THE INDUSTRYWEEK BEST PLANTS

2021 Statistical Profile

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The information contained in this Statistical Profile presents a composite picture of IndustryWeek's Best Plants winners and finalists for the past five years from 2016 to 2020/21 (Due to a scheduling change, the years 2020 and 2021 result in a combined award year). During these years IndustryWeek selected 25 winning facilities and 30 finalists. This report was prepared from a database populated with information supplied by the manufacturing plants when responding to the IW Best Plants questionnaire in each year of the competition.

It must be noted that, because the facilities, products and processes represented by the winners and finalists are quite diverse, direct comparisons can be misleading. However, over the 31 years of the competition, the judges have found that a fairly reliable indicator of a factory's manufacturing leadership is how much progress it makes year in and year out. Plants that shorten changeover times, manufacturing cycle times, and customer-order lead times, and those that cut scrap rates, improve customer quality, reduce employee injuries, and improve profitability, have a strong culture of continuous improvement that gives them a distinct lead over their competitors. They are able to make progress because they never stop benchmarking against other top performers, "stealing" the best ideas that they can find, wherever they can find them.

Regardless of industry differences, the data in this profile serves as a useful general benchmarking reference. The benchmark numbers indicate the top performance levels and greatest quantum leaps in improvement and offer a glimpse at the potential for achievement in organizations that are committed to world-class competitiveness. In reviewing the data in this Statistical Profile, bear in mind that performance levels achievable in one industry may not be realistic goals for another. For example, while a high-volume repetitive manufacturing operation may surpass 200 WIP (work-in-process) turns annually, a much lower figure could conceivably represent world-class inventory management for a low-volume maker of complex, highly customized products.

The process of setting realistic improvement goals—even “stretch” goals—should take into account the nature of the industry, manufacturing process, and product characteristics. As many experienced benchmarkers will attest, the most meaningful “best practice” indicators for purposes of competitive benchmarking generally are those culled from a similar class of facilities and operations. Unfortunately, such data is frequently not available. Because “average” performance levels for a diverse group of plants can be distorted by anomalous data attributable to unique circumstances, the performance data in this report that are most likely to be useful for general benchmarking purposes are the “median” figures.

This is the 30th year that IndustryWeek has compiled a Statistical Profile of its IW Best Plants winners and finalists. Because this information is based on a database of original responses for each original application from finalists, please note:

• The IW Best Plants data cited here were reported by finalists and winners from 2016 to 2020/21, a total of 55 plants. Because finalists from one year occasionally become finalists or award winners in subsequent years, the composite data may include more than one occurrence of a particular facility, albeit at different points in time.

• This report was compiled using a database built from the original applications for each year, with alterations to correct original reporting errors revealed in follow-up questionnaires or through plant visits. Thus, the 2016-2020/21 metrics have been “cleaned.” In compiling the database, where responses were thoroughly implausible, they have not been included.

• Where the Statistical Profile lists frequencies (“yes” or “no” answers, etc.) the percentages will not necessarily be based on *all* finalist plants, since some plants may not have answered a particular question. **Additionally, throughout the report, some data have been rounded and as a consequence the total may not equal exactly 100%.**

• The selection of the Best Plants finalists and winners is based on the subjective review by a panel of judges based on a comprehensive set of criteria and plant statements, not only the performance metrics reported here. Evaluations are based on statements of management practices, levels of employee involvement, and the implementation of various improvement programs, as well as quantifiable performance indicators and evidence of competitiveness. Thus, in a given category, the apparent “benchmark” performance may have been achieved by a plant that was not among the final winners.

• A copy of the entry form can be found at the end of this Statistical Profile.

2020/21 North American IW Best Plants Winners

- **Brose Tuscaloosa Inc.**
  Vance Alabama
  Automotive seat systems, door systems, cooling fan modules

- **Intertape Polymer Group**
  Tremonton, Utah
  Shrink and stretch film, shipping air pillows

- **Thermo Fisher Scientific**
  Greenville, North Carolina
  Pharmaceuticals

2020/21 North American IW Best Plants Finalists

- **Plastic Packaging Technologies**
  Columbus, Ohio
  Food-grade quality packaging

- **The Raymond Corporation**
  Muscatine, Iowa
  Forklift trucks

- **Schneider Electric Lexington Plant**
  Lexington, Kentucky
  Load centers, safety switches

2019 North American IW Best Plants Winners

- **All Metals Fabricating**
  Allen, Texas
  Job Shop/Contract manufacturer

- **Polamer Precision Inc.**
  New Britain, Conn.
  Aerospace/aviation components

- **SSP Fittings Corp.**
  Twinsburg, Ohio
  Instrumentation valves and fittings

2019 North American IW Best Plants Finalists

- **Johnson Controls Building Technologies & Solutions**
  Juarez, Chihuahua, Mexico
  Pressure and temperature controls switches

- **Plastic Packaging Technologies**
  Columbus, Ohio
  Food-grade quality packaging

2018 North American IW Best Plants Winners

- **Adient**
  West Point, Georgia
  Automotive seats

- **Applied Technical Services**
  Everett, Washington
  Printed circuit boards

- **Intertape Polymer Group**
  Blythewood, South Carolina
  paper masking and duct tape, stencil

- **Johnson Controls**
  Norman, Oklahoma
  light commercial HVAC fabrication/assembly

- **The Raymond Corporation**
  Greene, New York
  forklifts, lift trucks, pallet jacks

- **T&S Brass and Bronze Works**
  Travelers Rest, South Carolina
  commercial foodservice, plumbing products

2018 North American IW Best Plants Finalists

- **Boeing Propulsion South Carolina**
  Ladson, South Carolina
  engine nacelle inlet

- **Enerpac**
  Columbus, Wisconsin
  hydraulic pumps, cylinders and tools

- **GE Appliances, a Haier company – AP1 Laundry**
  Louisville, Kentucky
  washing machines

- **GE Appliances, a Haier company – Decatur Refrigeration**
  Decatur, Alabama.
  refrigerators

- **Hearth & Home Technologies**
  Lake City, Minnesota
  gas fireplaces, inserts, venting components

- **Johnson Controls Power Solutions, Saint Joseph Distribution Center**
  Saint Joseph, Missouri
  batteries

2017 North American IW Best Plants Winners

- **Accuride Wheel End Solutions, Rockford Operations**
  Rockford, Ill.
  wheel end components

- **Adient Lerma Seating Plant**
  Lerma de Villada, Mexico, Mexico
  automotive seating

- **AGCO Jackson Operations**
  Jackson, Minn.
  agricultural equipment

- **Boston Scientific, Arden Hills Operations**
  Arden Hills, Minn.
  rhythm management medical devices

- **Intertape Polymer Group**
  Tremonton, Utah
  polyolefin shrink film and stretch film

- **Johnson Controls Building Technologies & Solutions**
  Reynosa, Tamaulipas, Mexico
  building automation system components

- **Thermo Fisher Scientific**
  Auburn, Ala.
  drug test kits, dairy testing products, infant products, water test vials

2017 North American IW Best Plants Finalists

- **Curbell Medical Products Inc.**
  Orchard Park, N.Y.
  hospital pillow speaker

- **Federal-Mogul Motorparts**
  Skokie, Ill.
  gaskets

- **Inline Plastics Corp., Shelton Operations**
  Shelton, Conn.
  plastic food containers

- **Inteva Products**
  Cottondale, Ala.
  automotive interior assemblies

- **Johnson Controls PS Mexico Celaya Site**
  Celaya, Guanajuato, Mexico
  batteries

- **L.B. Foster, Allegheny Rail Products**
  Pueblo, Colo.
  insulated bonded joints for trains

- **MultiTech**
  Mounds View, Minn.
  IoT communications hardware

- **New Flyer**
  Winnipeg, Manitoba, Canada
  transit buses

- **The Raymond Corporation**
  Greene, N.Y.
  forklift trucks

- **Textron Aviation Mexico Plant 6**
  Chihuahua, Chihuahua, Mexico
  sheet metal aerostructures

- **Thermo King Manufactura**
  Arecibo, Puerto Rico
  transport refrigeration unit

- **UTC Aerospace Systems – Aerostructures**
  Mexicali, Baja California, Mexico
  aerospace engine nacelle components

2016 North American IW Best Plants Winners

- **Firstronic**
  <u>*Grand Rapids, Mich.*</u>
  electronic assemblies

- **Intertape Polymer Group Inc.**
  Danville, Va.
  carton sealing tape and stretch film

- **Johnson Controls, Optima Plant**
  Cienega de Flores, Nuevo Leon, Mexico
  batteries for use in automobiles, boats and commercial vehicles

- **L.B. Foster Threaded Products**
  Magnolia, Texas
  water well system pipes

- **Maclean-Fogg Metform Group**
  Savanna, Ill.
  hot-forged fasteners and gear blanks

- **UTC Aerospace Systems – Aerostructures**
  Foley, Ala.
  aerospace engine nacelle components

2016 North American IW Best Plants Finalists

- **DeWys Manufacturing Inc.**
  Marne, Mich.
  metal fabrication

- **Intertape Polymer Group Inc.**
  Tremonton, Utah
  shrink and stretch film

- **Lincoln Electric Maquinas**
  Torreon, Coahuila, Mexico
  welding machines

- **New Flyer Industries**
  St. Cloud, Minn.
  transit buses

- **New Flyer Industries**
  Winnipeg, Manitoba, Canada
  transit buses

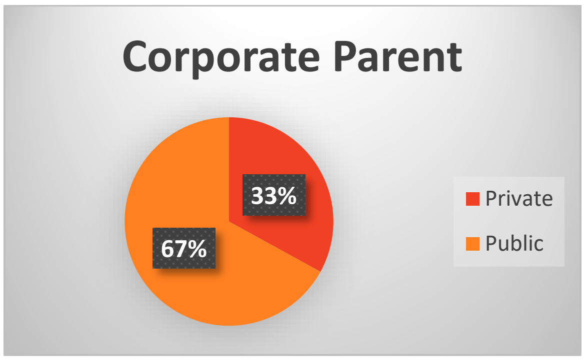
- **Paccar Engine Co.**
  Columbus, Miss.
  diesel engines

- **Wiegel Tool Works Inc.**
  Wood Dale, Ill.
  metal stampings

Plant Profile

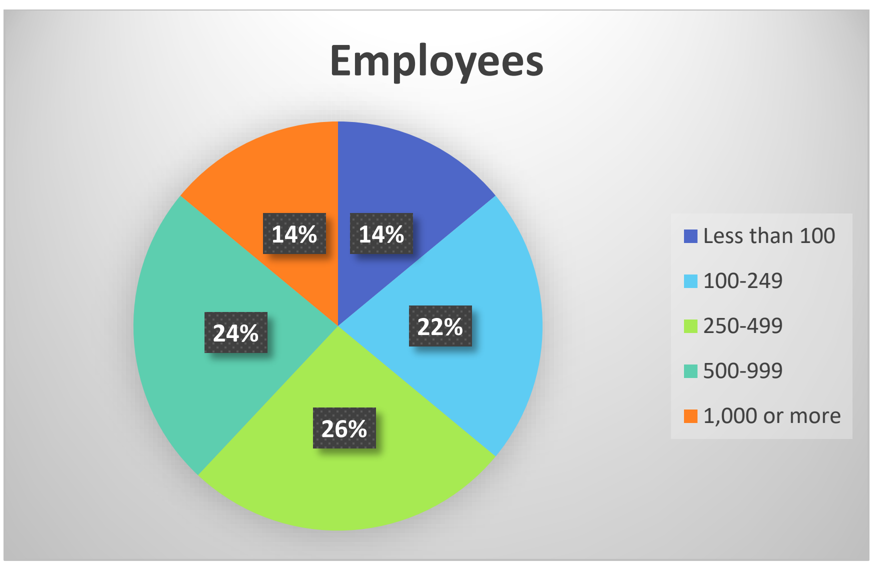
Private or public company—corporate parent (% of plants):

Year	***Private***	***Public***
2016-2020/21	33	67



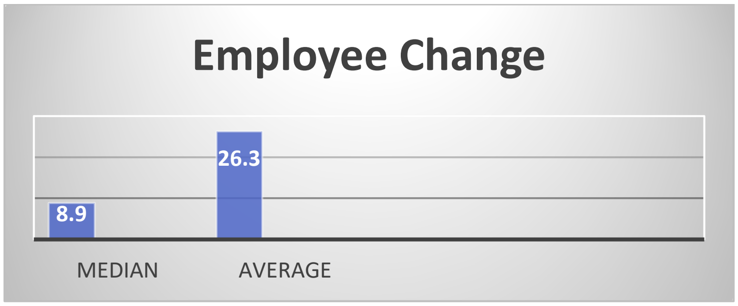
Number of plant employees (% of plants):

Year	***Less than 100***	***100-249***	***250-499***	***500-999***	***1,000 or more***
2016-2020/21	14	22	26	24	14



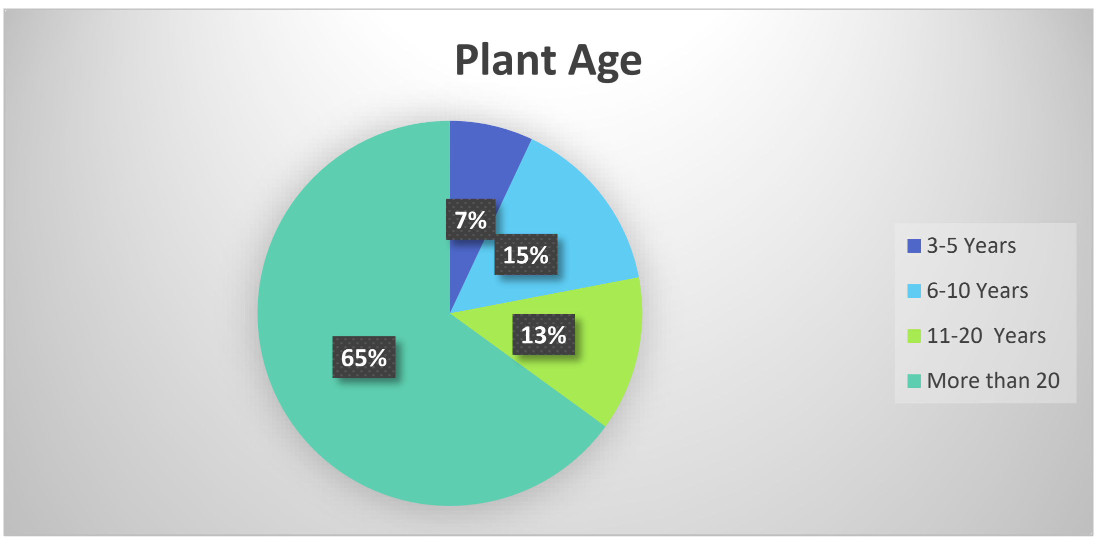
Change in number of total employees over past 3 years, %:

Year	*Median*	*Average*
2016-2020/21	8.9	26.3



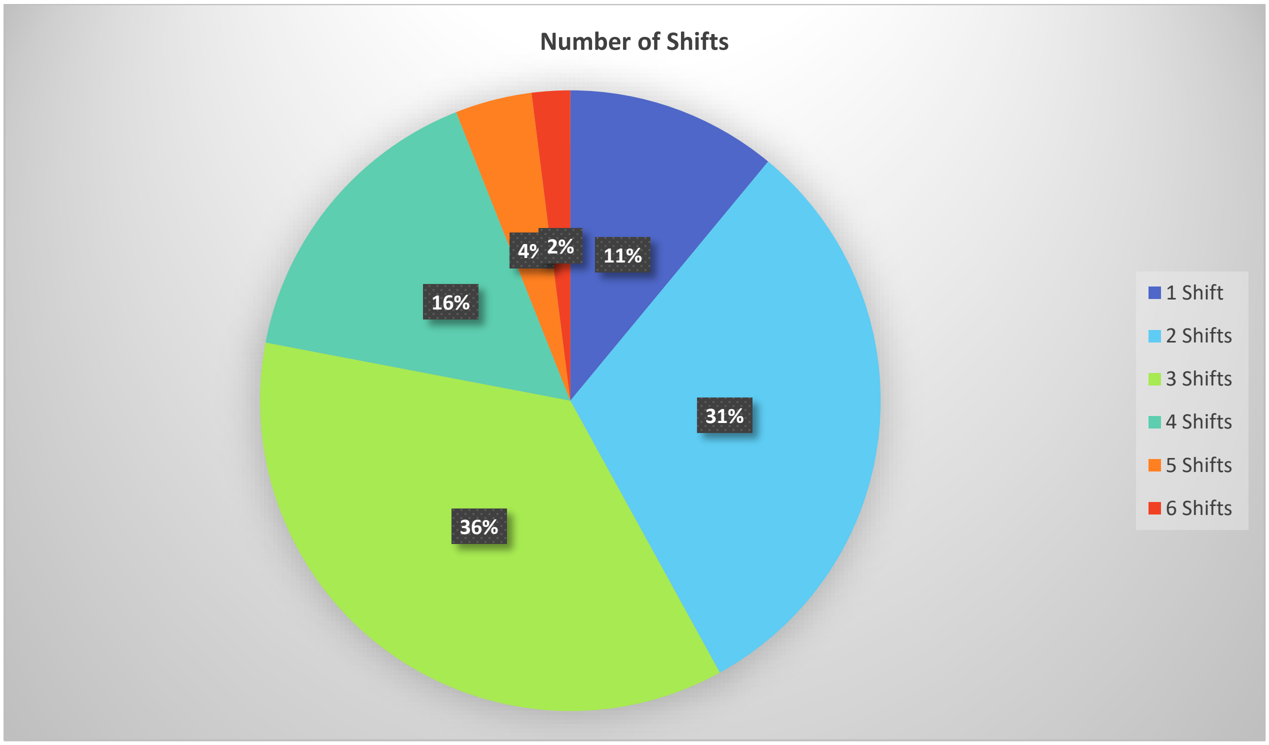
Age of plant, years (% of plants):

Year	*3-5 years*	*6-10 years*	*11-20 years*	*20 or more years*
2016-2020/21	7	15	13	65



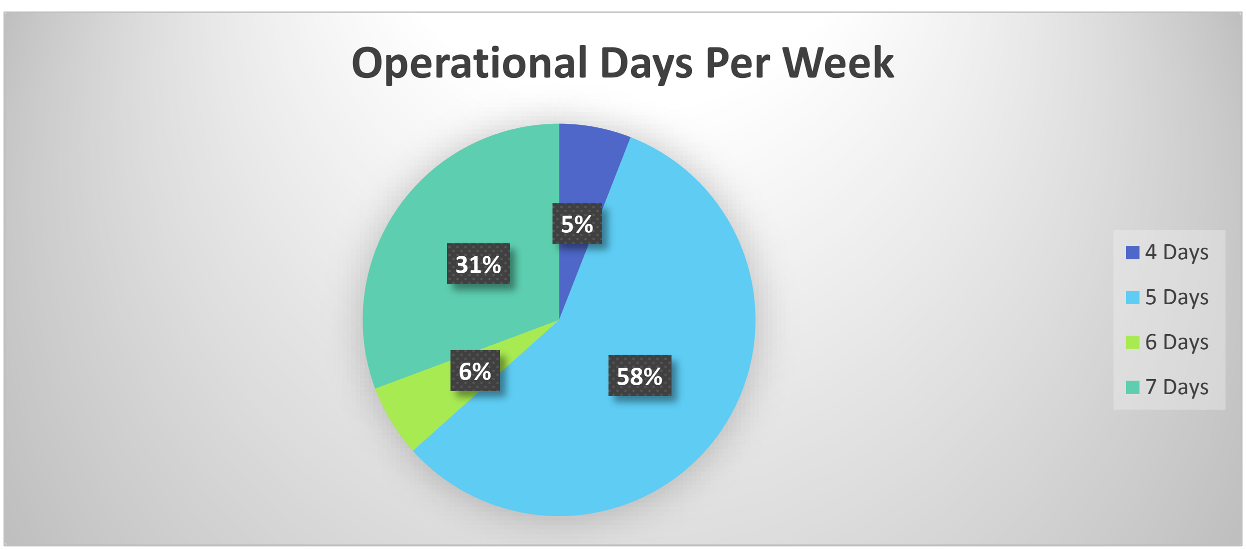
Number of shifts (% of plants):

Year	*1 shift*	*2 shifts*	*3 shifts*	*4 shifts*	*5 shifts*	*6 shifts*
2016-2020/21	11	31	36	16	4	2



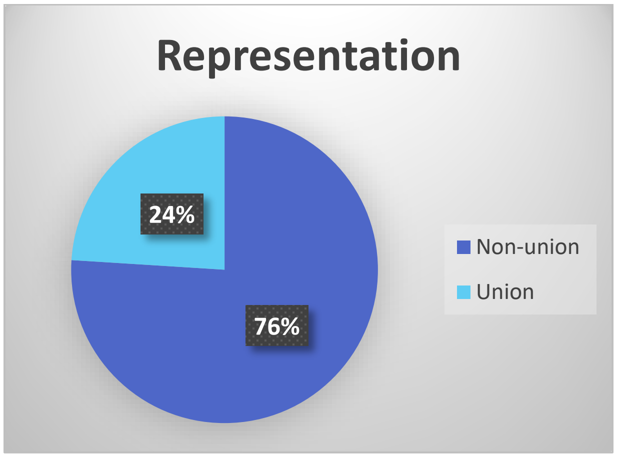
Operational days per week (% of plants):

Year	*4 days*	*5 days*	*6 days*	*7 days*
2016-2020/21	5	58	6	31



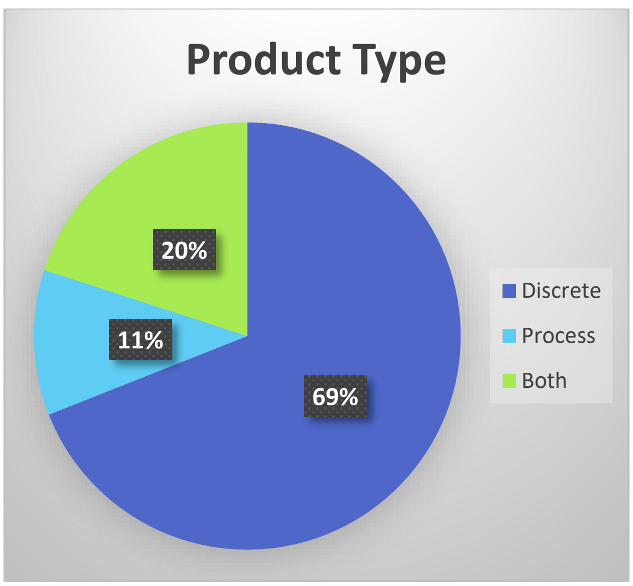
Workers represented by a union (% of plants):

Year	***Nonunion***	***Union***
2016-2020/21	76	24



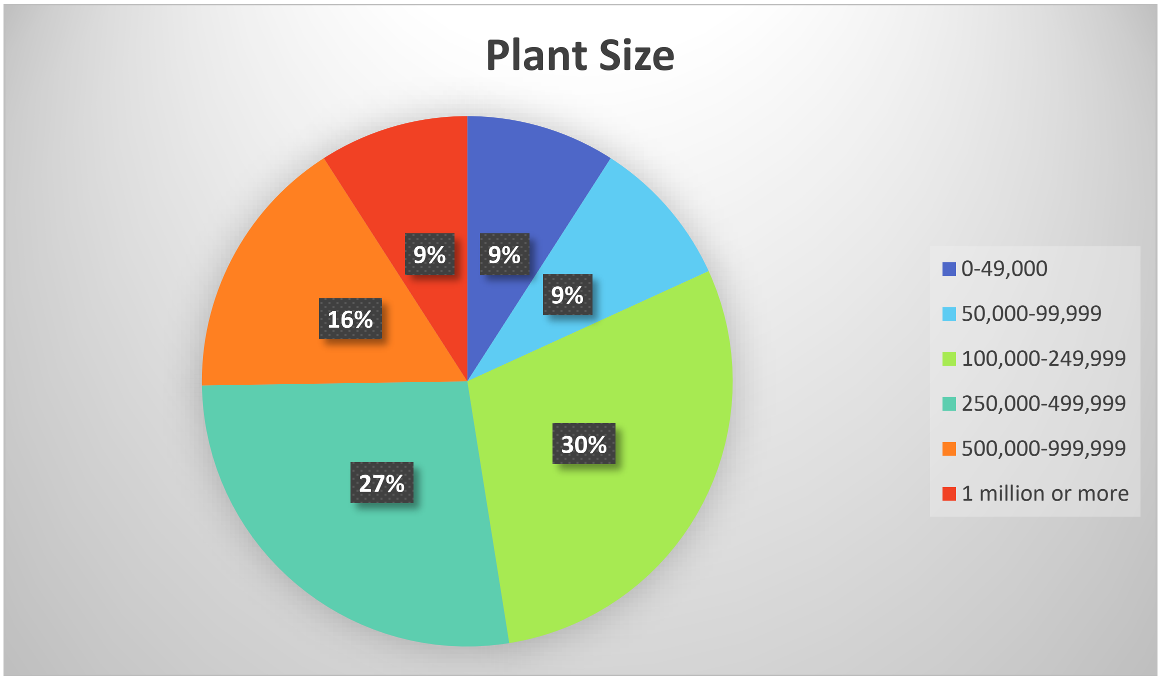
Product type* (% of plants):

Year	***Discrete***	***Process***	***Both***
2016-2020/21	69	11	20



Square footage of plant (% of plants):

