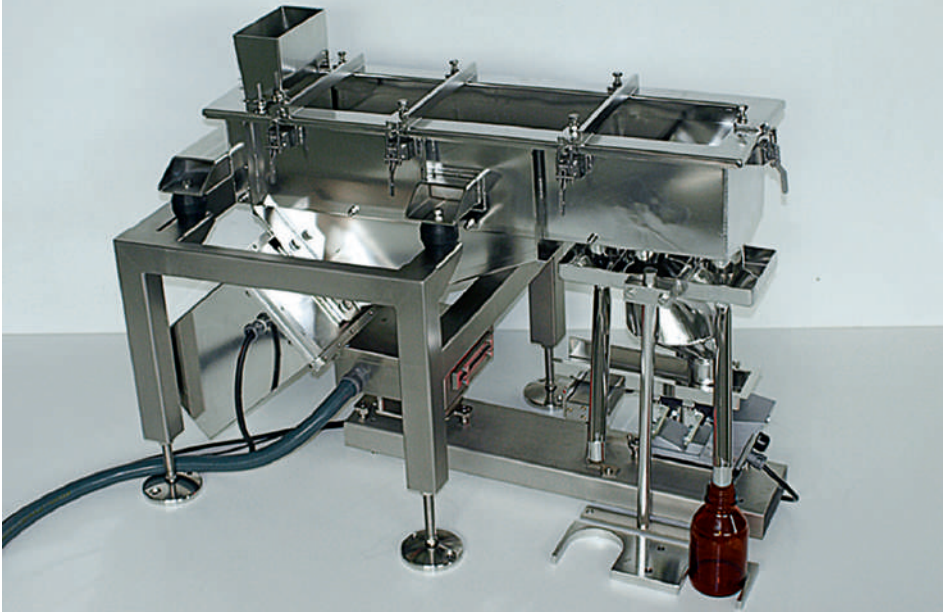


Our W.S. Tyler CPA product range covers an exceptionally wide performance spectrum due to its consistent and innovative modular design. These CPA devices are another showcase of our talent for developing tailor-made systems for special applications. We remain proud of our diligence and initiative, appreciating and addressing specific requirements or challenging installation conditions on site.



Following intensive planning and consulting, we produce detailed design drawings for calculation and production. Then, the system is subject to several test runs prior to delivery.

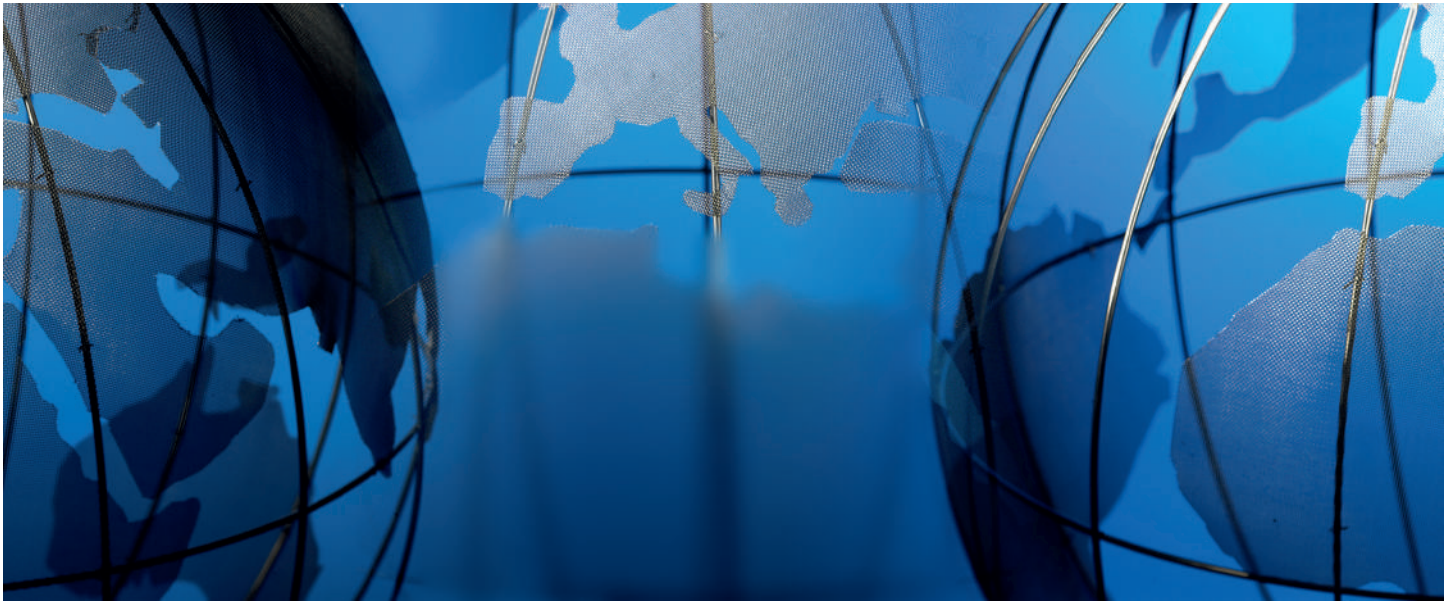
W.S. Tyler also supports our customers during the subsequent installation and commissioning of your CPA systems, including availability to instruct and train your staff. Our competent after-sale service assists you with maintenance, modifications, and software updates for your CPA units.



One of the numerous advantages of working with W.S. Tyler is direct access to our CPA team at every stage. That contact often saves time, cuts considerable cost, and ensures the reliability our customers have come to expect from W.S. Tyler's peerless products and service.



# NO SITE IS OUT OF SIGHT



W.S. Tyler has actively influenced the development of woven wire mesh since its beginning. Given that legacy, we are excited to continue to share our unrivaled experience, cutting-edge technology, and knowledge of wire cloth with customers.

No matter the industry, wherever W.S. Tyler wire cloth is used, our customers benefit from our broad but still unique individual service.

With our global network, we are able to offer the competence and reliability needed to be your full-service partner. And, in the time to come, to continuously cultivate our expertise and weave ideas.

Since 1953, W.S. Tyler has enjoyed a working relationship with Haver & Boecker, which operates production sites in Germany, the United Kingdom, Belgium, the United States, Canada, Brazil, India, and Belarus. More than 2,800 people work for the Haver Group worldwide.

# GET IN TOUCH

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