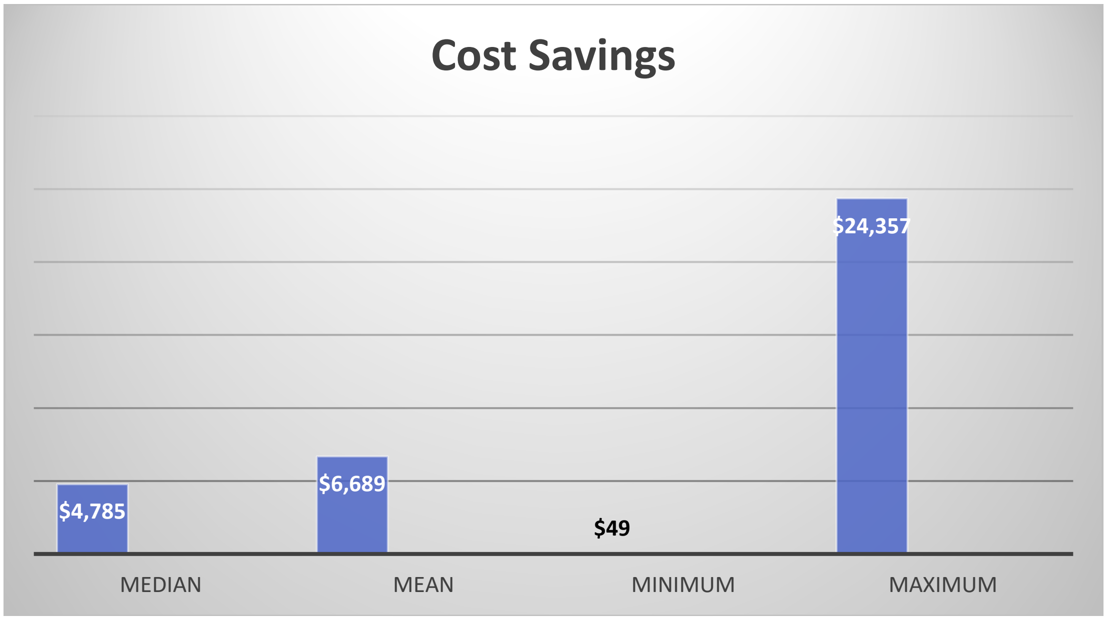
Year	***0-49,000***	***50,000-99,999***	***100,000-249,999***	***250,000-499,999***	***500,000-999,999***	***1,000,000 or more***
2016-2020/21	9	9	30	27	16	9



Management Practices

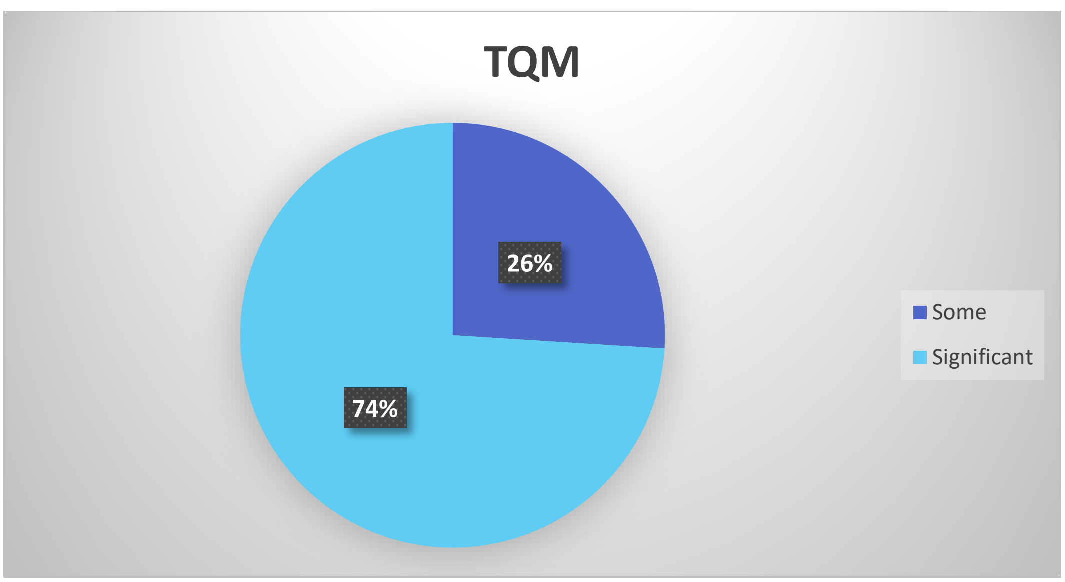
Total documented cost savings as a result of specific improvement programs and projects over the most recent calendar year per employee (include all employees):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	$4,785	$6,689	$49	$24,357



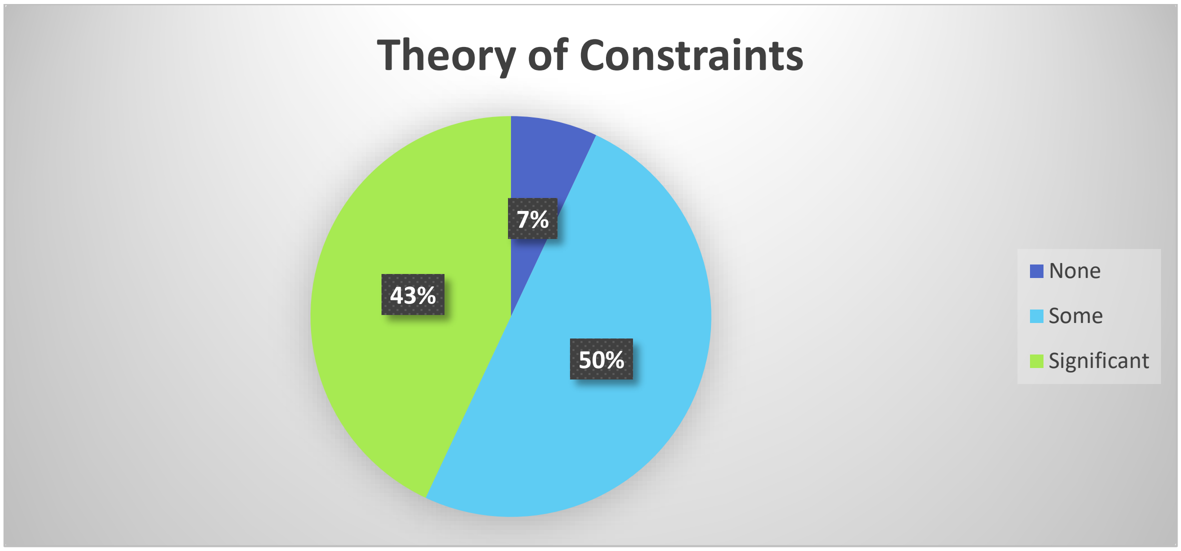
Please indicate the extent to which total quality management has been implemented: (% of plants)

Year	***None***	***Some***	***Significant***
2016-2020/21	0	26	74



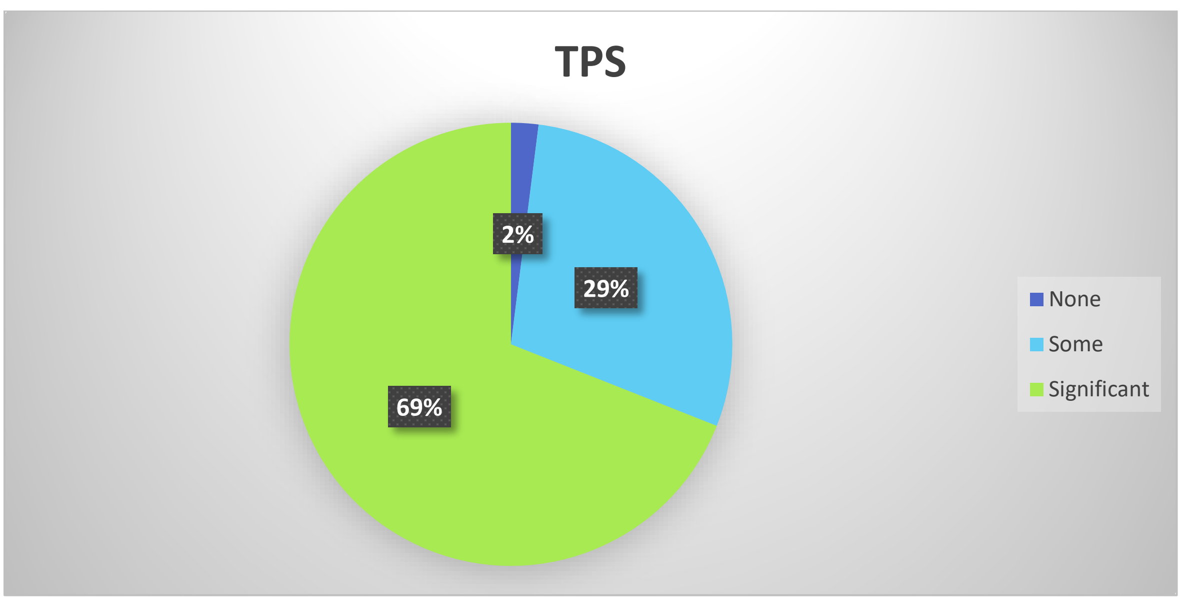
Please indicate the extent to which the theory of constraints has been implemented:

Year	***None***	***Some***	***Significant***
2016-2020/21	7	50	43



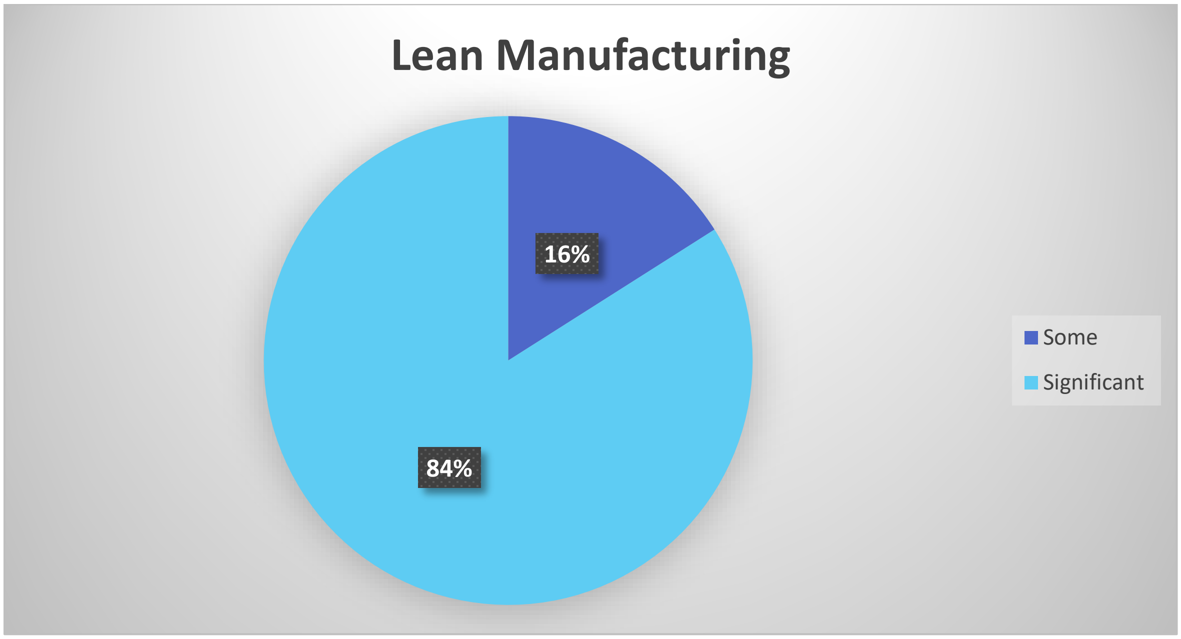
Please indicate the extent to which the Toyota Production System has been implemented:

Year	***None***	***Some***	***Significant***
2016-2020/21	2	29	69



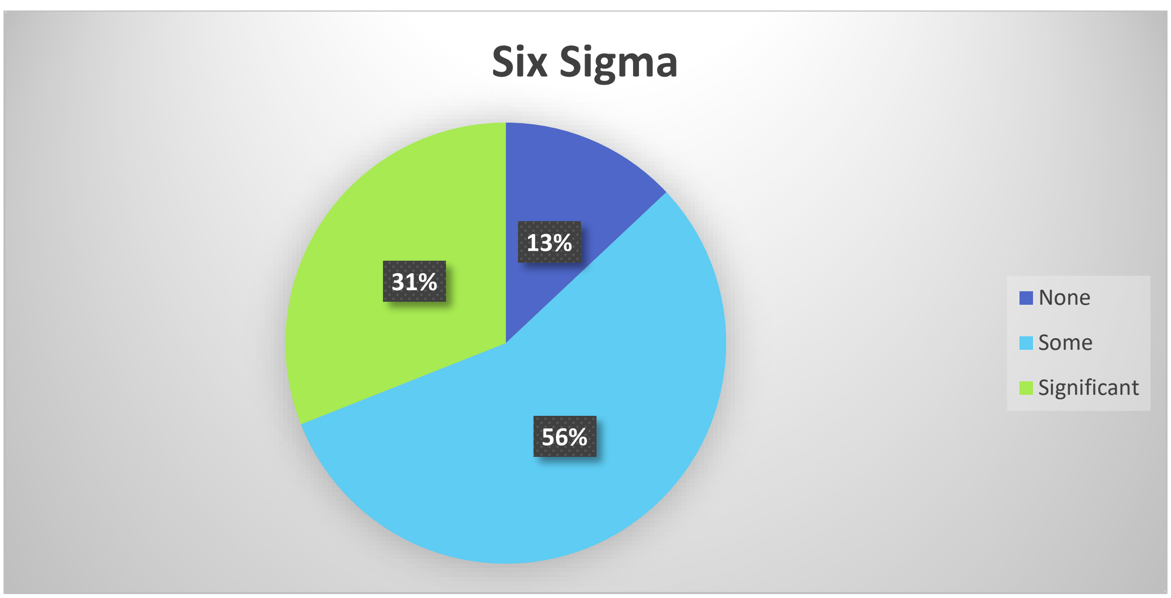
Please indicate the extent to which lean manufacturing has been implemented:

Year	***None***	***Some***	***Significant***
2016-2020/21	0	16	84



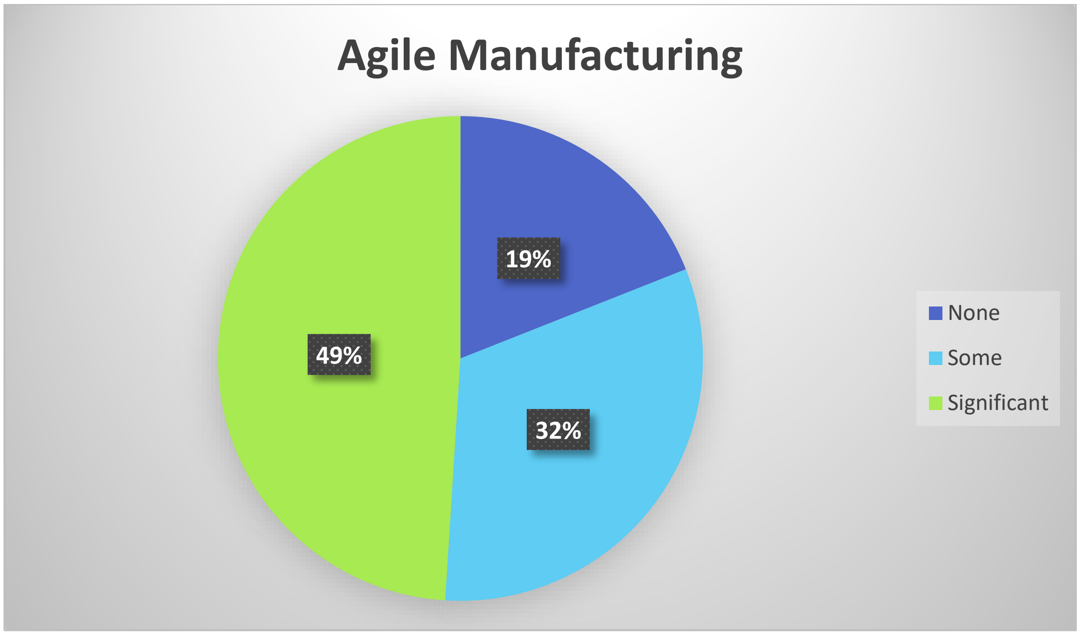
Please indicate the extent to which Six Sigma has been implemented:

Year	***None***	***Some***	***Significant***
2016-2020/21	13	56	31



Please indicate the extent to which agile manufacturing has been implemented:

Year	***None***	***Some***	***Significant***
2016-2020/21	19	32	49



Management's No. 1 indicator of plant performance:

- Cash flow
- Compliance to customer commit date
- Contribution percentage
- Conversion cost
- Converted cells per direct labor hour
- Cost absorption
- Cost performance index
- Customer and internal rejections (rejections x 1,000,000)/parts produced or sold)
- Customer complaints
- Customer delight (customer rating system)
- Customer experience
- Customer fill rate
- Customer loyalty index
- Customer on-time delivery (Units shipped on time to promise date)
- Linearity
- Lost cycles (number of missed opportunities to produce a product/total opportunities)
- Man-hours per unit
- Manufacturing costs per finished goods production unit (operating expenses/total produced)
- Manufacturing sales per employee
- Mfg. conversion cost per unit of product shipped (Total mfg. Costs/finished goods prod.)
- Mfg. expense as % of sales
- Net operating profit
- NOP (net operating profit, annual value of shipments less material and mfg. Costs)
- Operating income (Sales - (cost of sales + selling and admin costs))
- OEE (machine availability x quality yield x % of optimal for equipment)
- On time delivery
- On time shipments
- Operating earnings

- Customer order fill rates (orders filled and shipped within 24 hours)
- Economic profit (net operating profit after taxes minus capital charge)
- Customer satisfaction (quality, ppm)
- CV Uptime, bottleneck operation (percent of operating time compared to scheduled time)
- Cycle time (contract receipt to delivery)
- Delivered customer value (Throughput time, rework, prod., quality discrepancies, delivery)
- Dock-to-dock inventory turns
- EBITDA
- EBITDA per employee
- Gross profit
- Growth of revenue
- Hours per unit
- Individual productivity (Output/effort or (# of machines produced)/people)
- Line fill rate
- Reliability (mean time between removals)
- Return and rejected ppm
- Return on assets
- Return on net assets (After tax profits divided by average assets)
- Return on sales (Net operating profit as a percentage of net sales)
- Safety
- Sales
- Sales per employee
- Scrap rate (monthly report)
- Scrap rate reductions
- Service call rate (number of service calls/units in warranty by production period)
- Plant productivity factor
- PPM (total customer rejects/total shipped x 1,000,000)
- Pretax bottom line
- Prime tons produced
- Product unit cost
- Production volumes of key products (monthly, wkly, and daily prod. And shipping reports)
- Productivity (output/hour)
- Productivity improvements (productivity savings/standard cost of production)
- Profit
- Profit x quality x cycle time
- Profitability (earnings before income tax, depreciation & amortization (EBITA))
- Quality
- Quality (12 months rolling average confirmed quality returns/units shipped)
- Reliability (actual pounds produced to schedule (customer needs))
- Shipping units completed by 2:00 pm (% that ship on that are completed by 2:00)
- Total hours per unit
- Total manufacturing cost
- Turnaround time and quality
- Units/employee/day
- Units/labor hour
- Value generated/associate (standard value of labor and expense divided by total associates)
- Variable margin
- Voice of the customer rate
- Yield (good pieces packed/total pieces fed)

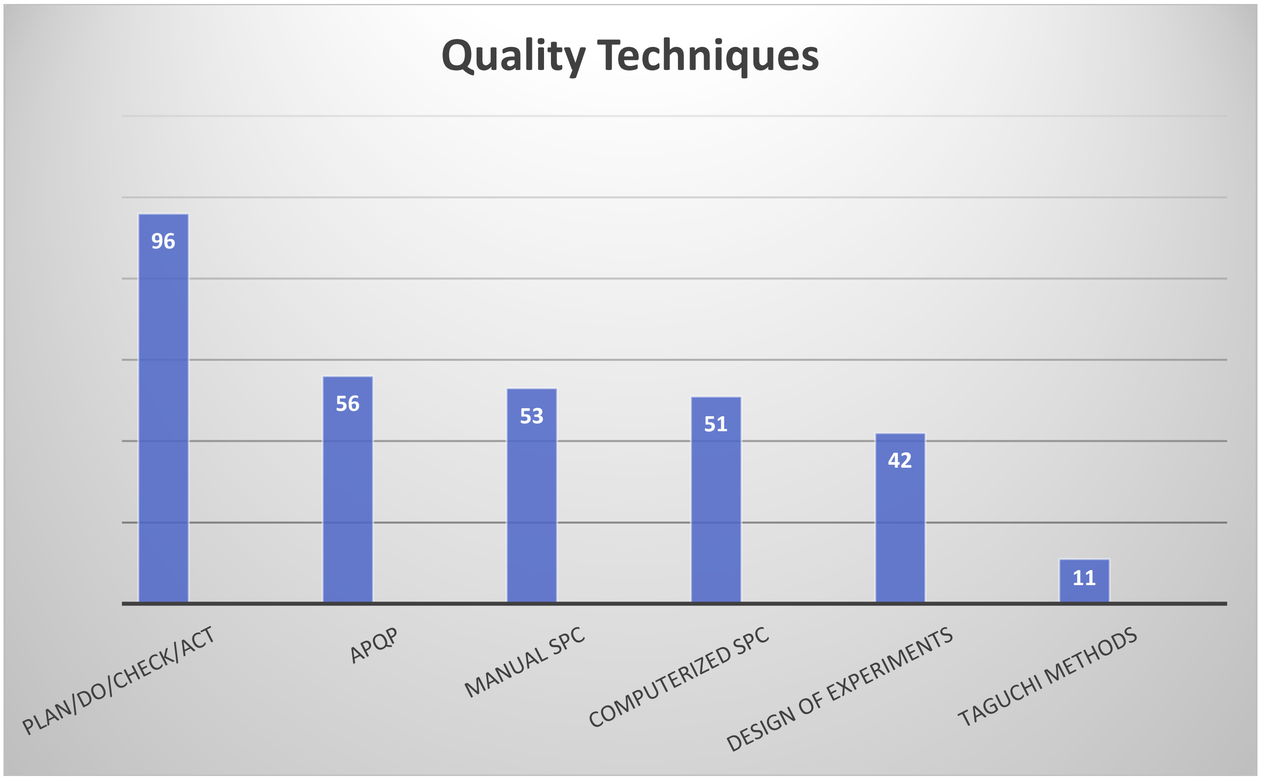
QUALITY

Quality techniques *extensively* implemented (% of plants):

Year **2016-2020/21**	***Six Sigma***	***Quality function deployment***	***Poka-yoke (mis-take-proofing)***	***Failure mode effect analysis (FMEA)***	***Total Quality Management***	***Employee prob-lem-solving teams***
	64	35	78	84	76	95

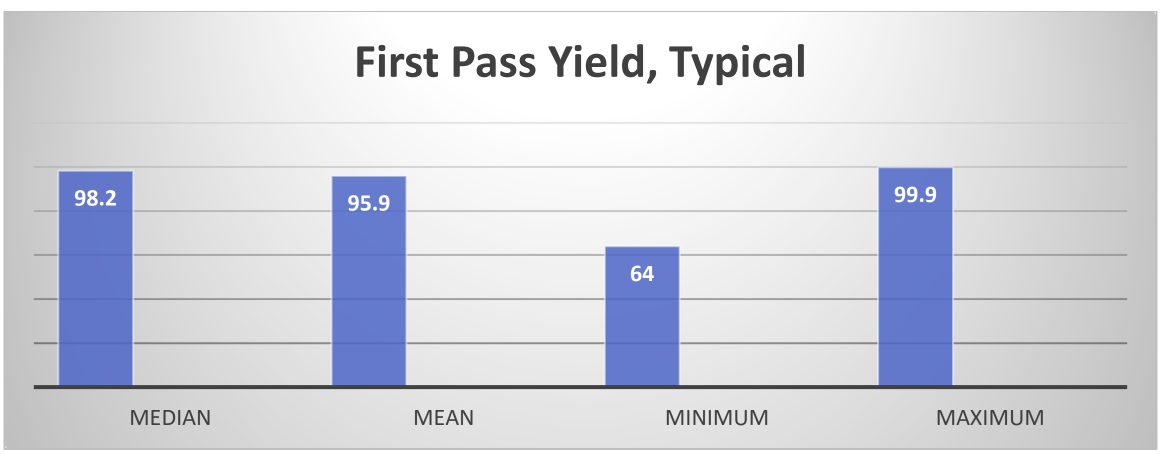
Quality techniques *extensively* implemented (% of plants):

Year 2016-2020/21	*Plan/do/check/act*	*Advanced product quality planning (APQP)*	*Manual SPC*	*Computerized SPC*	*Design of Experiments*	*Taguchi methods*
	96	56	53	51	42	11



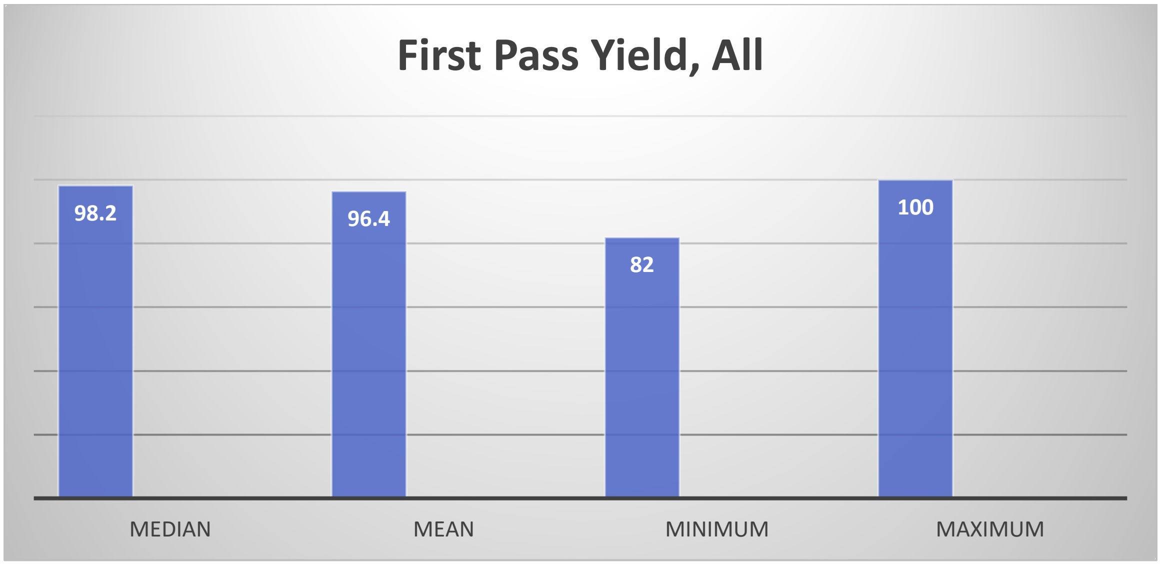
Current first-pass yield, typical finished product (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	98.2	95.9	64.0	99.9



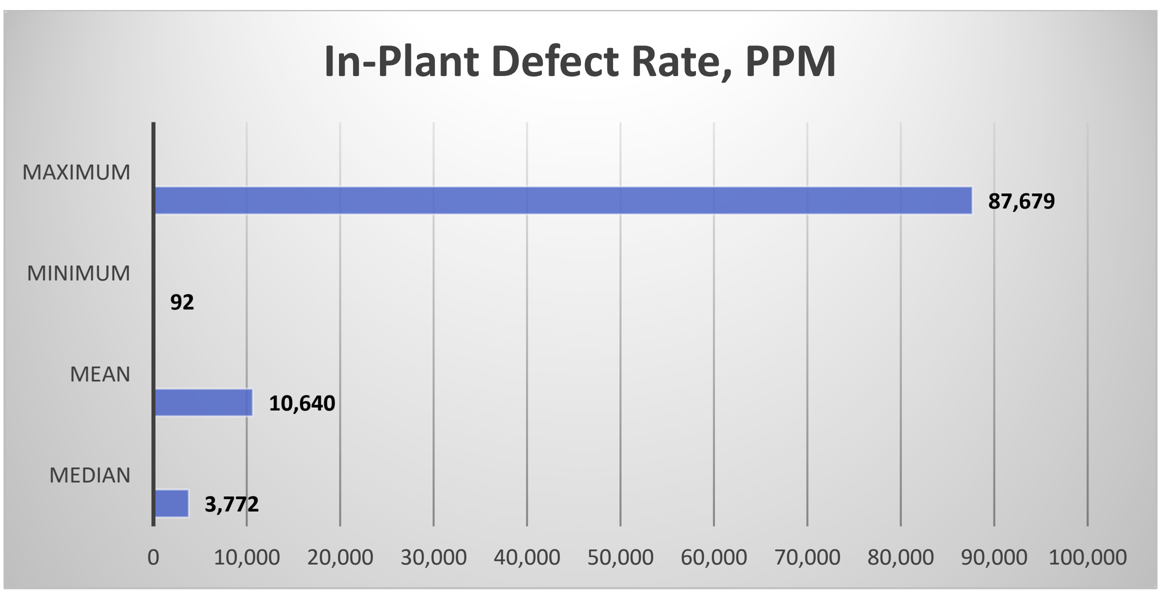
Average first-pass yield, all finished products (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	98.2	96.4	82.0	100.0



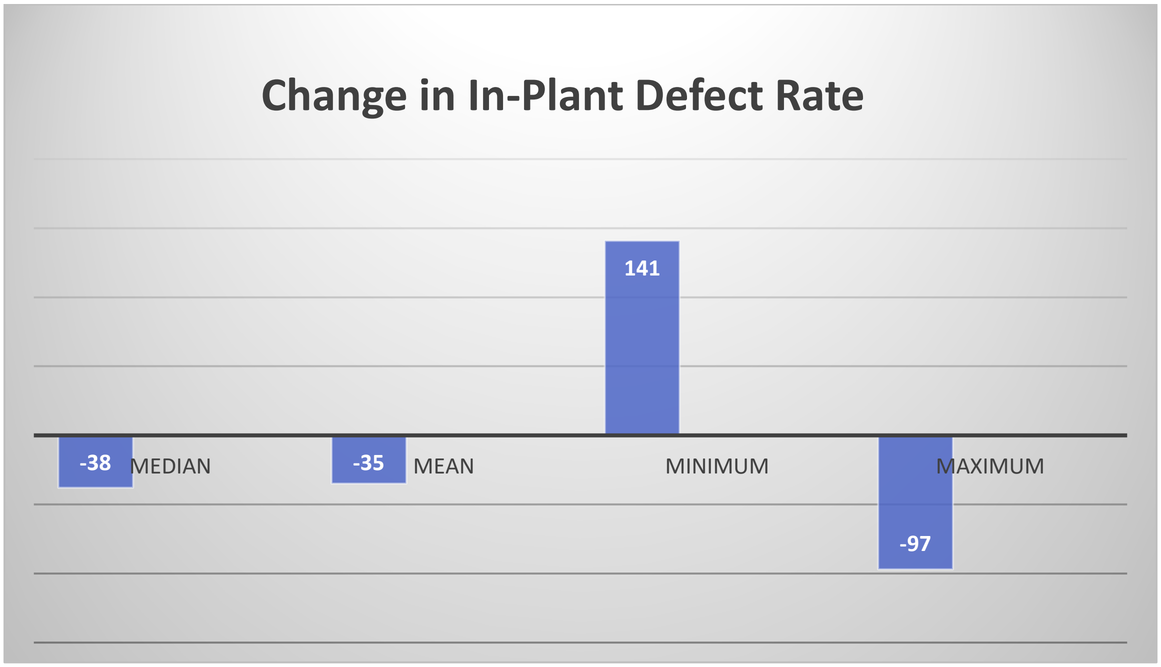
In-plant defect rate (ppm):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	3,772	10,640	92	87,679



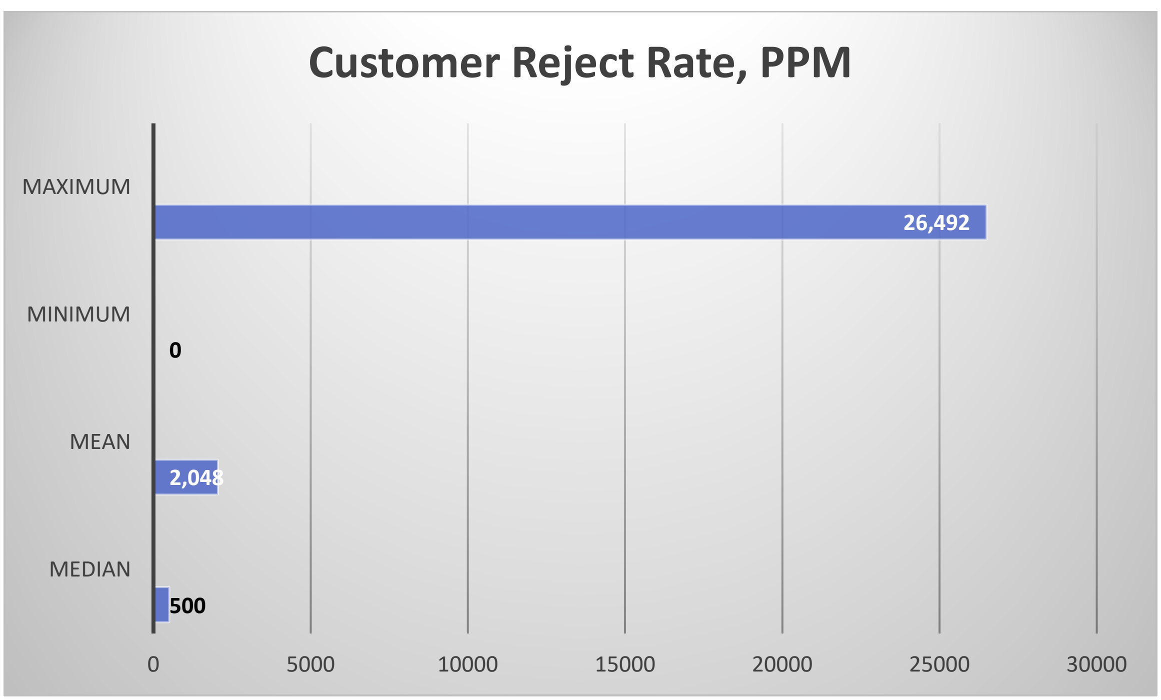
Change in in-plant defect rate, last three years* (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	38% reduction	35% reduction	141% increase	97% reduction



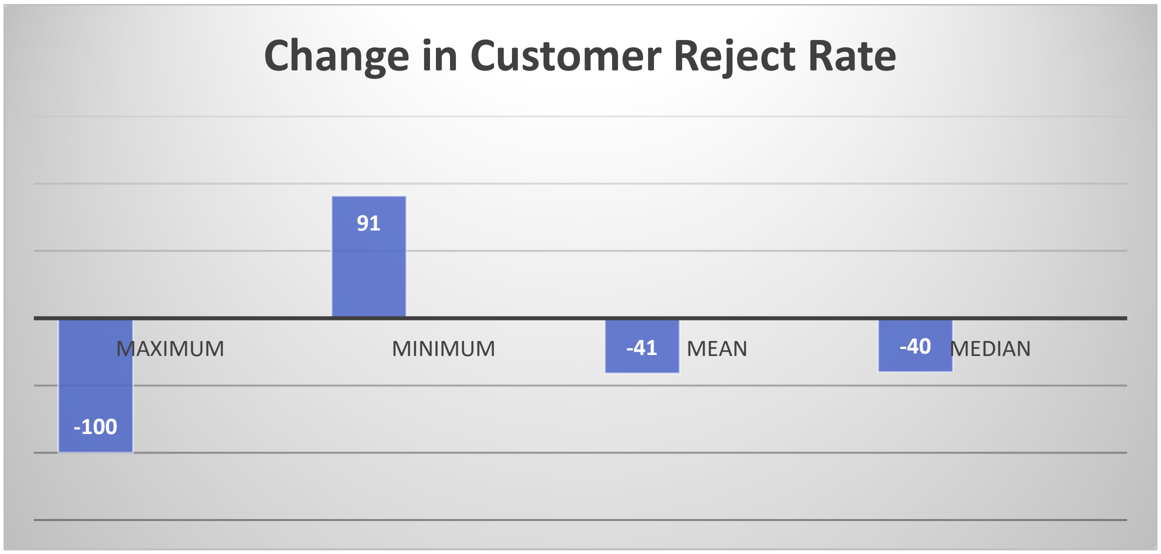
Customer reject rate on shipped products (ppm):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	500	2,048	0	26,492



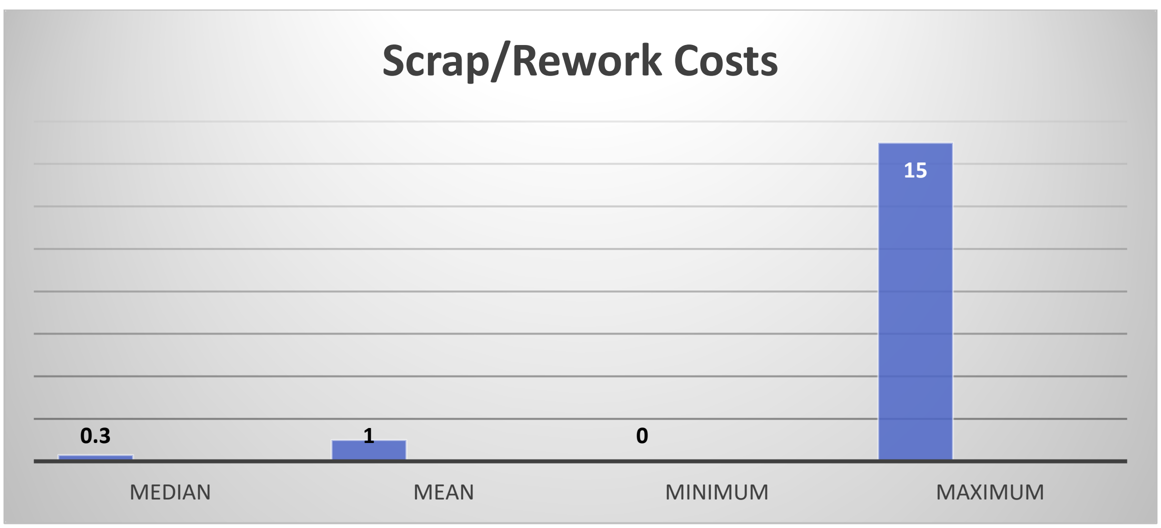
Change in customer reject rate, last three years* (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	40% decrease	41% decrease	91% increase	100% decrease



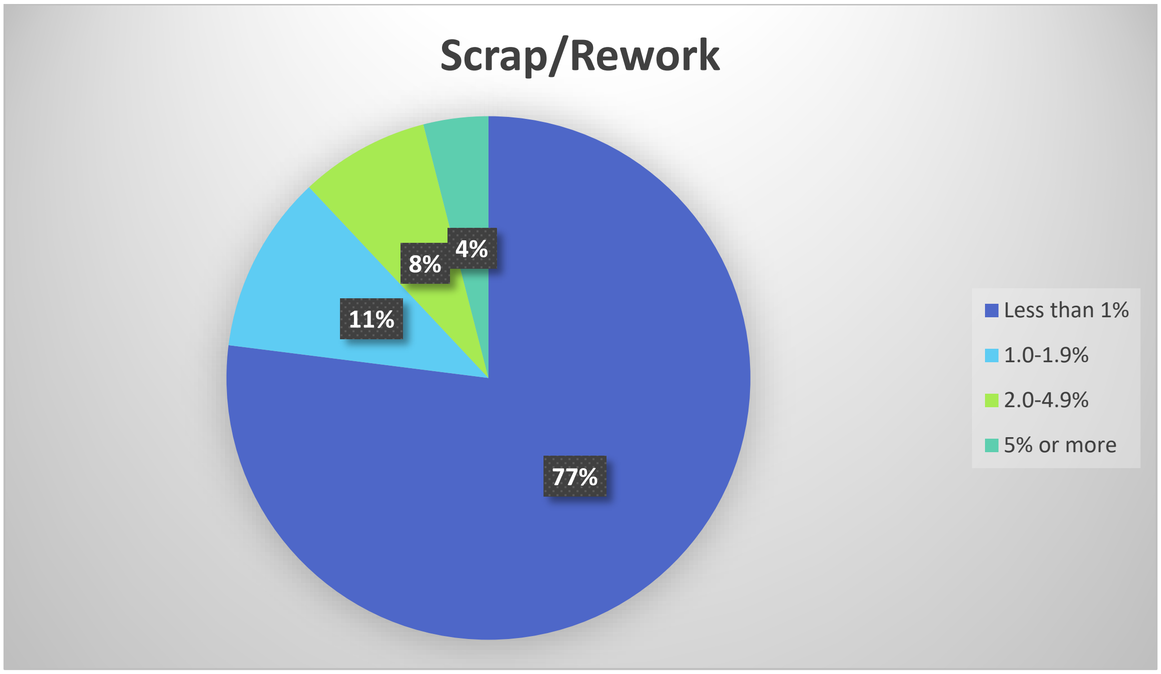
Scrap/rework (% of sales):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	0.3	1.0	0.0	15



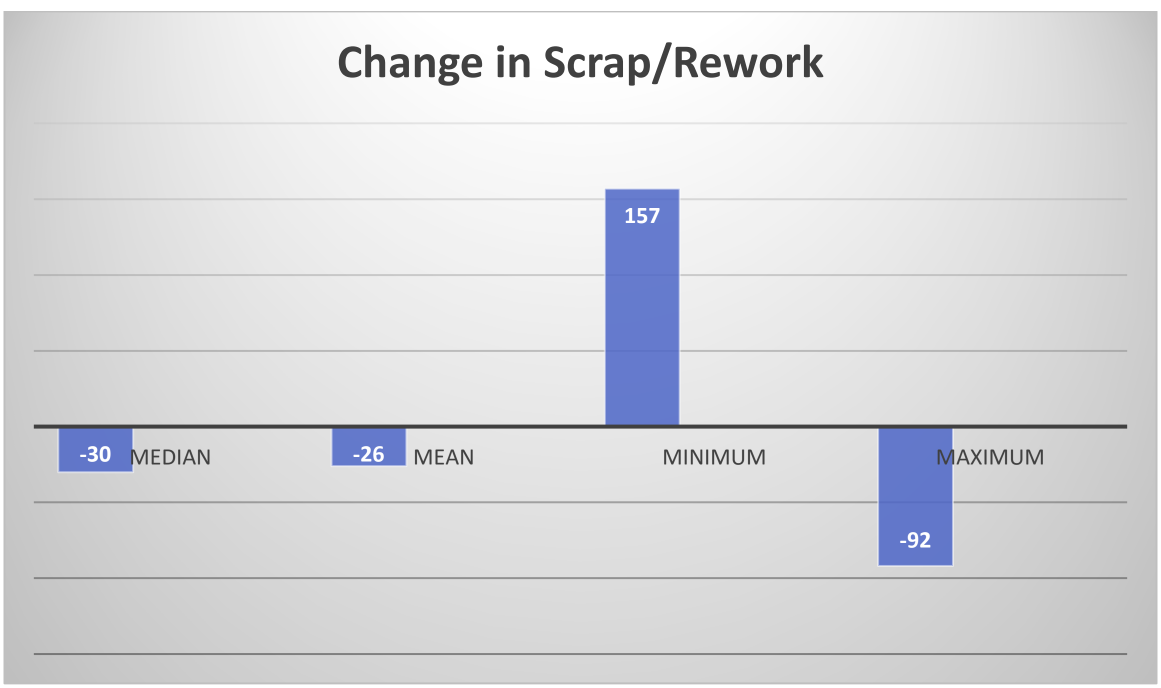
Scrap/rework (% of sales):

Year	***Less than 1%***	***1.0-1.9%***	***2.0-4.9%***	***5% or more***
2016-2020/21	77	11	8	4



Change in scrap/rework, last three years* (%):

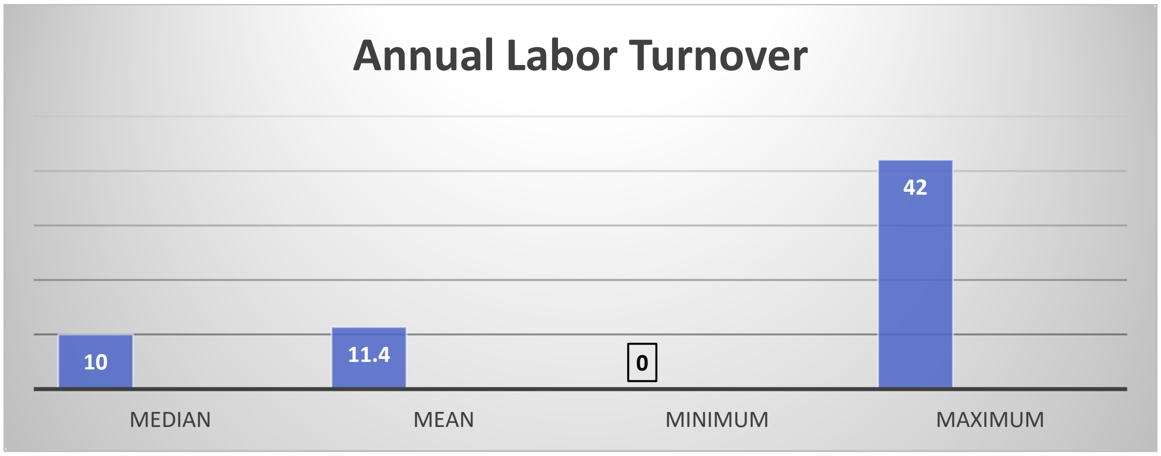
Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-30%	-26%	157% increase	-92%



Employee Involvement/Empowerment

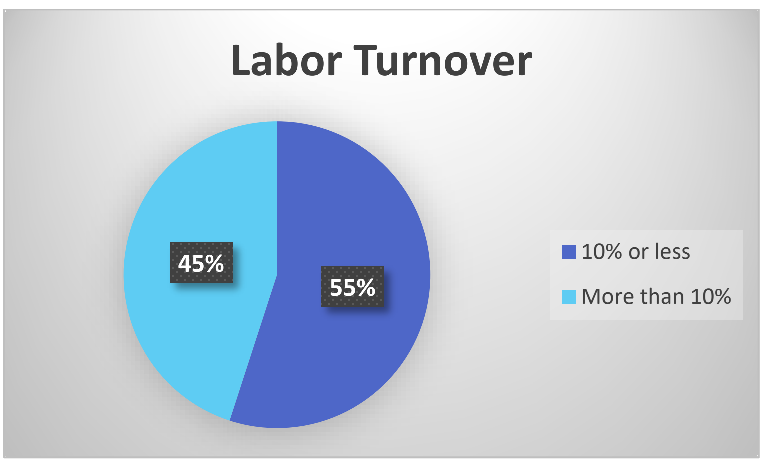
Current annual labor-turnover rate (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	10.0	11.4	0.0	42.0



Current annual labor-turnover rate (% of plants):

Year	*10% or less*	*More than 10%*
2016-2020/21	55	45

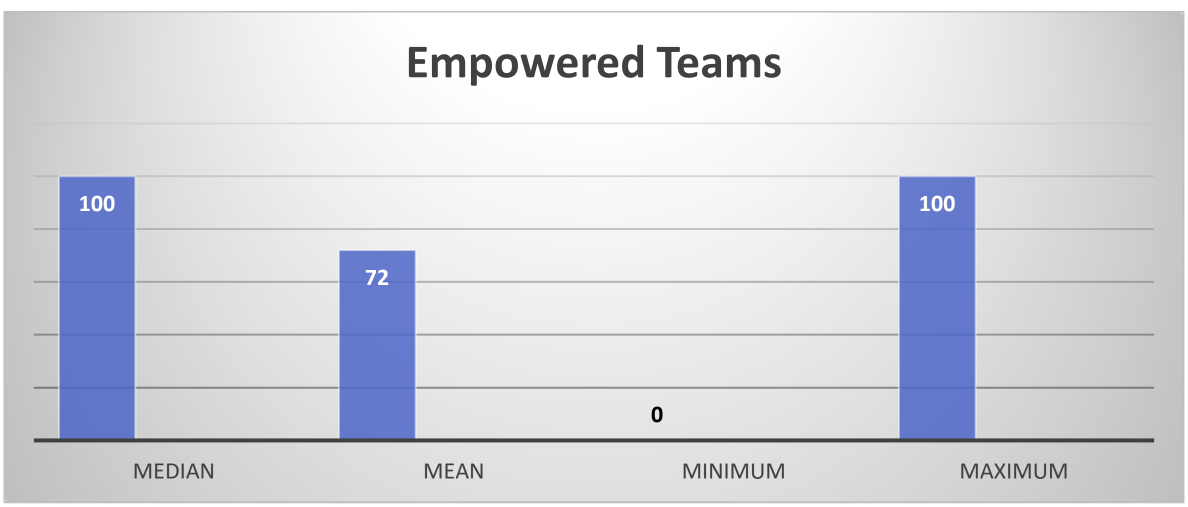


Frequency that employee satisfaction is formally measured (number of times per year):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	1.0	1.6	0.0	12.0

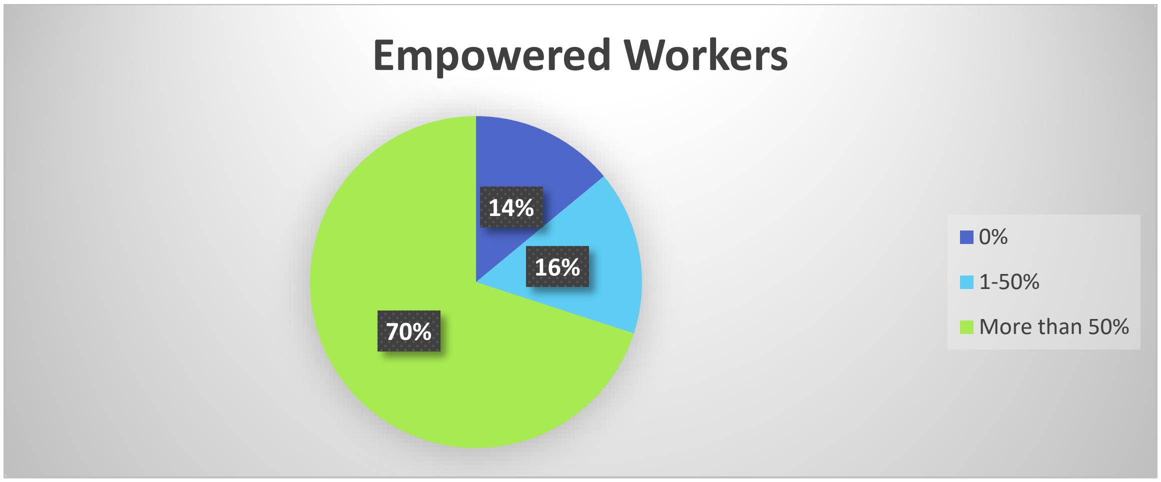
Production workers in self-directed or empowered work teams (% of production workforce):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	100	72	0	100



Production workers in self-directed or empowered work teams (% of production workforce):

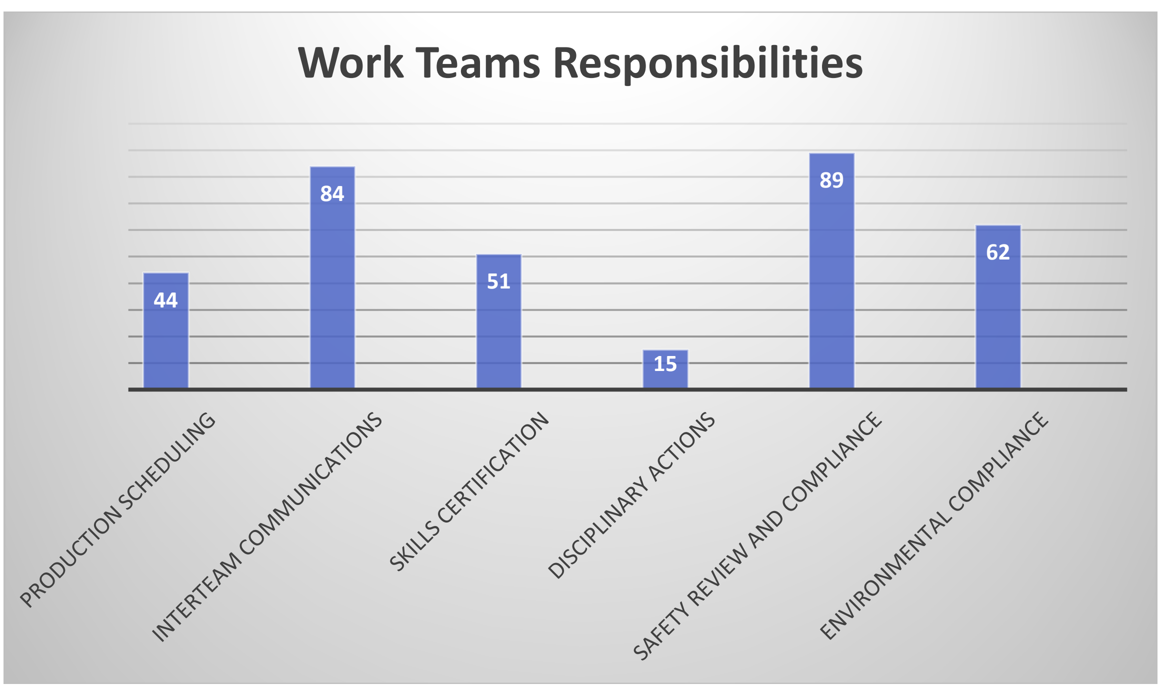
Year	***0%***	***1-50%***	***More than 50%***
2016-2020/21	14	16	70



Note: The above chart indicates that 14% of participants reported none of their production workforce participated in self-directed or empowered work teams, while 16% reported that up to half of their workforce participated in such teams. Seventy percent reported that greater than 50% of their production workers participate in self-directed or empowered teams.

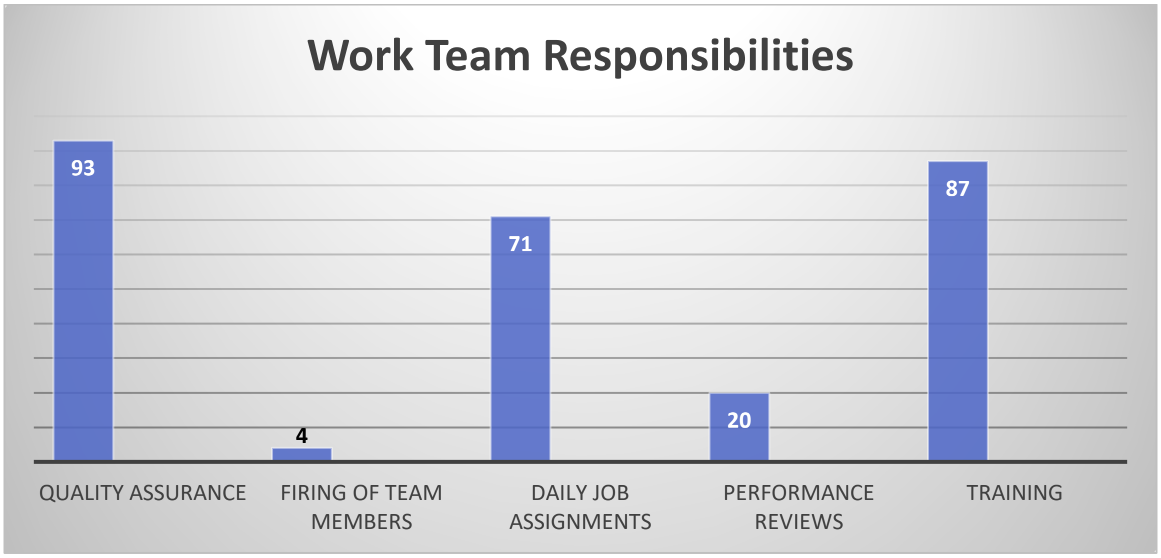
Responsibilities/decisions handled by work teams (% of plants):

Year	***Production scheduling***	***Inter-team communications***	***Skills certification***	***Disciplinary actions***	***Safety review and compliance***	***Environmental compliance***
2016-2020/21	44	84	51	15	89	62



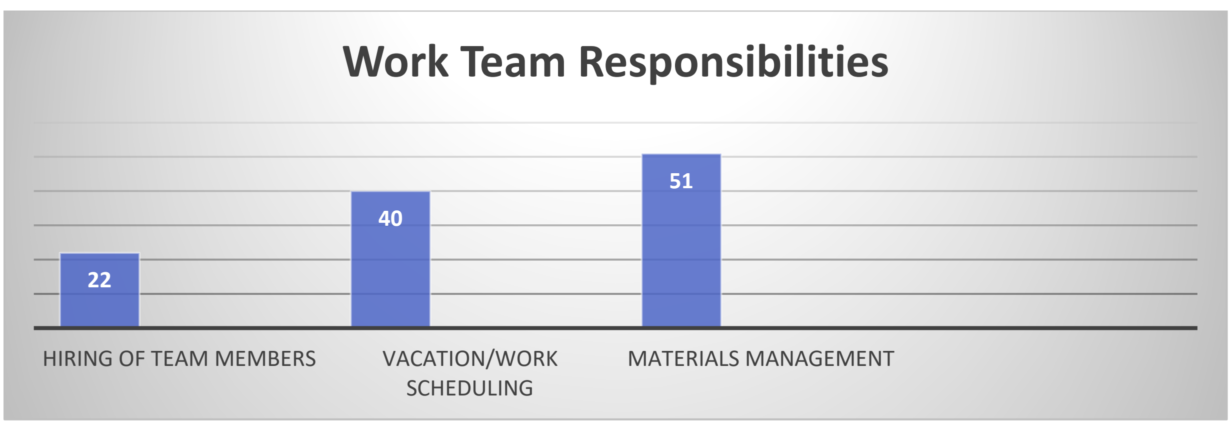
Responsibilities/decisions handled by work teams (% of plants) continued:

Year	*Quality assurance*	*Firing of team members*	*Daily job assignments*	*Performance reviews (peer evaluation)*	*Training*
2016-2020/21	93	4	71	20	87



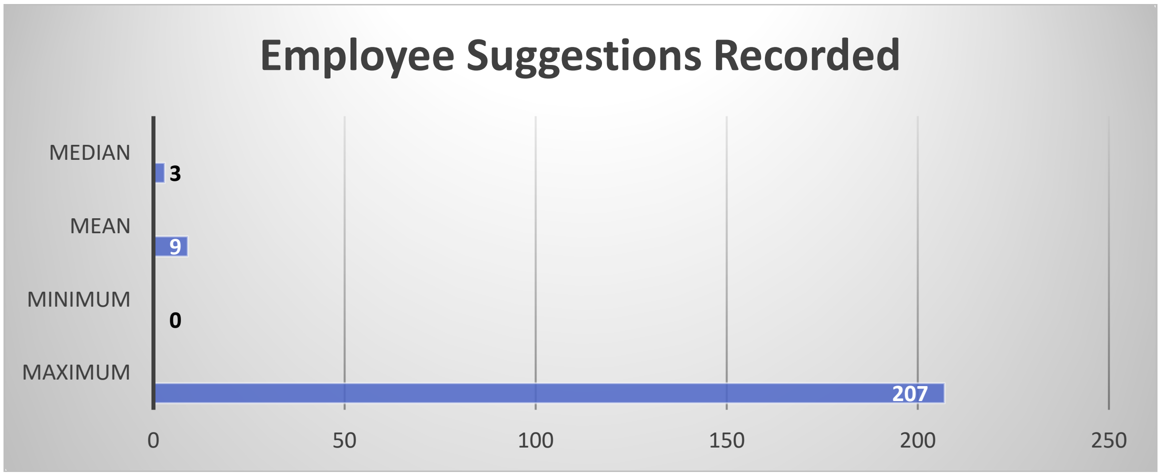
Responsibilities/decisions handled by work teams (% of plants) continued:

Year	*Hiring of team members*	*Vacation/work scheduling*	*Materials management*
2016-2020/21	22	40	51



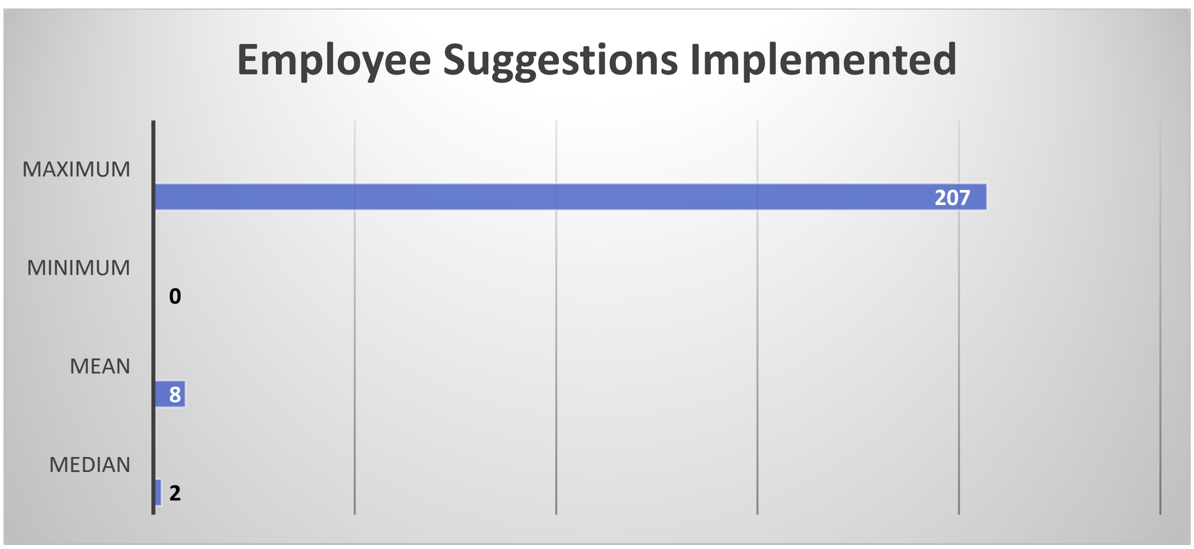
Suggestions per employee recorded last year:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	3	9	0	207



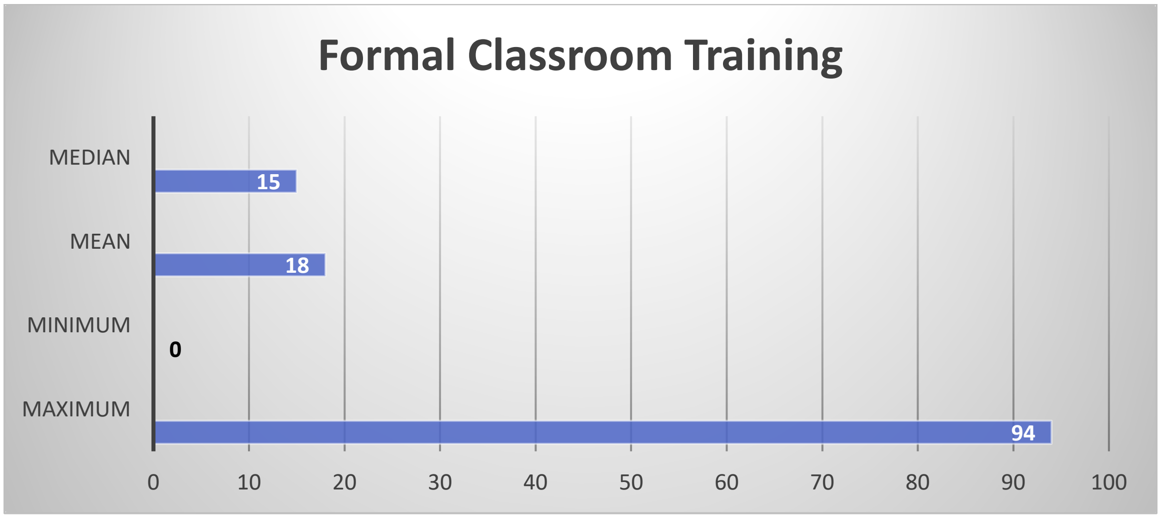
Suggestions per employee implemented last year:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	2	8	0	207



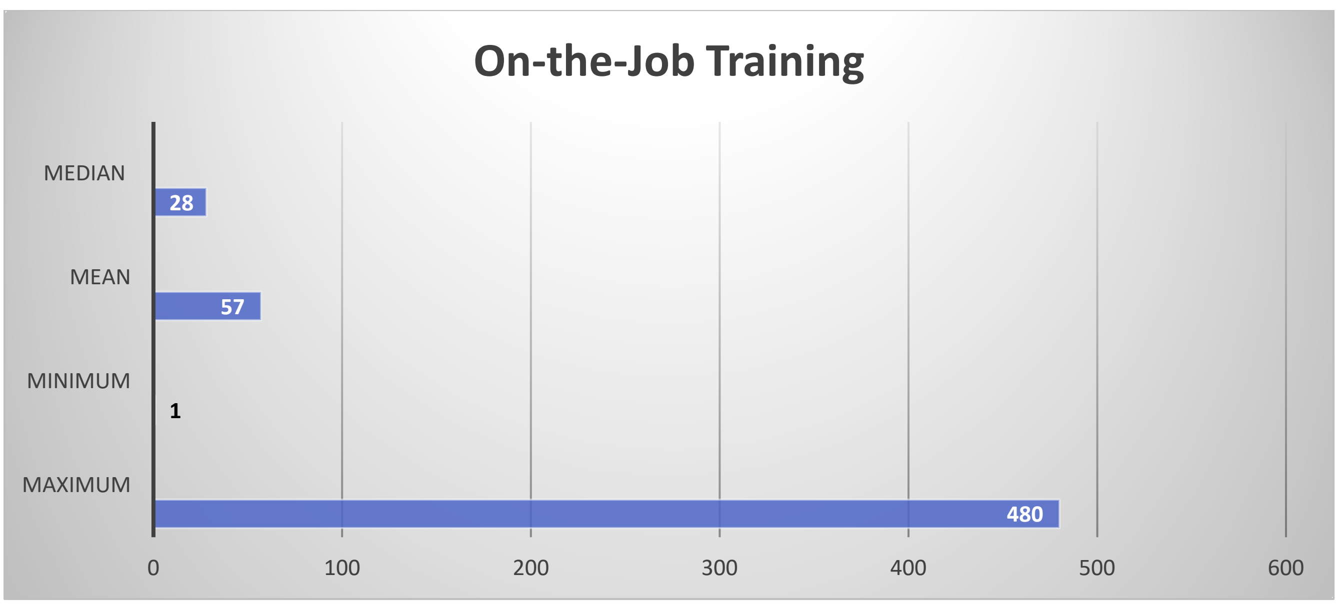
Average annual hours of formal classroom or online training per production employee:

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	15	18	0	94



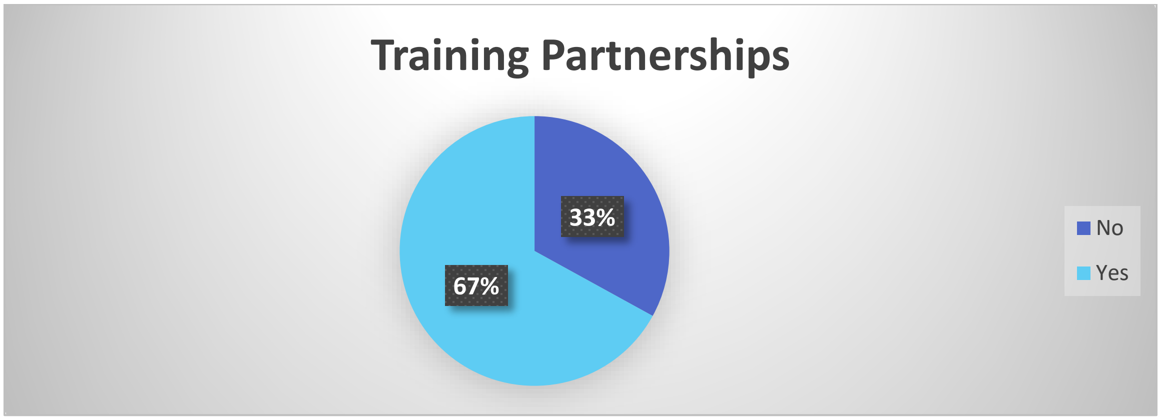
Average annual hours of on-the-job training per production employee:

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	28	57	1	480



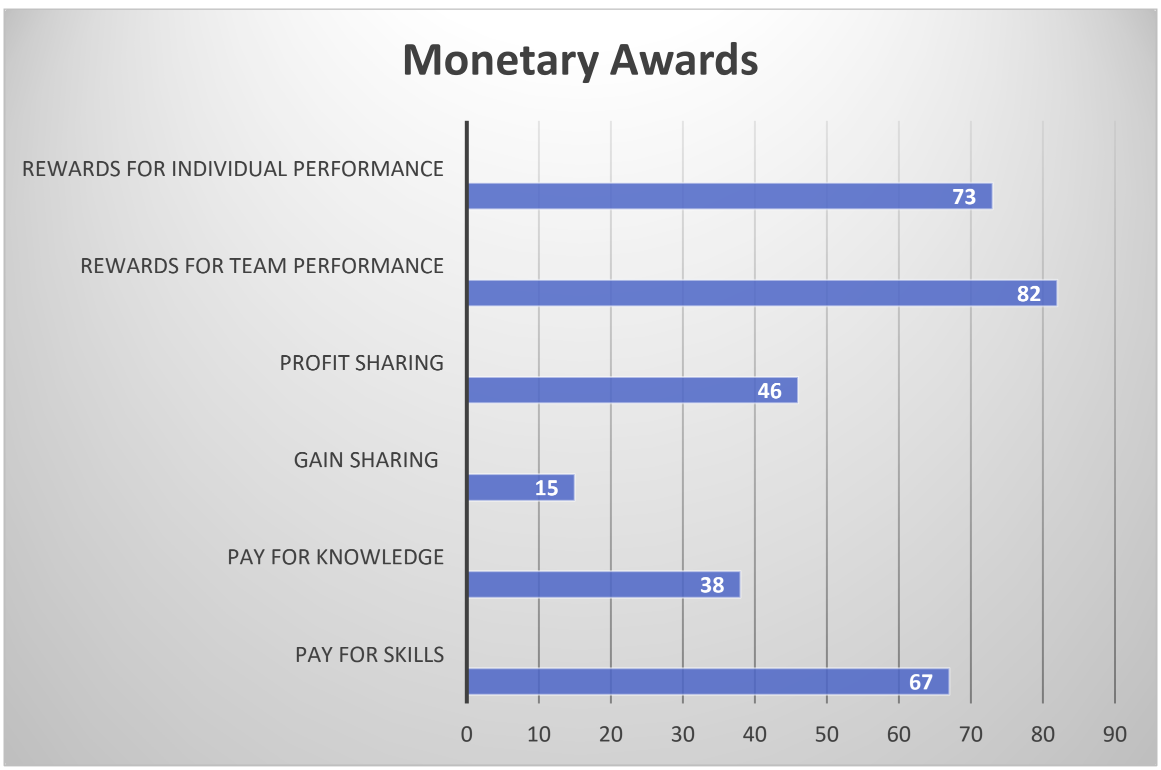
Training curriculum established with local college (% of plants):

Year	***No***	***Yes***
2016-2020/21	33	67



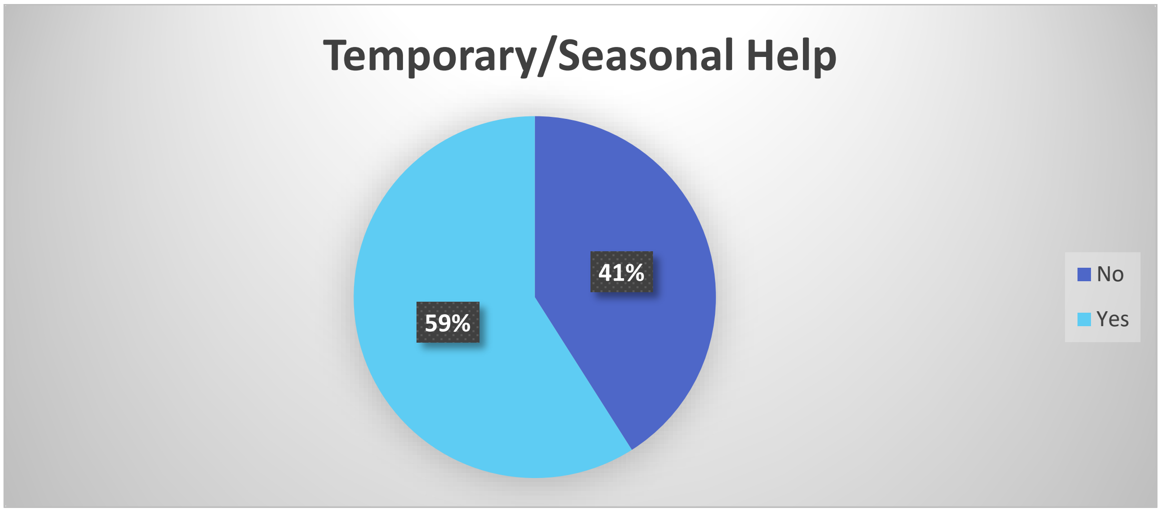
Monetary awards for production employees (% of plants):

Year **2016-2020/21**	***Rewards for individual performance***	***Rewards for team performance***	***Profit sharing***	***Gain sharing***	***Pay for knowledge***	***Pay for skills***
	73	82	46	15	38	67



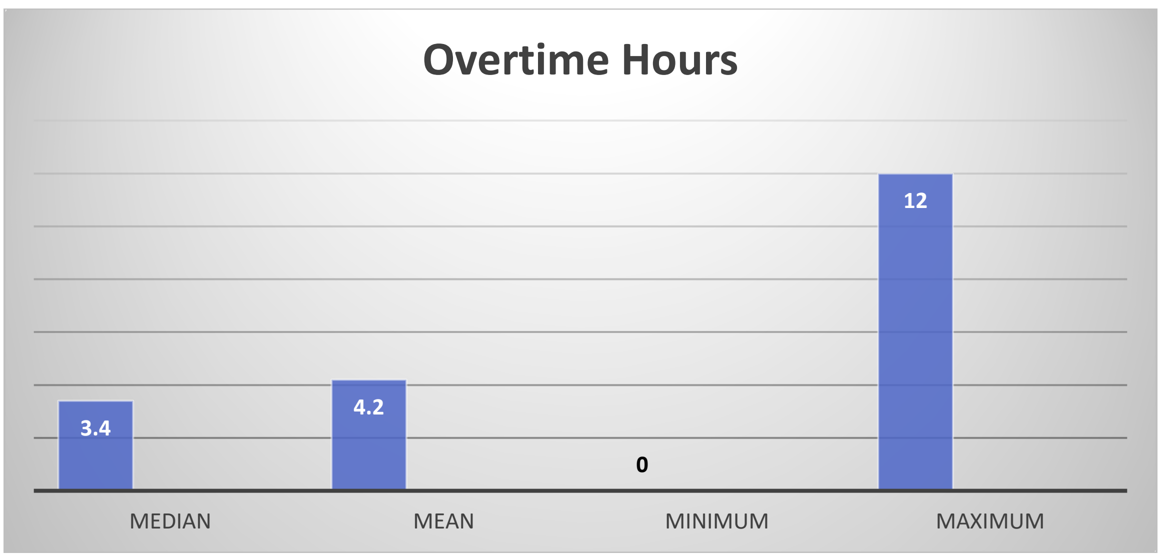
Plant employs seasonal/temporary workers (% of plants):

Year	*No*	*Yes*
2016-2020/21	41	59



Average hours of overtime per week for production employees, per employee:

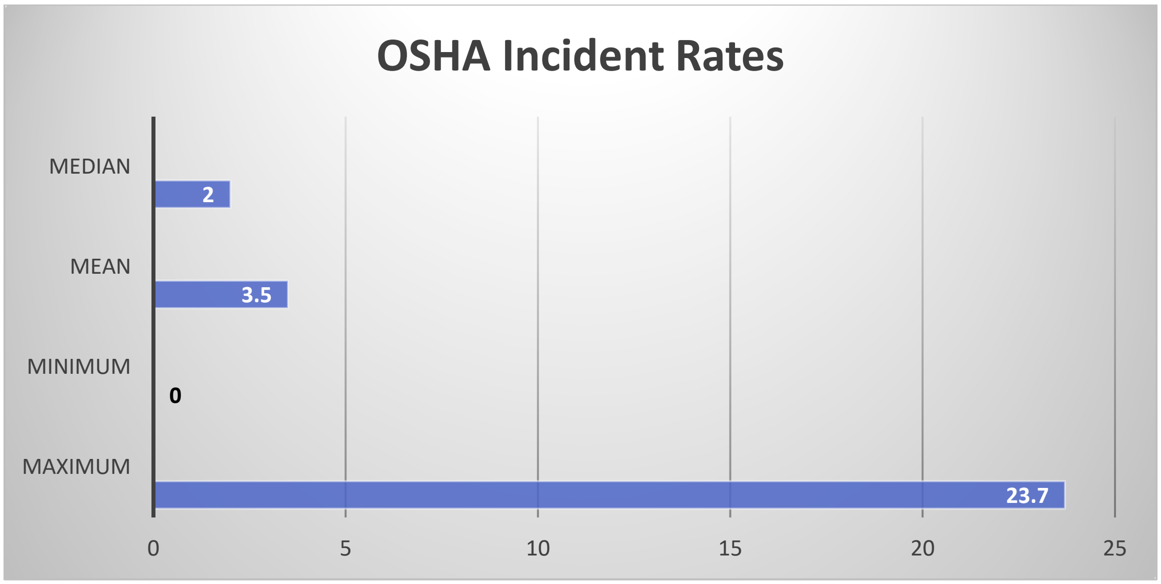
Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	3.4	4.2	0.0	12.0



Safety

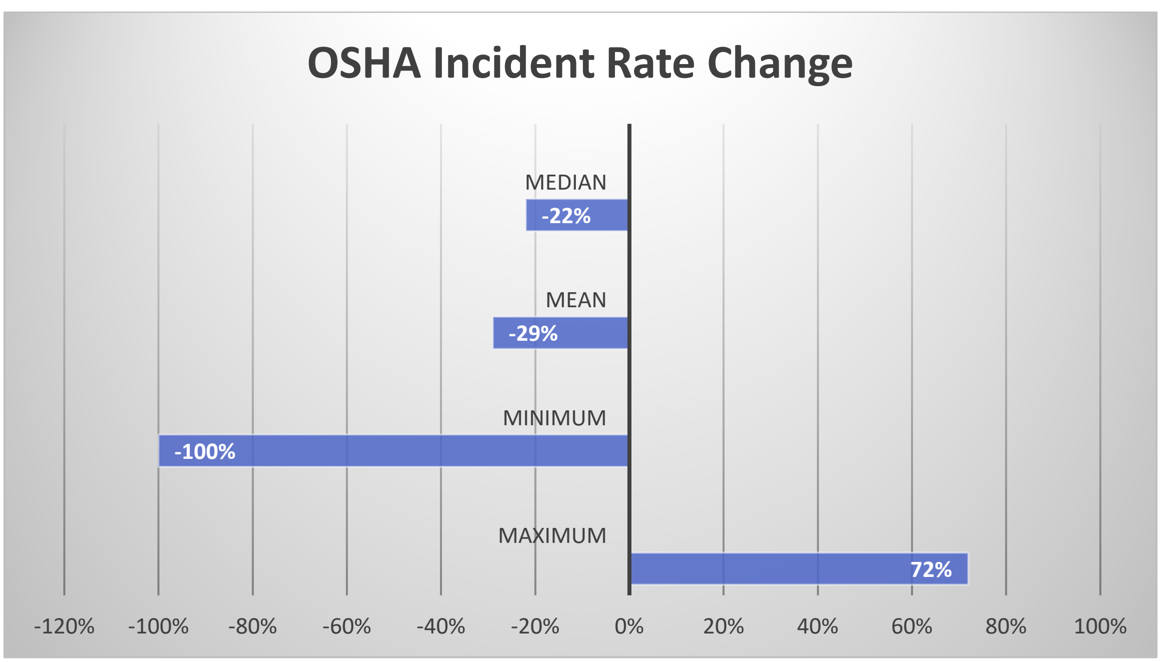
Plant's OSHA-reportable incident rate per 100 employees (work-related injuries and illnesses per 100 employees), most recent calendar year:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	2.1	3.5	0.0	23.7



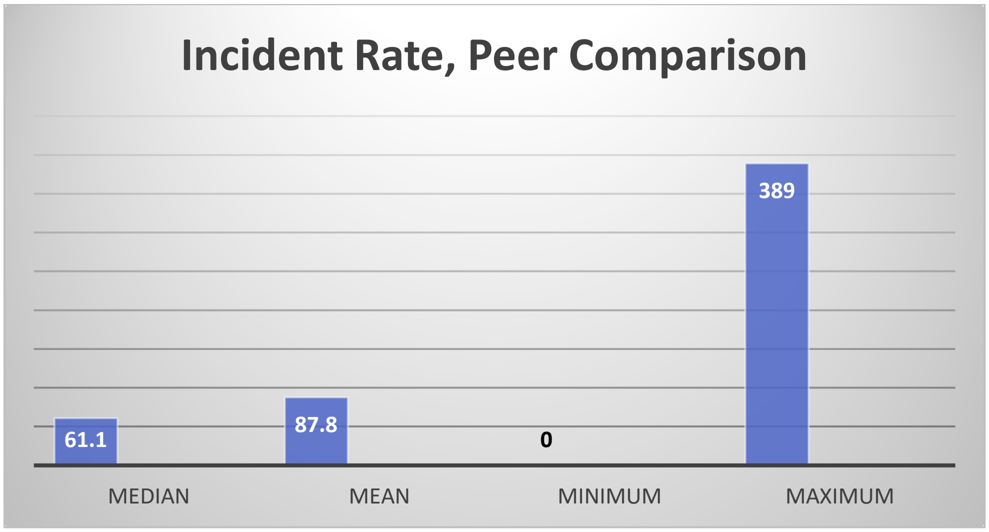
Change in OSHA-reportable incident rate within last three years (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-22.0	-29.0	-100.0	72.0



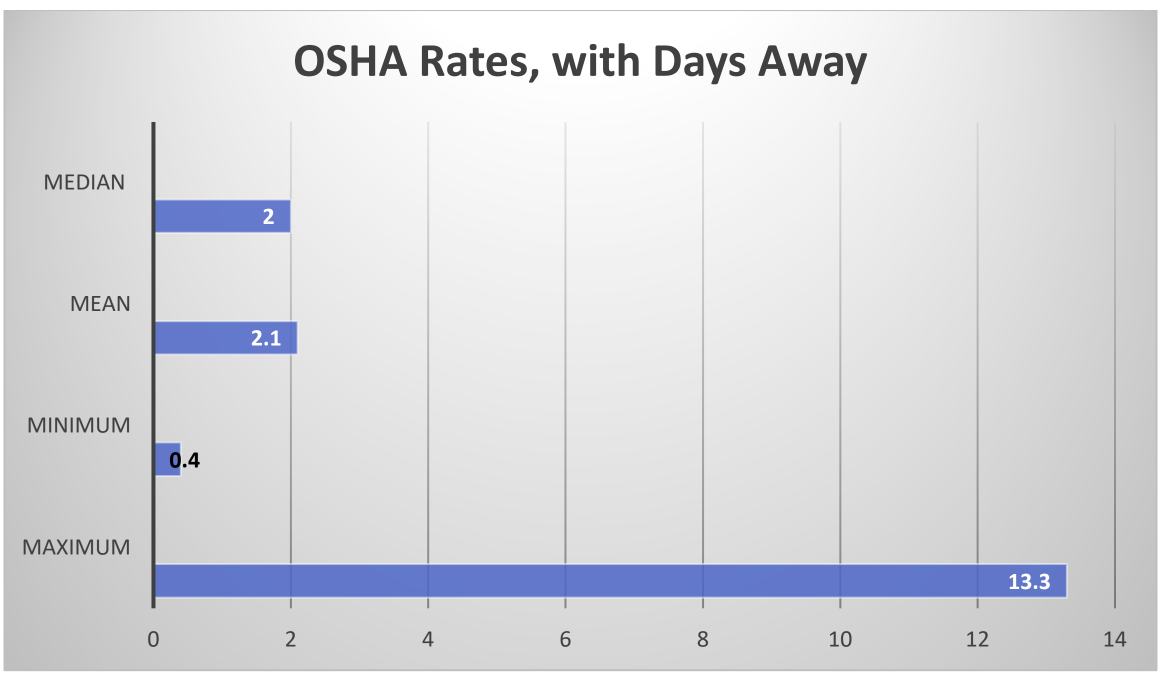
OSHA-reportable incident rate as a percentage of the industry average (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	61.1	87.8	0.0	389.0



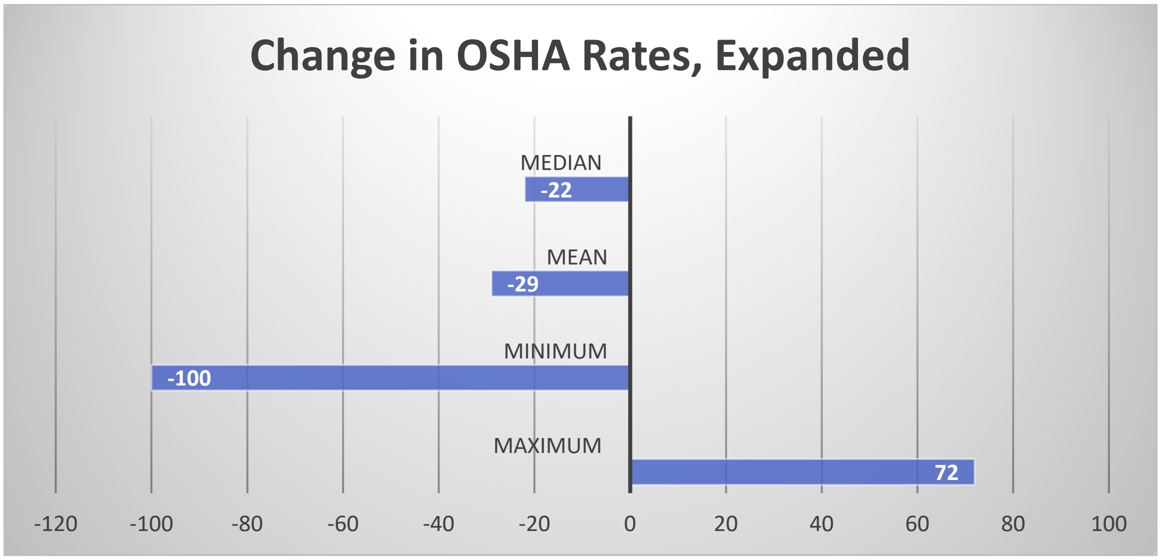
Plant's OSHA-recordable injury and illness rate with days away from work, job transfer, or restriction per calendar year:

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	2.0	2.1	0.4	13.3



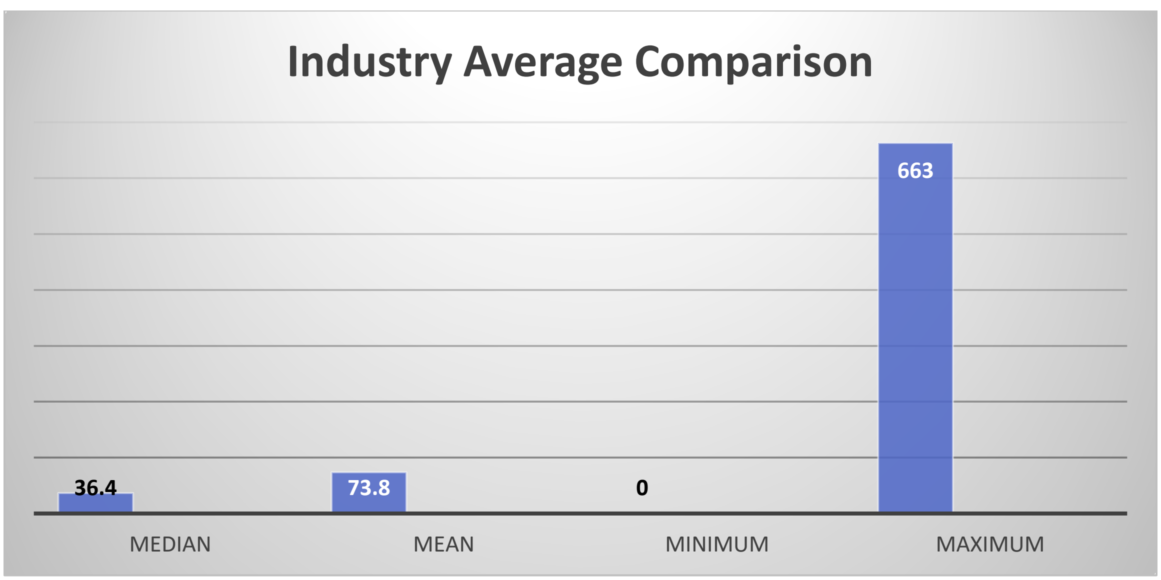
Percentage change in OSHA-recordable injury and illness rate with days away from work rate within last three years:

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	-22	-29	-100	72



OSHA-recordable injury and illness rate with days away from work rate as a percentage of the industry average (lost-workday rate reported prior to 2004):

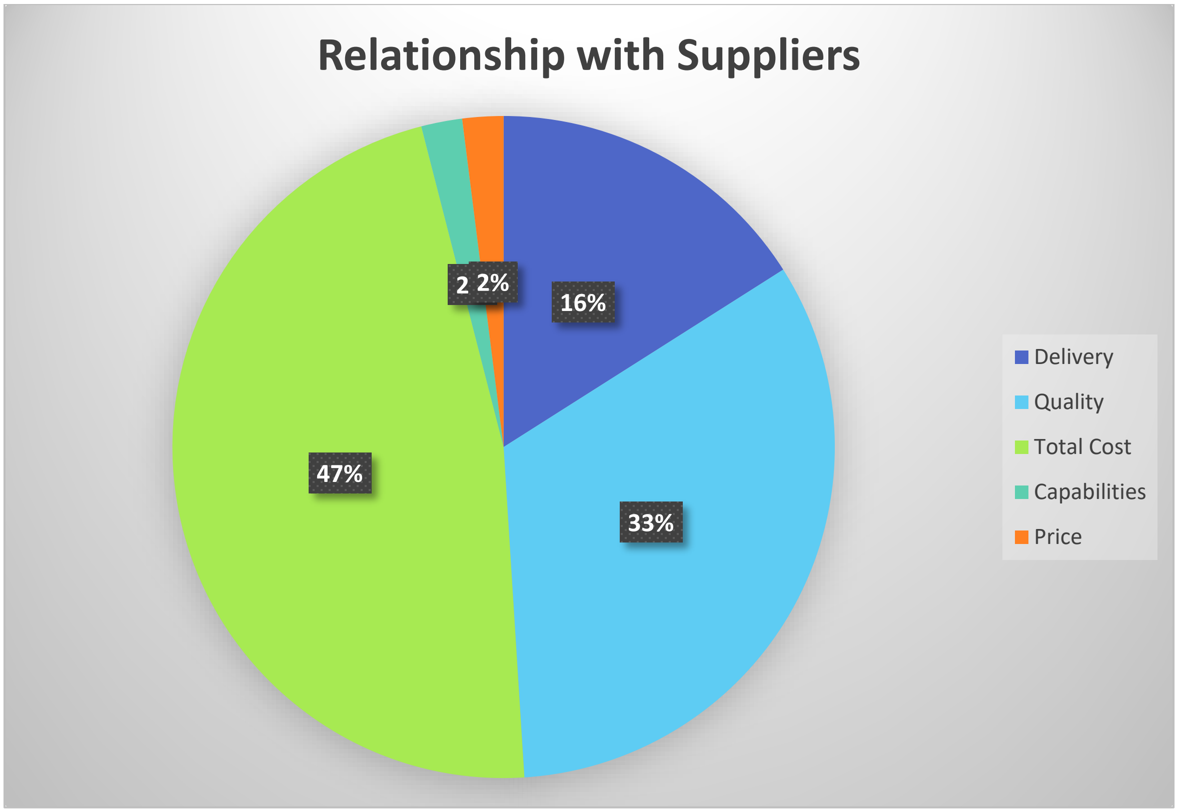
Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	36.4	73.8	0.0	663.0



Supplier Relations

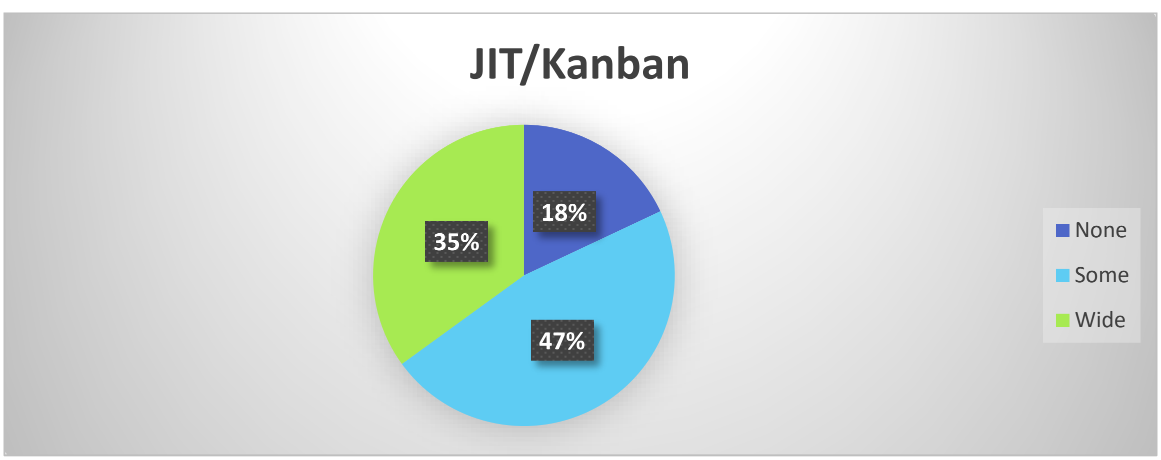
Best describes site's relationship with suppliers (% of plants):

Year	*Focused on delivery*	*Focused on quality*	*Focused on total cost*	*Focused on capabilities*	*Focused on price*	*Other*
2016-2020/21	16	33	47	2	2	0



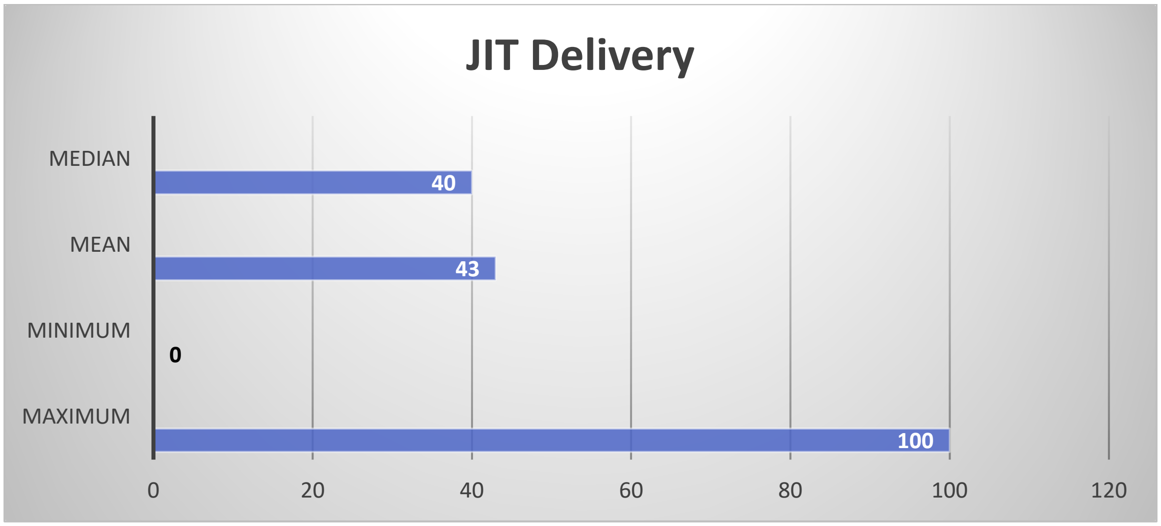
JIT/kanban system with suppliers (% of plants):

Year	*None*	*Some*	*Wide*
2016-2020/21	18	47	35



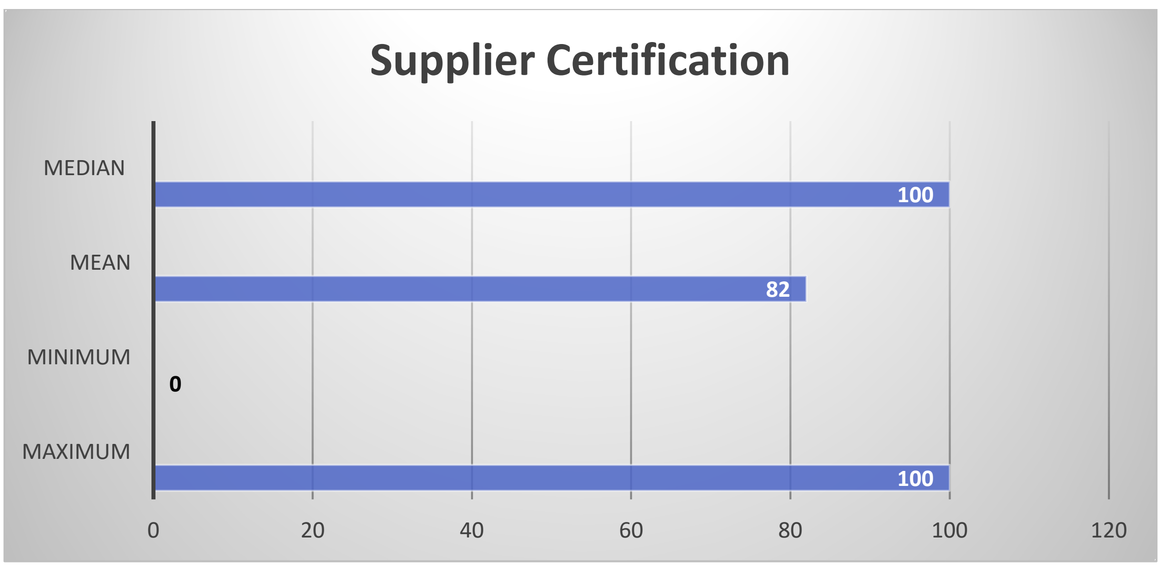
Percentage of key suppliers that provide JIT delivery:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	40	43	0	100



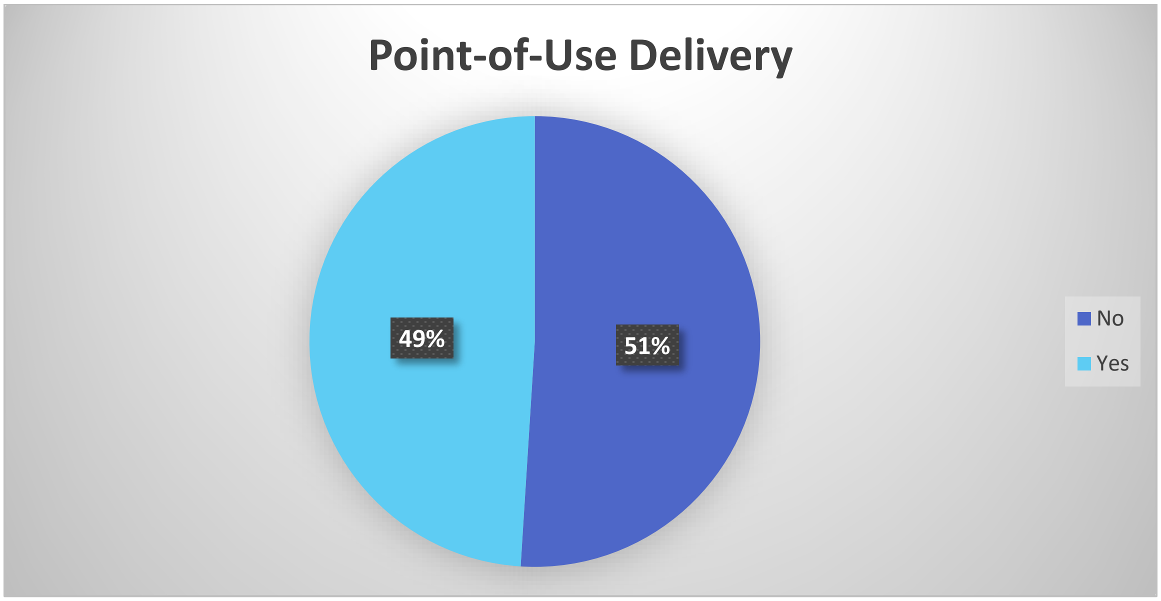
Percentage of key suppliers formally certified:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	100	82	0	100



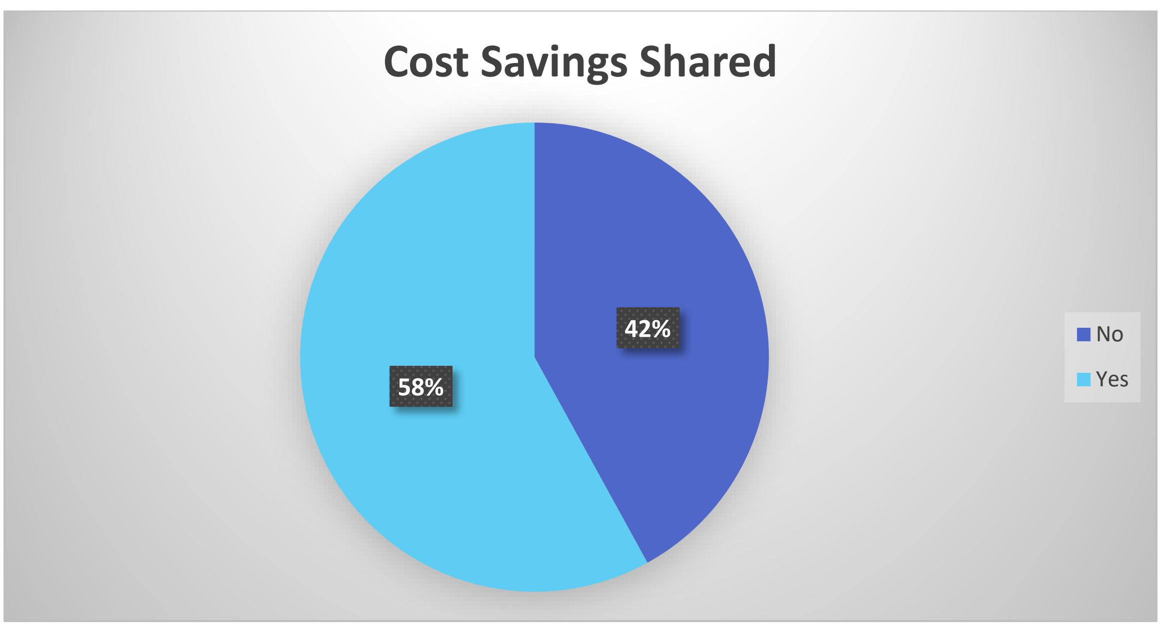
Point-of-use delivery in plant by high-volume suppliers (% of plants):

Year	***No***	***Yes***
2016-2020/21	51	49



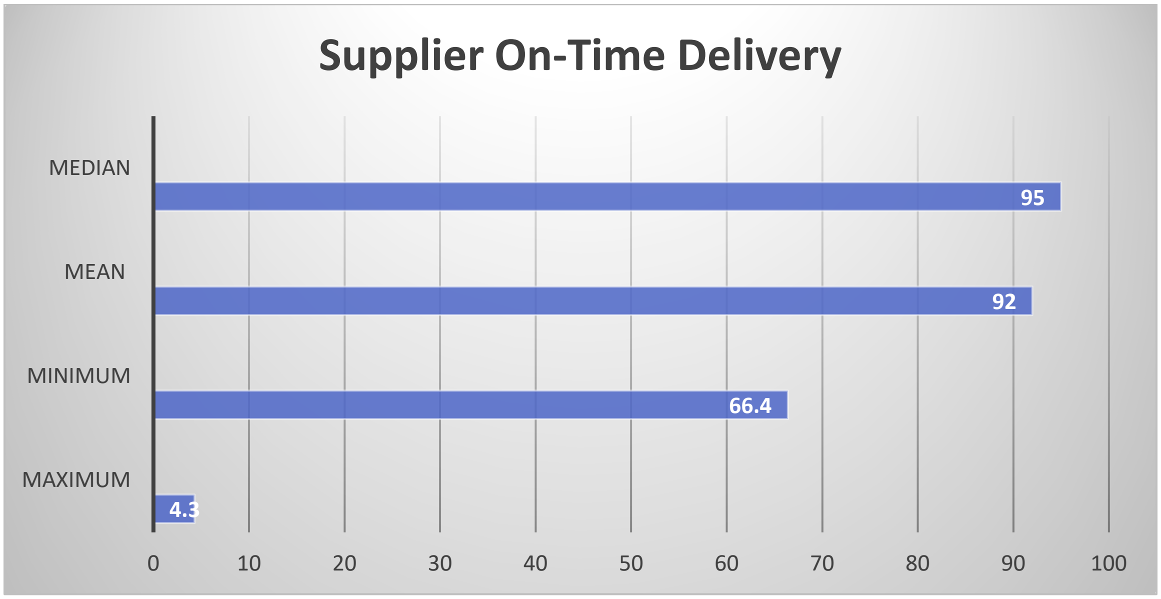
Cost savings shared with the supplier when supplier initiatives yield cost savings for the plant:

Year	***No***	***Yes***
2016-2020/21	42	58



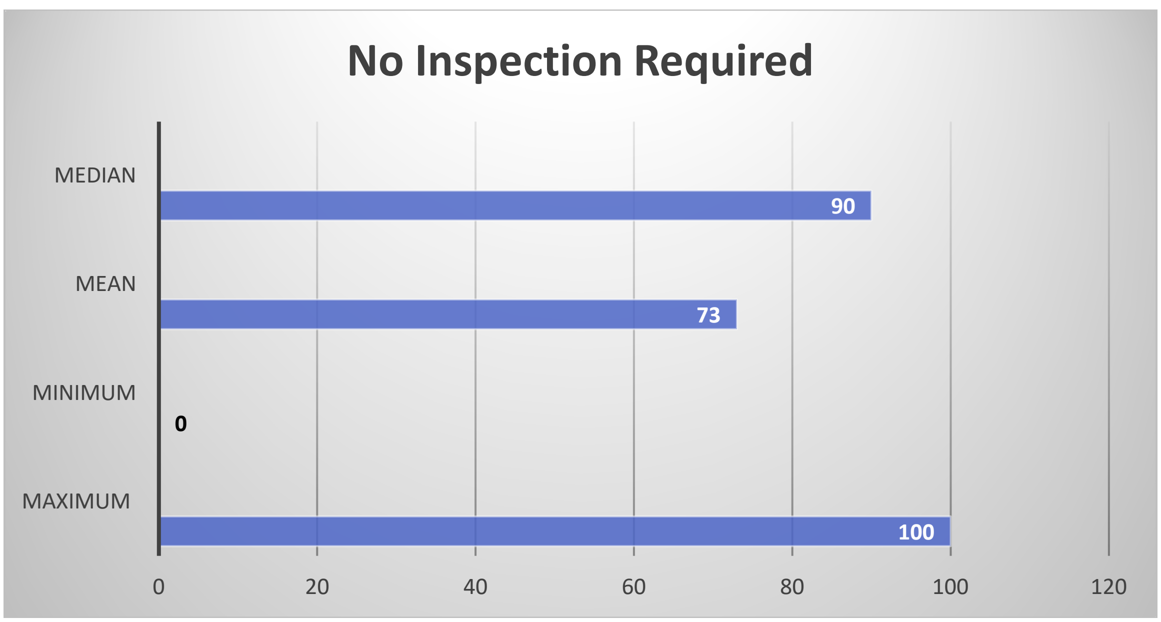
Percentage of supplier orders delivered on time (by the request date):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	95.0	92.0	66.4	100.0



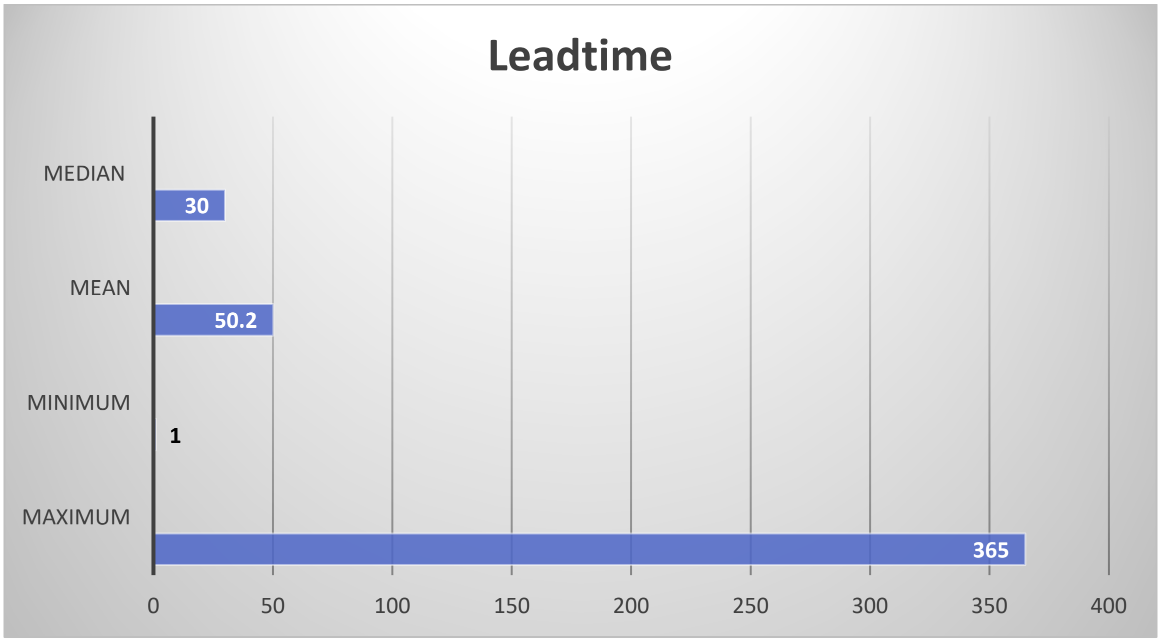
Percentage of purchased material not requiring incoming inspection:

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	90	73	0	100



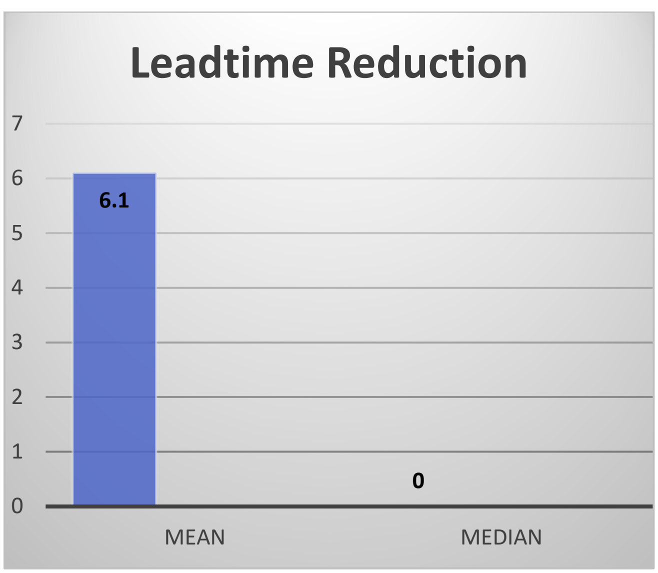
Typical leadtime on all class-A (high-cost) purchased materials (days):

Year	Median	Mean	Minimum	Maximum
2016-2020/21	30.0	50.2	1.0	365.0



Percentage reduction in leadtime on class-A materials, last three years:

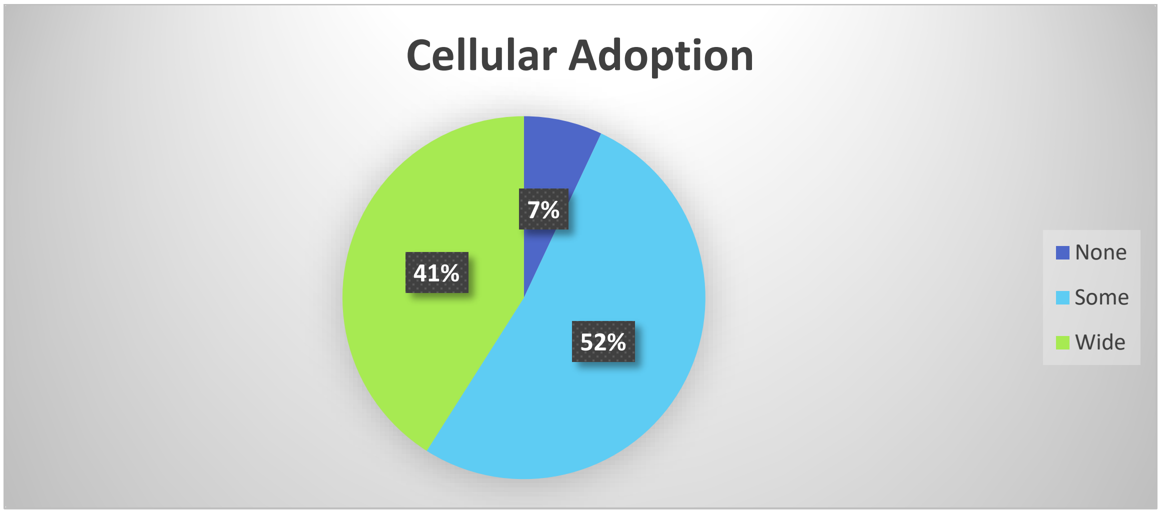
Year	Median	Mean
2016-2020/21	0.0	6.1



MANUFACTURING OPERATIONS & FLEXIBILITY

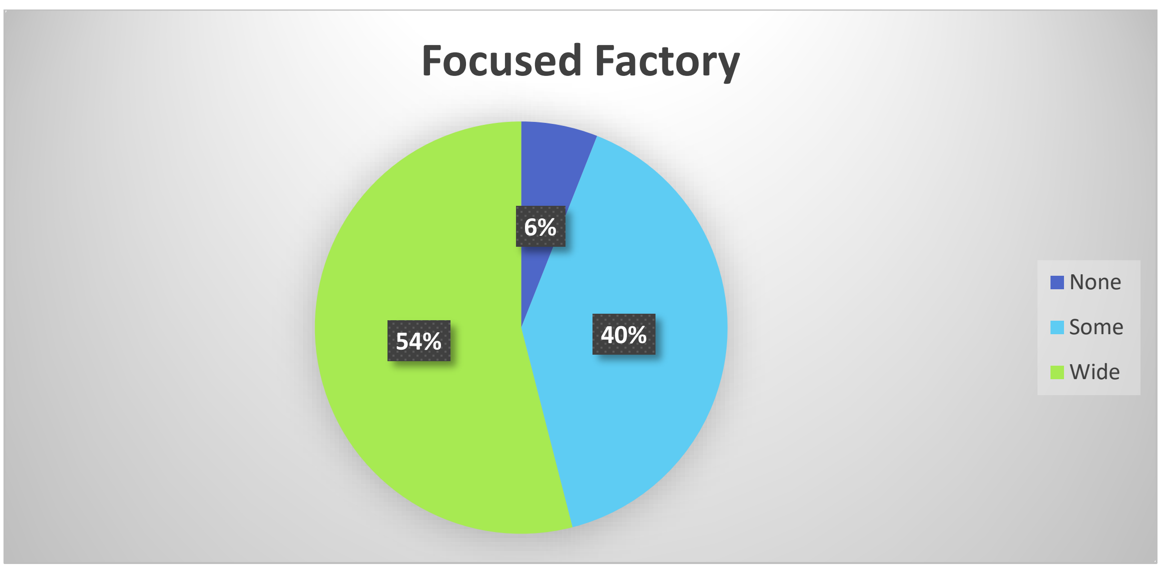
Adoption of cellular-manufacturing practices (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	7	52	41



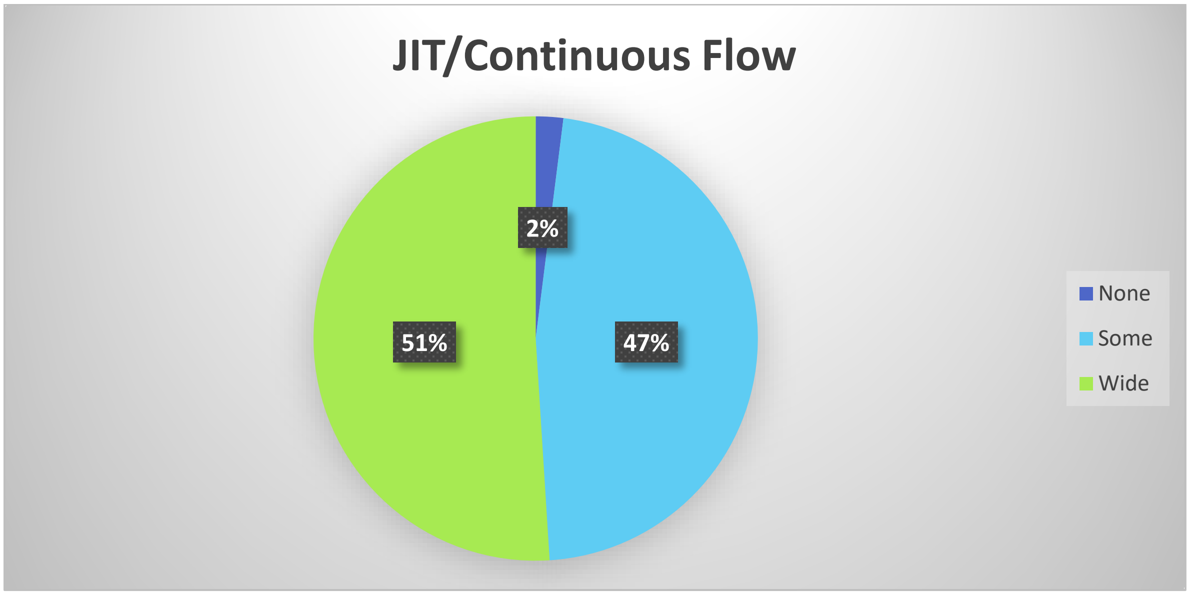
Adoption of focused-factory production systems (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	6	40	54



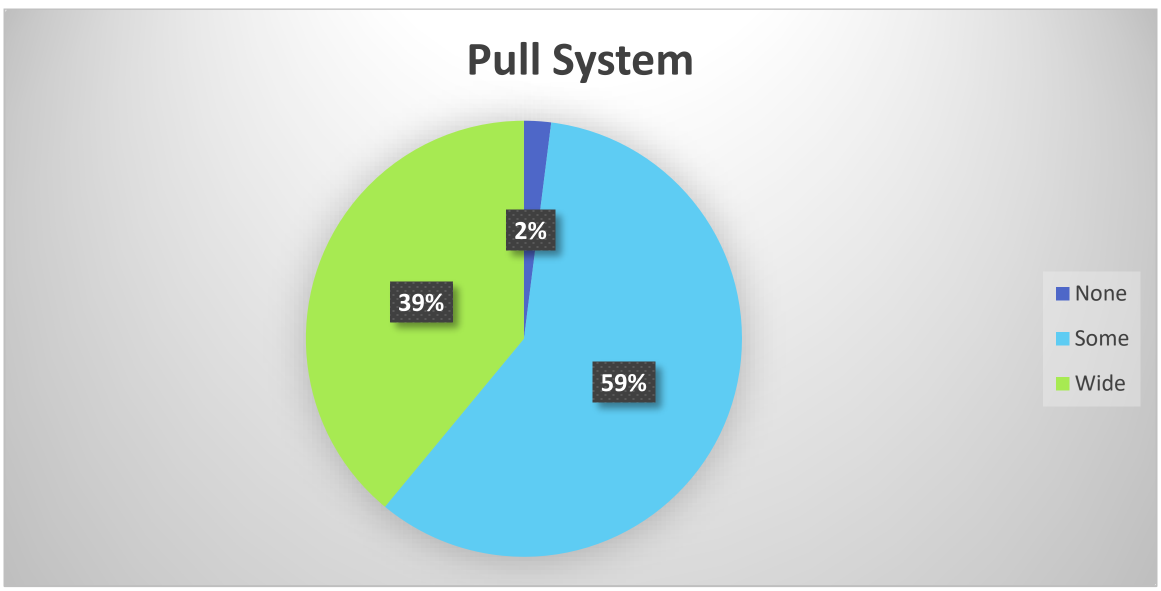
Adoption of JIT/continuous-flow production methods (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	2	47	51



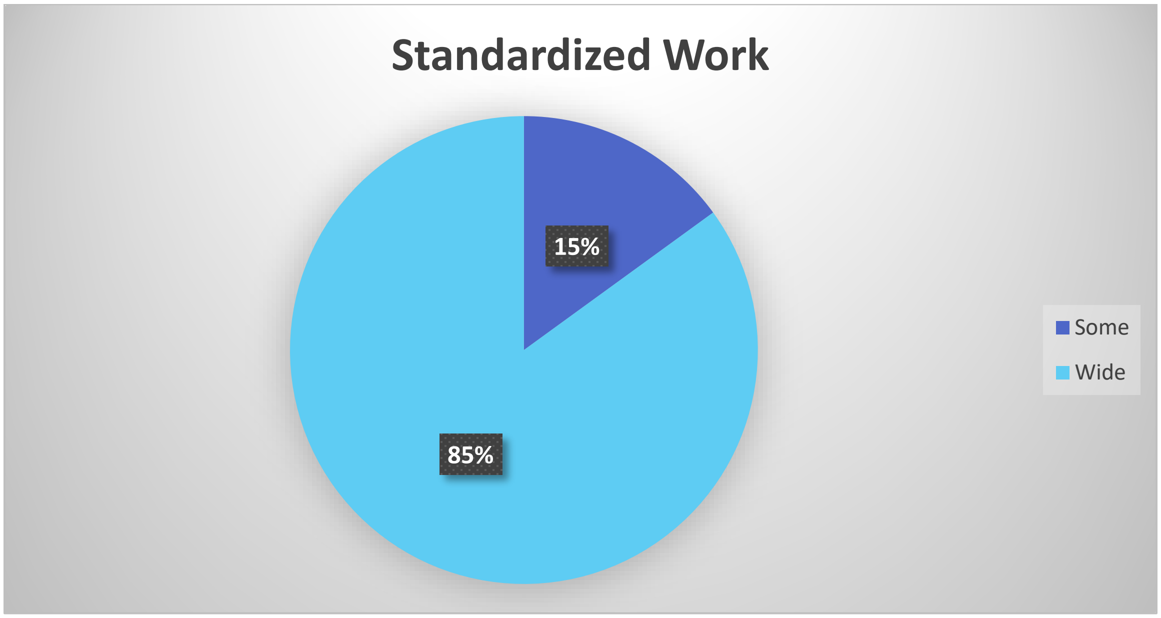
Adoption of internal pull system with kanban signals (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	2	59	39



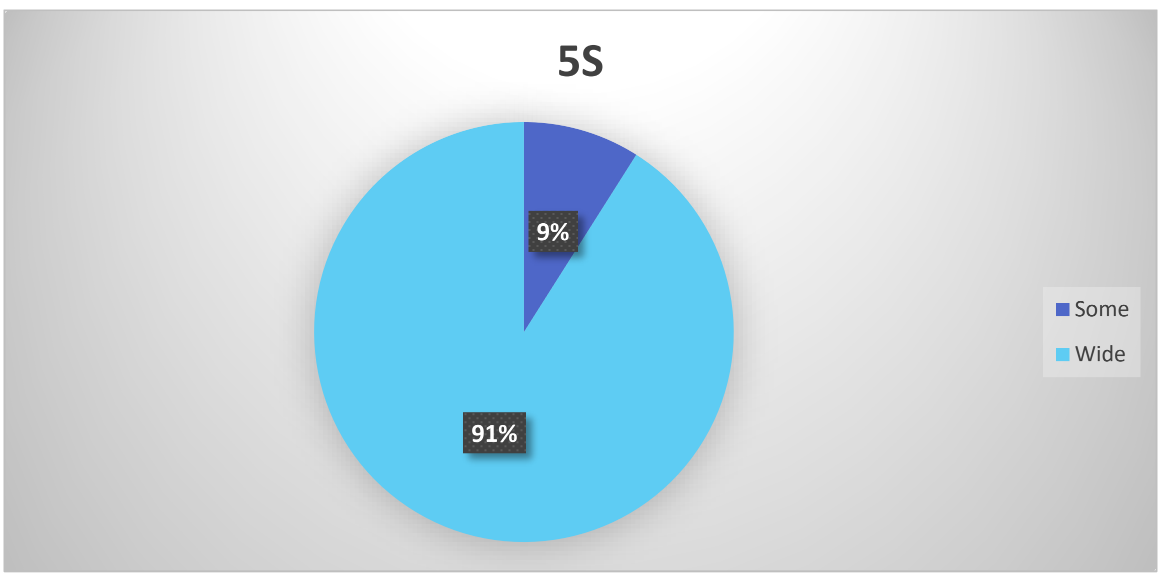
Adoption of standardized work (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	0	15	85



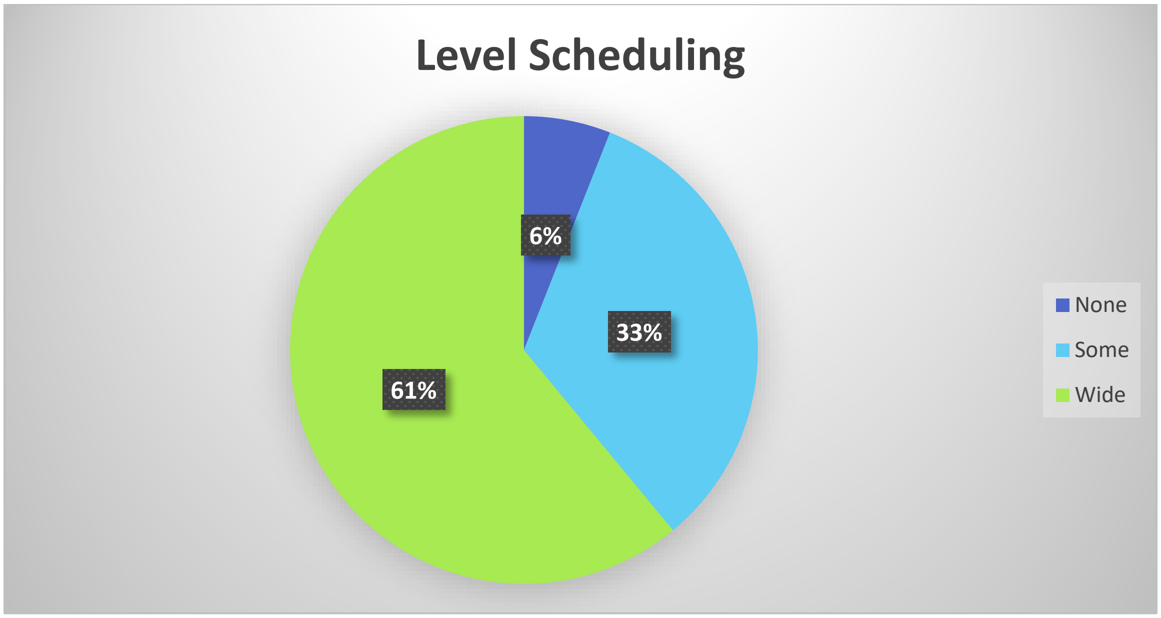
Adoption of 5S (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	0	9	91



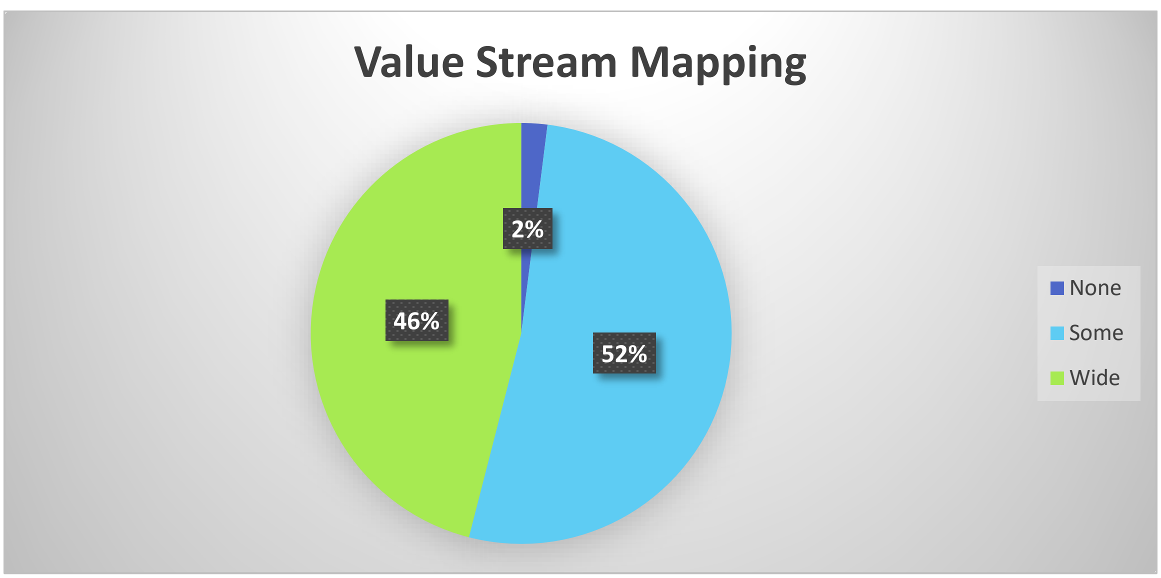
Adoption of level scheduling (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	6	33	61



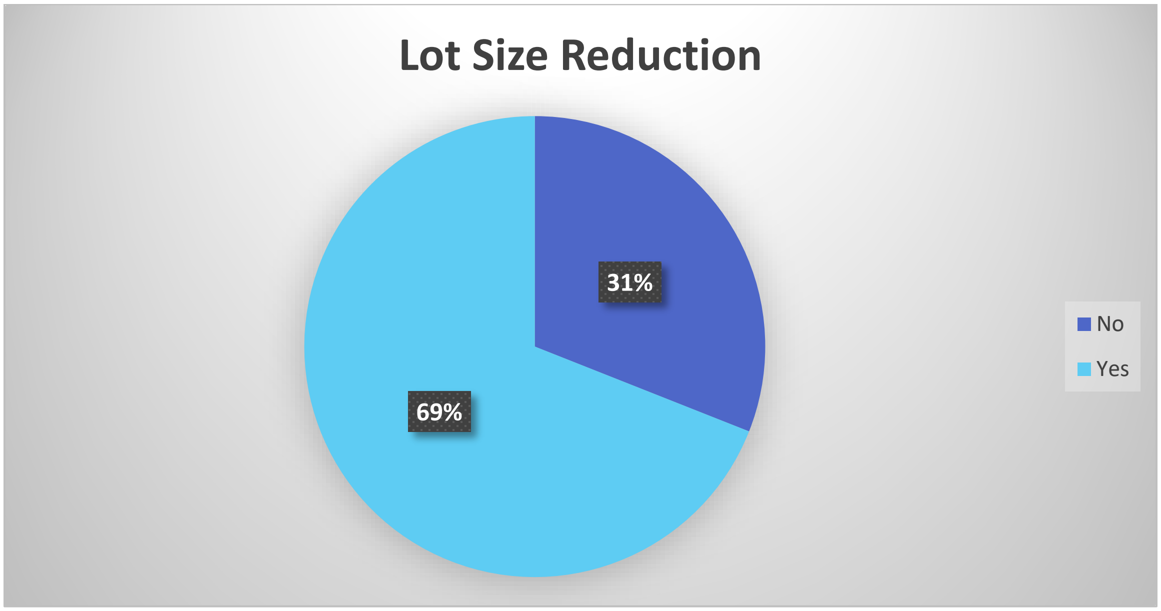
Value-stream mapping (% of plants):

Year	***None***	***Some***	***Wide***
2016-2020/21	2	52	46



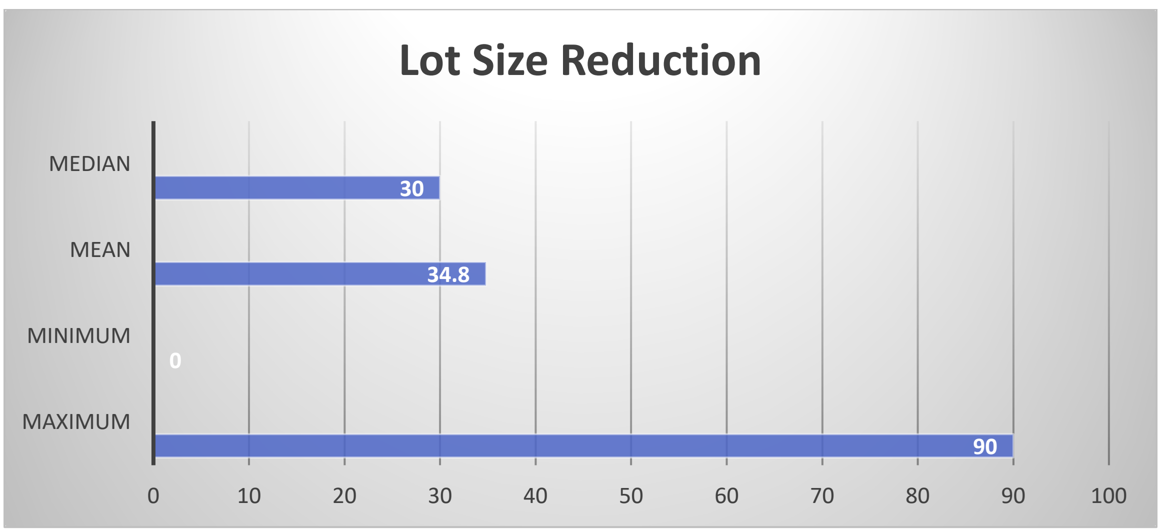
Emphasis on lot-size reduction (% of plants):

Year	***No***	***Yes***
2016-2020/21	31	69



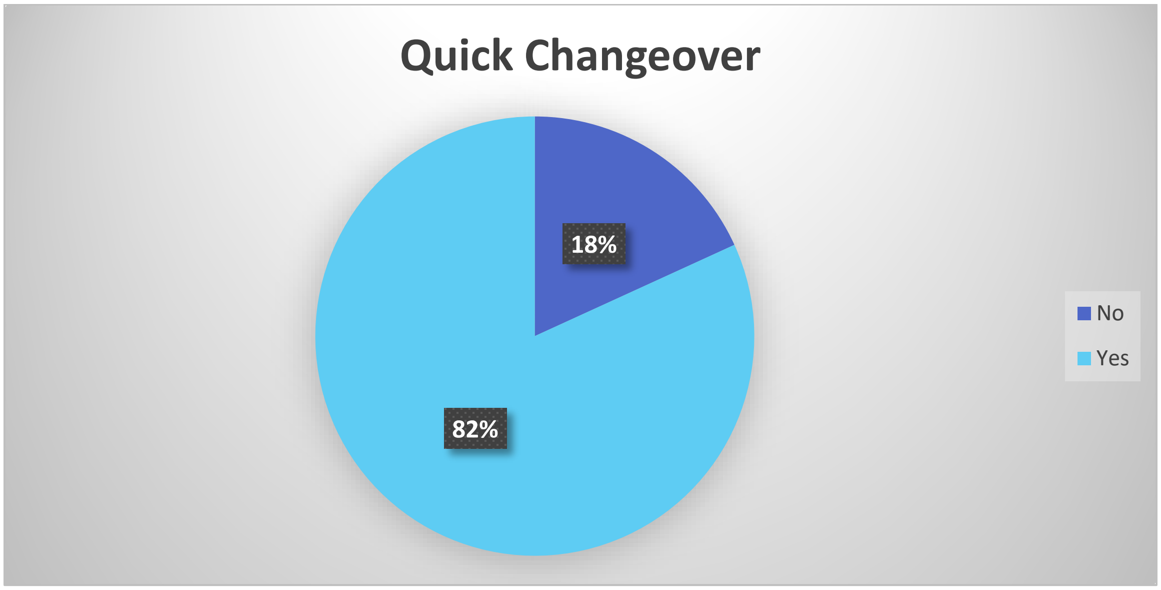
Decrease in lot sizes past 3 years (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	30.0	34.8	0.0	90.0



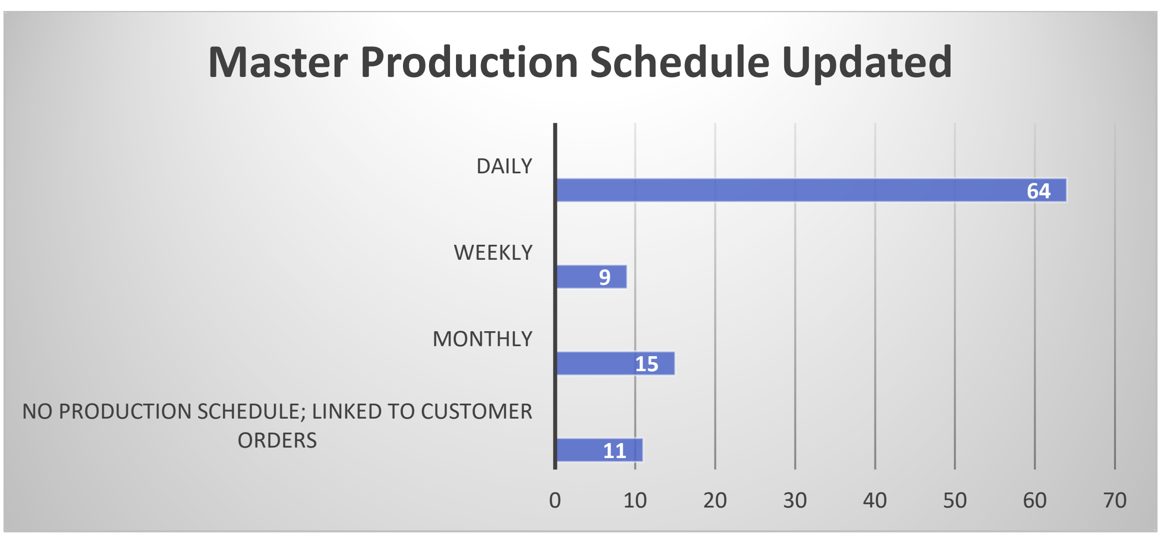
Wide adoption of quick-changeover methods (% of plants):

Year	*No*	*Yes*
2016-2020/21	18	82



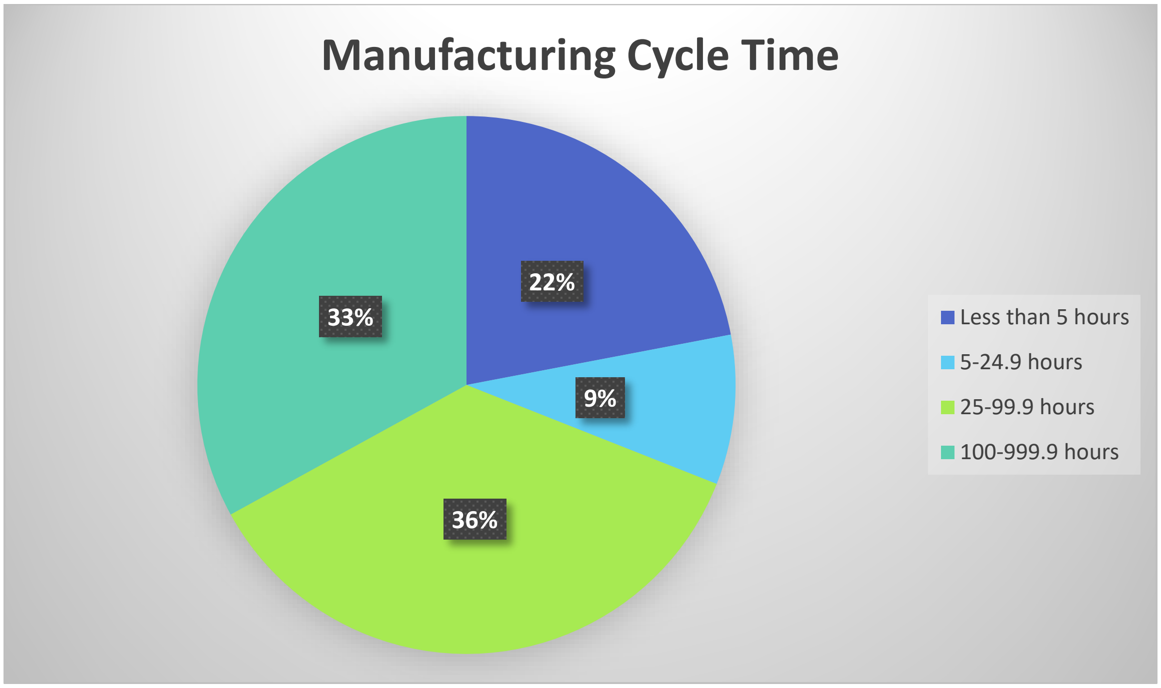
Frequency that the master production schedule is updated (% of plants):

Year	*Daily*	*Weekly*	*Monthly*	*No production schedules, all work linked to customer orders*
2016-2020/21	64	9	15	11



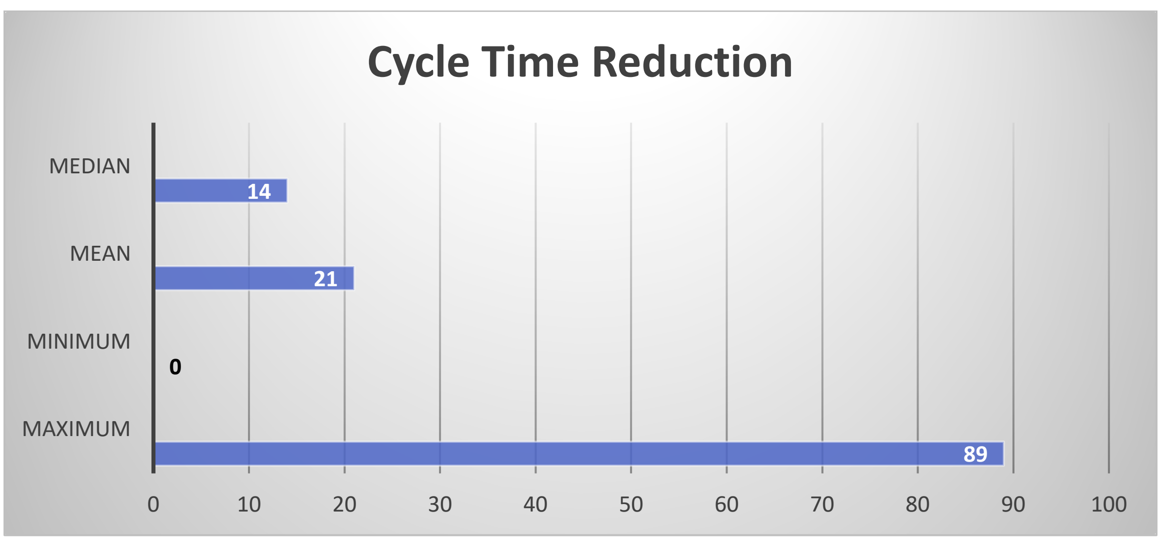
Approximate manufacturing cycle time in hours (hours: 24 hours = 1 day):

Year	*Less than 5*	*5-24.9*	*25-99.9*	*100-999.9*	*1,000 hours or more*
2016-2020/21	22	9	36	33	0



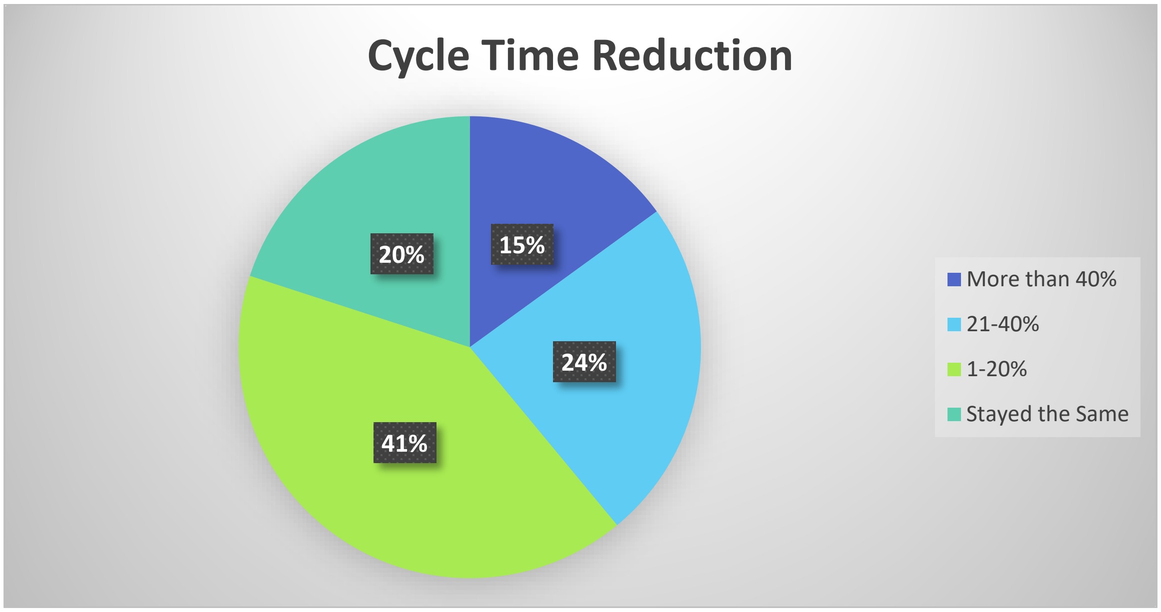
Decrease in manufacturing cycle times, last three years (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	14	21	0	89



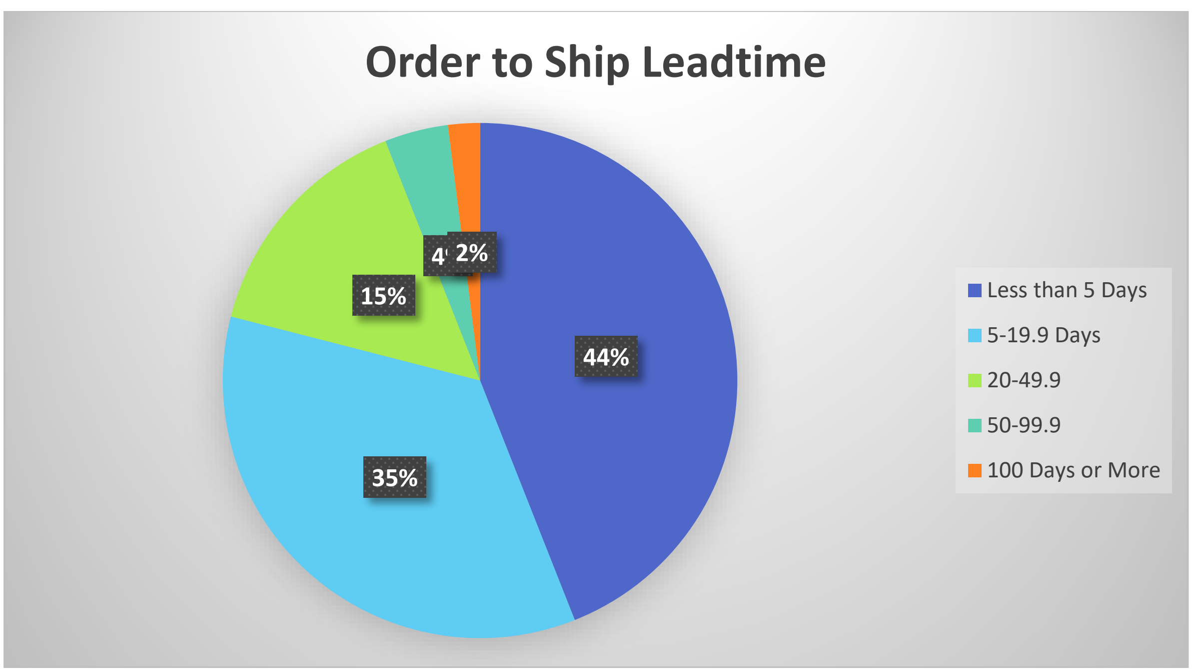
Decrease in manufacturing cycle times, last three years (% of plants):

Year	***More than 40%***	***21-40%***	***1-20%***	***Stayed the same***
2016-2020/21	15	24	41	20



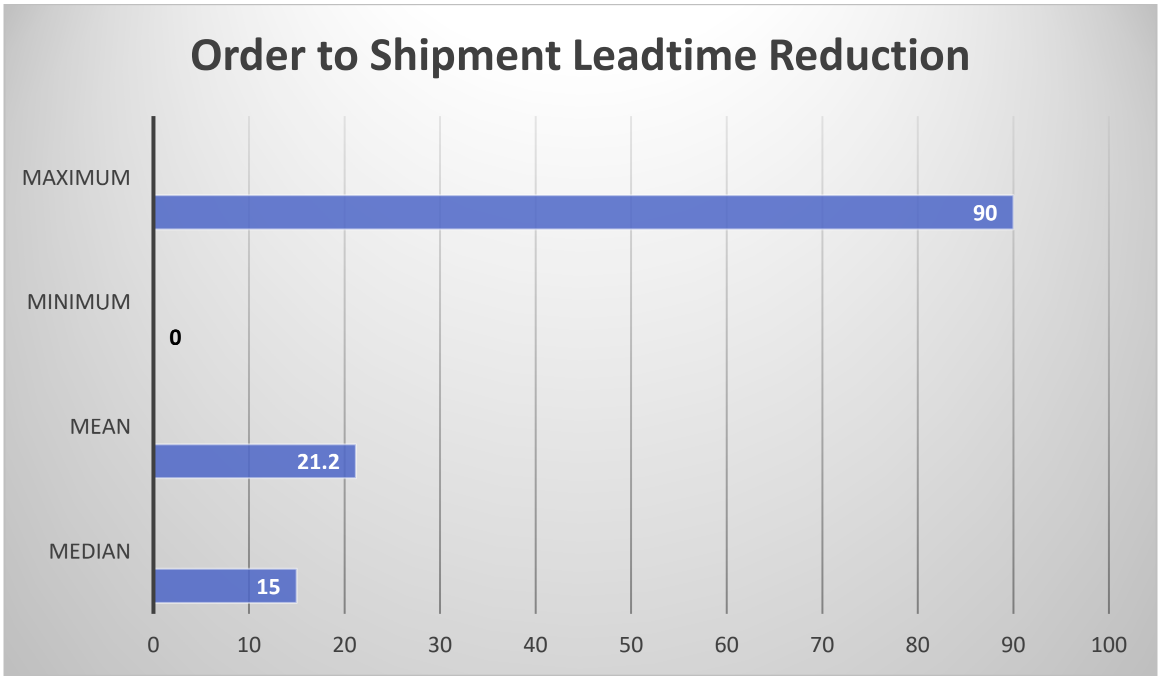
Standard order-to-shipment leadtime [days: 1 day = 24 hours] (% of plants):

Year	***Less than 5***	***5-19.9***	***20-49.9***	***50-99.9***	***100 days or more***
2016-2020/21	44	35	15	4	2



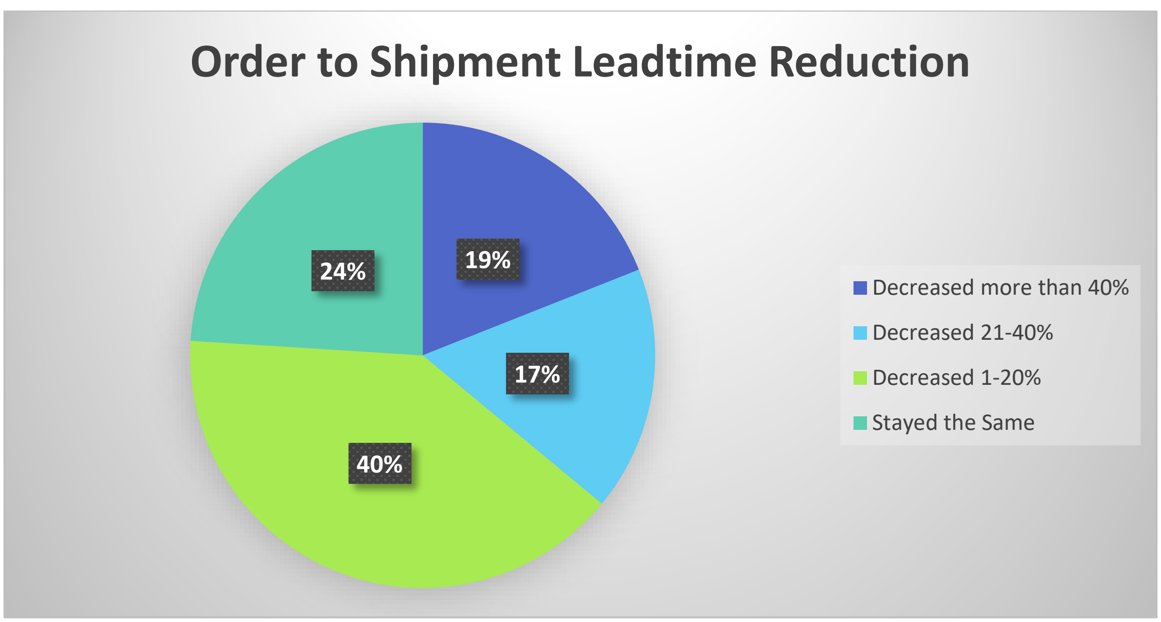
Reduction in order-to-shipment leadtime, last three years (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	15.0	21.2	0.0	90.0



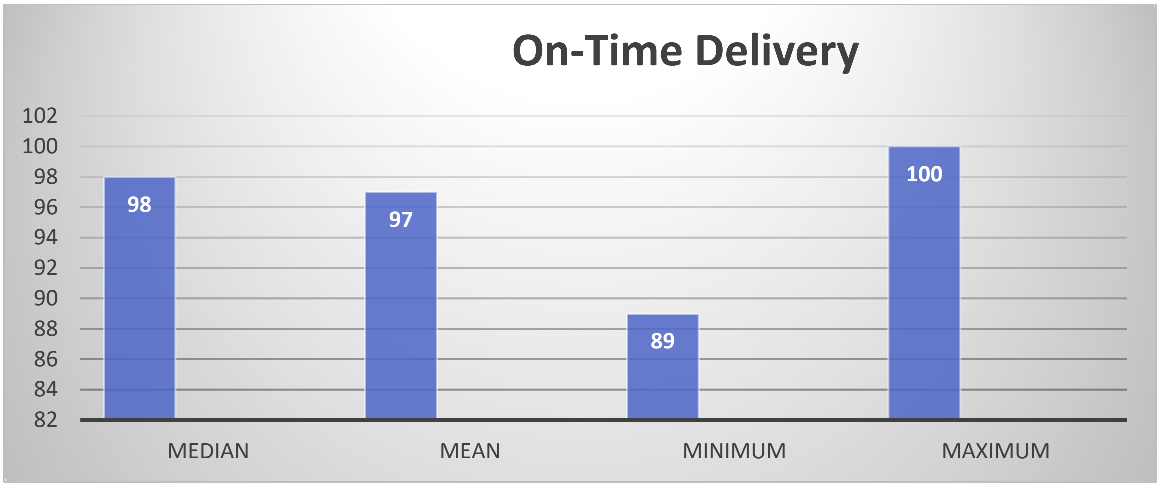
Reduction in order-to-shipment leadtime, last three years (% of plants):

Year	*Decreased more than 40%*	*Decreased 21-40%*	*Decreased 1-20%*	*Stayed the same*
2016-2020/21	19	17	40	24



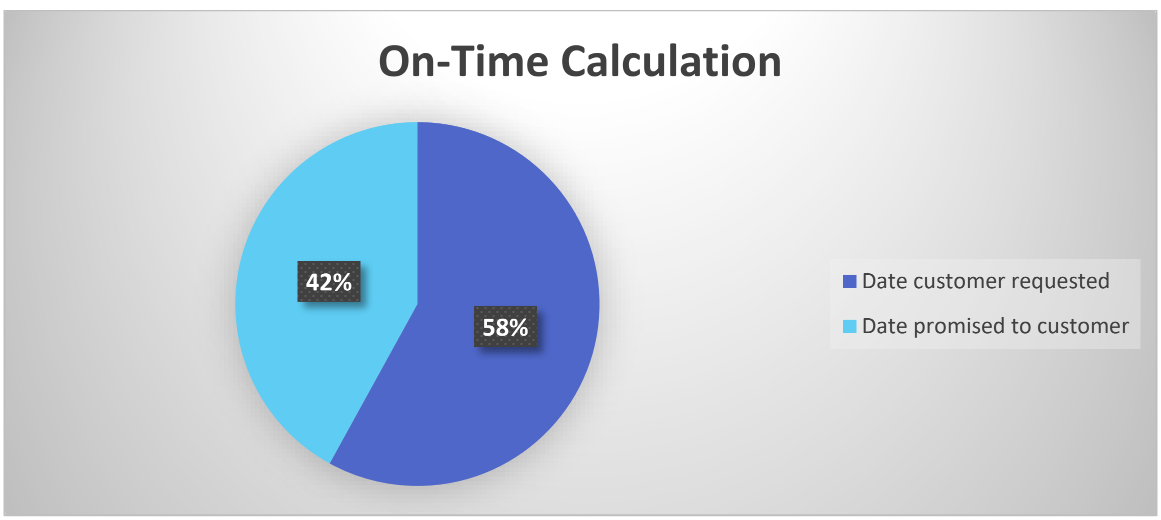
On-time delivery rate (% on time):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	98	97	89	100



Basis for on-time delivery rate calculation (% of plants):

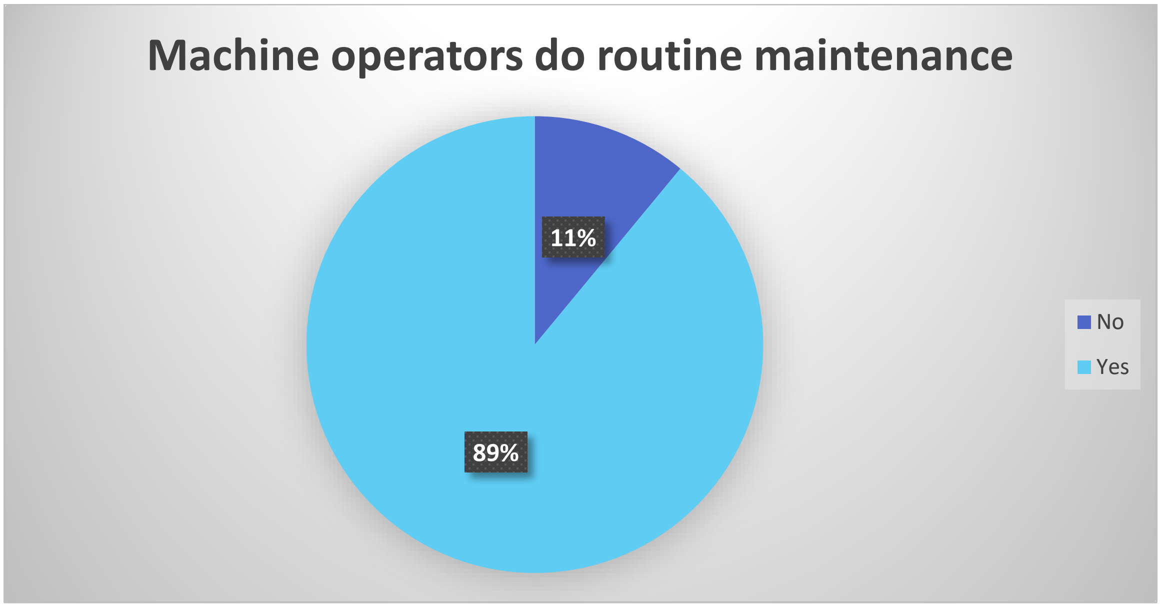
Year	*Date customer requested*	*Date promised to customer*
2016-2020/21	58	42



MAINTENANCE

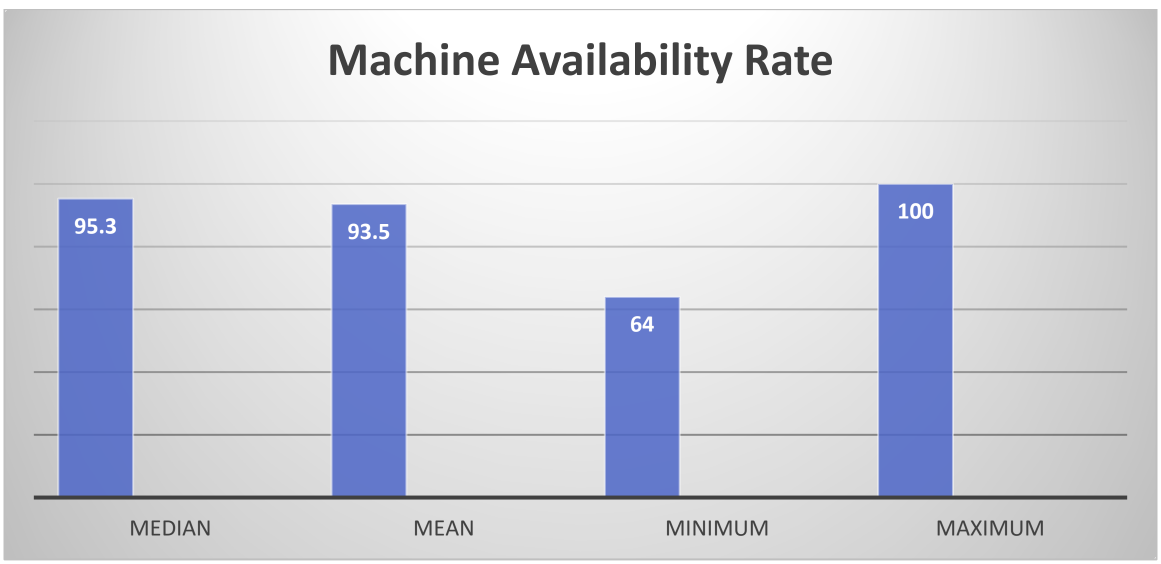
Machine operators perform preventive and routine maintenance (% of plants):

Year	***No***	***Yes***
2016-2020/21	11	89



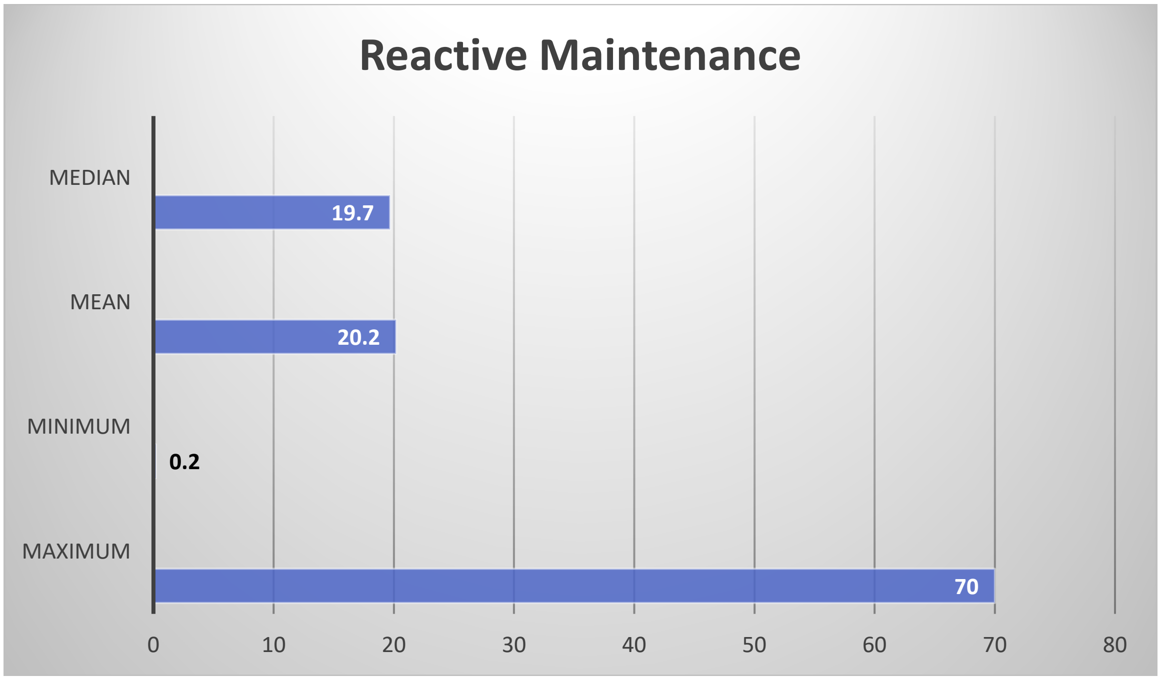
Average machine availability rate as a percent of scheduled uptime(%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	95.3	93.5	64.0	100.0



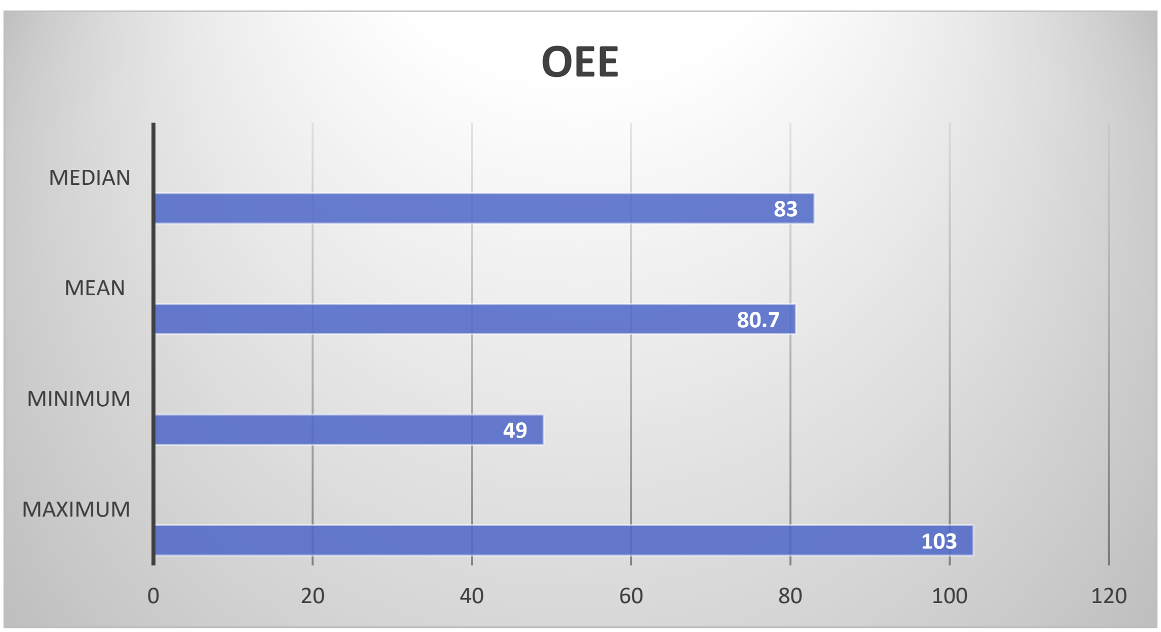
Reactive maintenance work, in response to unexpected machine or equipment breakdown (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	19.7	20.2	0.2	70.0



Current operating equipment efficiency (OEE) for major product lines:

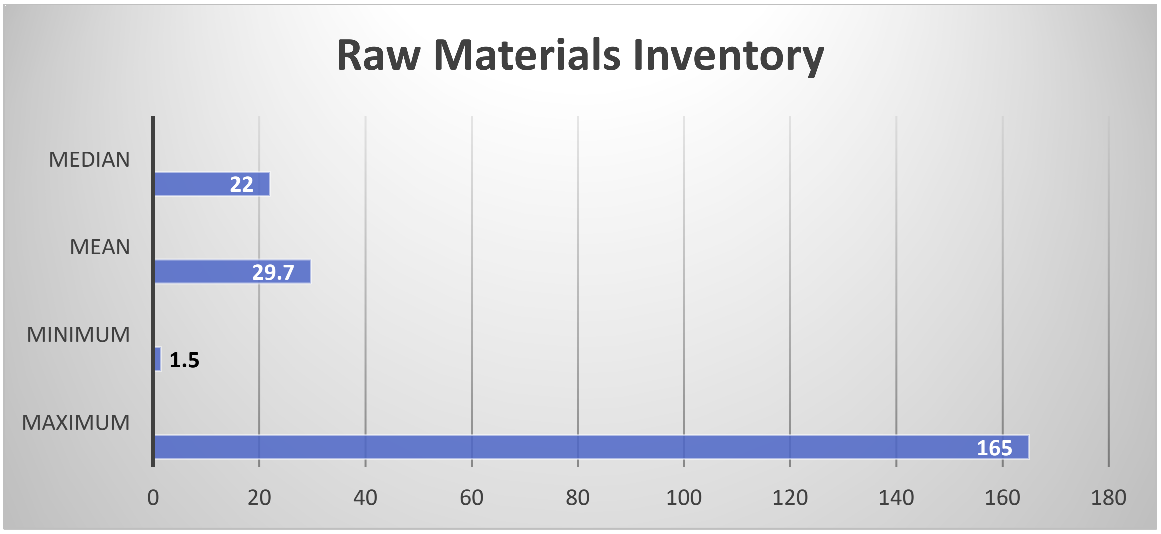
Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	83.0	80.7	49.0	103.0



Inventory Management

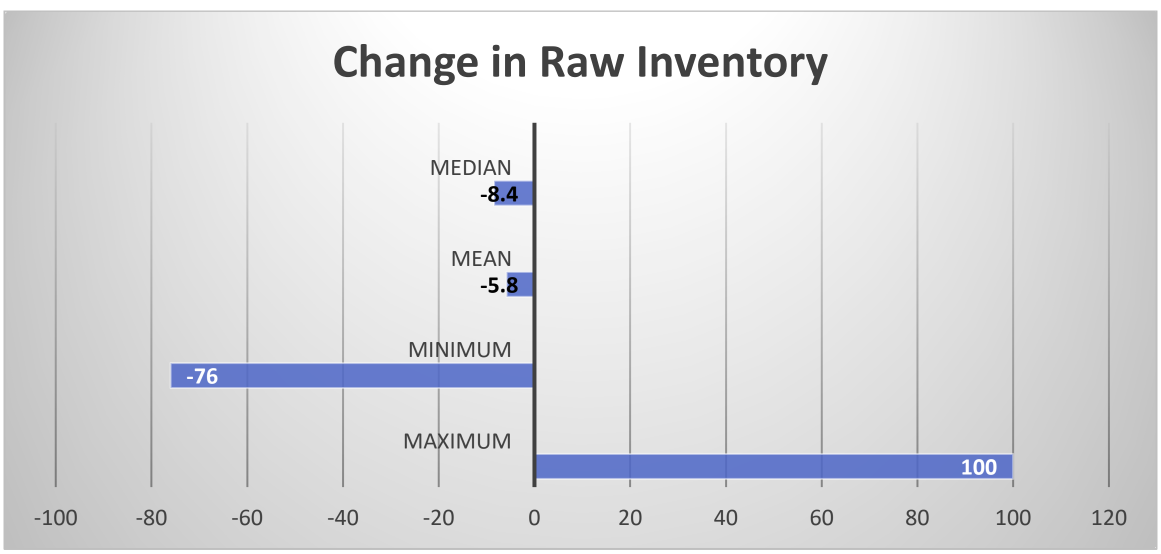
Average days of raw-materials inventory:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	22.0	29.7	1.5	165.0



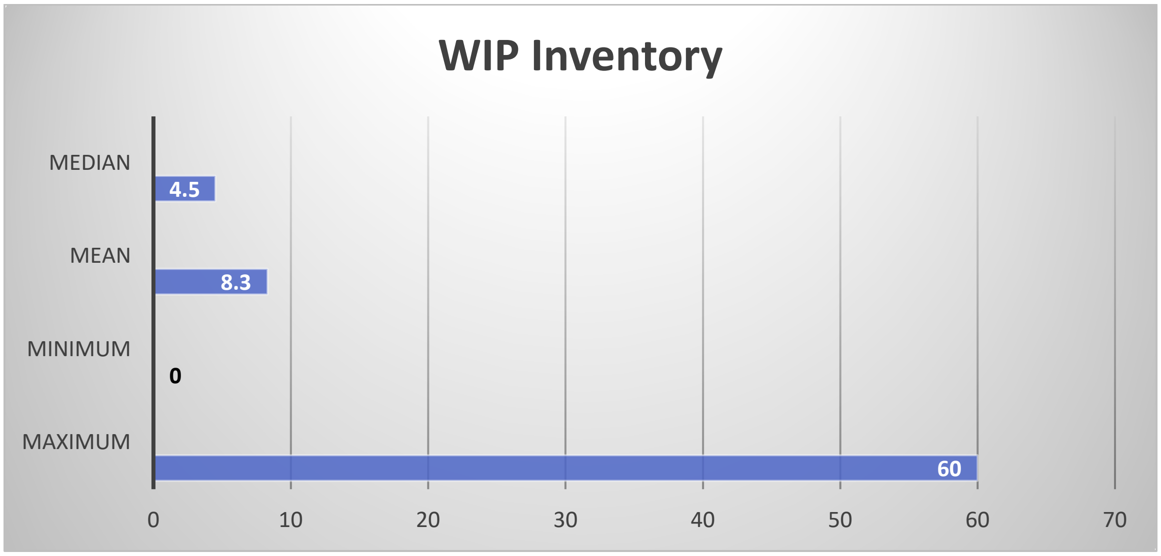
Change in raw-materials inventory, last three years* (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-8.4	-5.8	-76.0	100.0



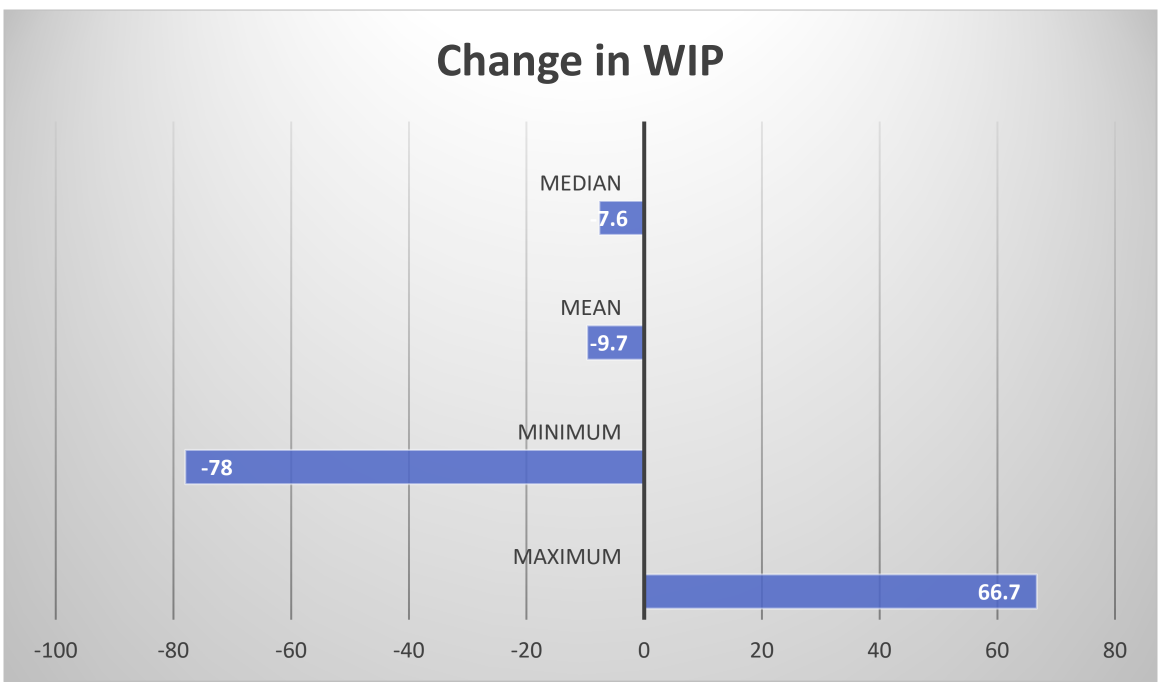
Average days of WIP inventory:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	4.5	8.3	0.0	60.0



Change in WIP inventory, last three years (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-7.6	-9.7	-78.0	66.7



Average days of finished-goods inventory:

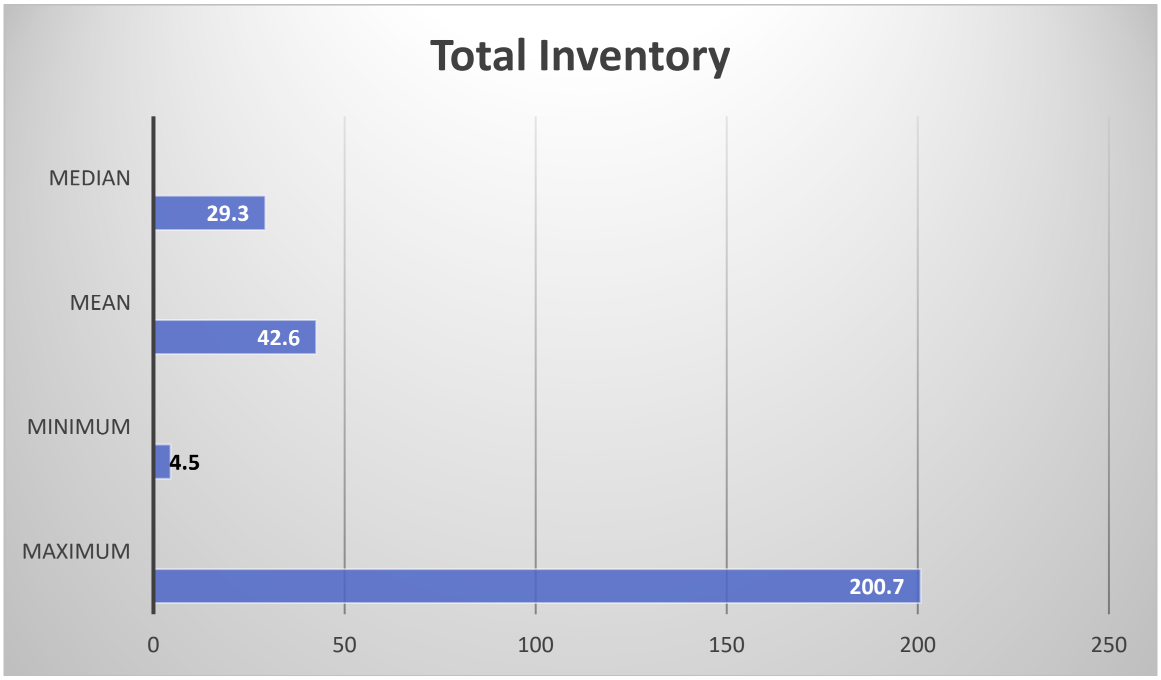
Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	7.0	13.9	0.0	86.0

Change in finished-goods inventory, last three years (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	-10.0	9.1	-95.0	1,000.0

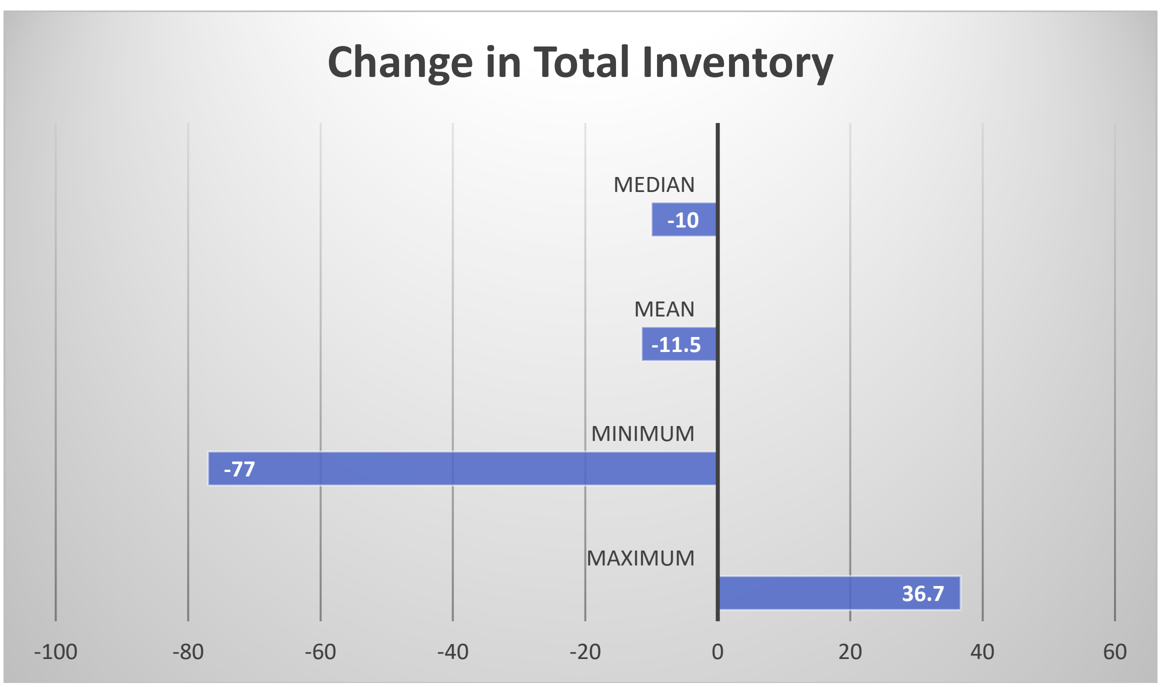
Average days of inventory (raw materials, WIP and finished goods:

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	29.3	42.6	4.5	200.7



Change in total inventory, last three years* (%):

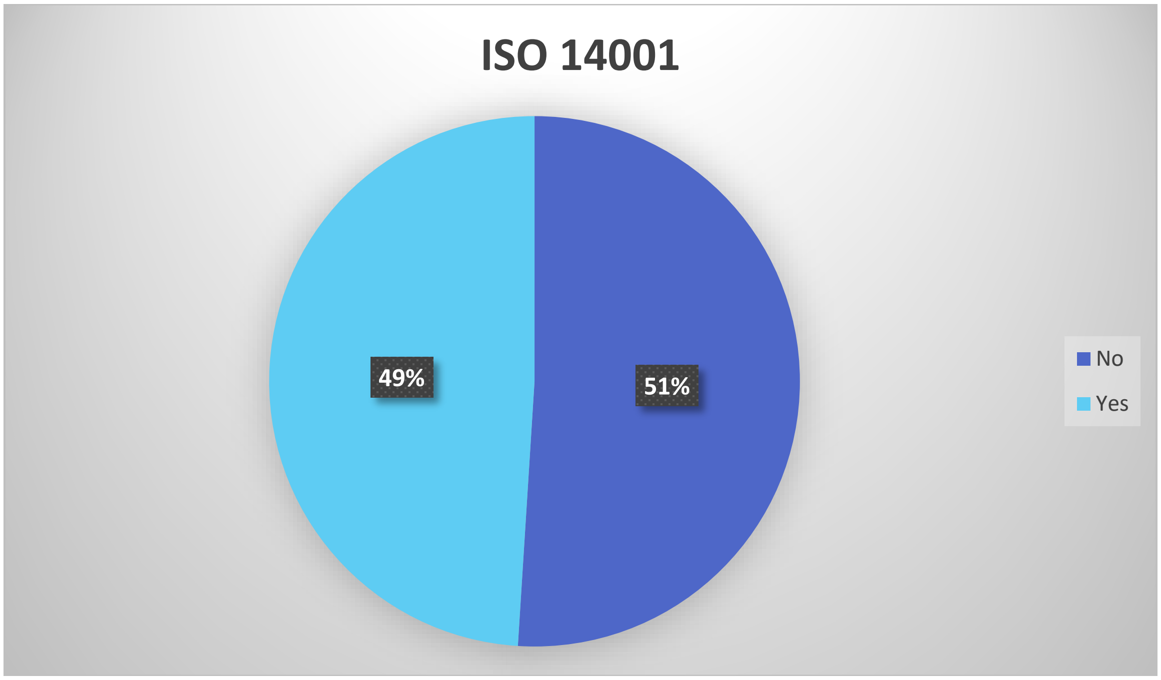
Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-10.0	-11.5	-77.0	36.7



ENVIRONMENTAL STEWARDSHIP

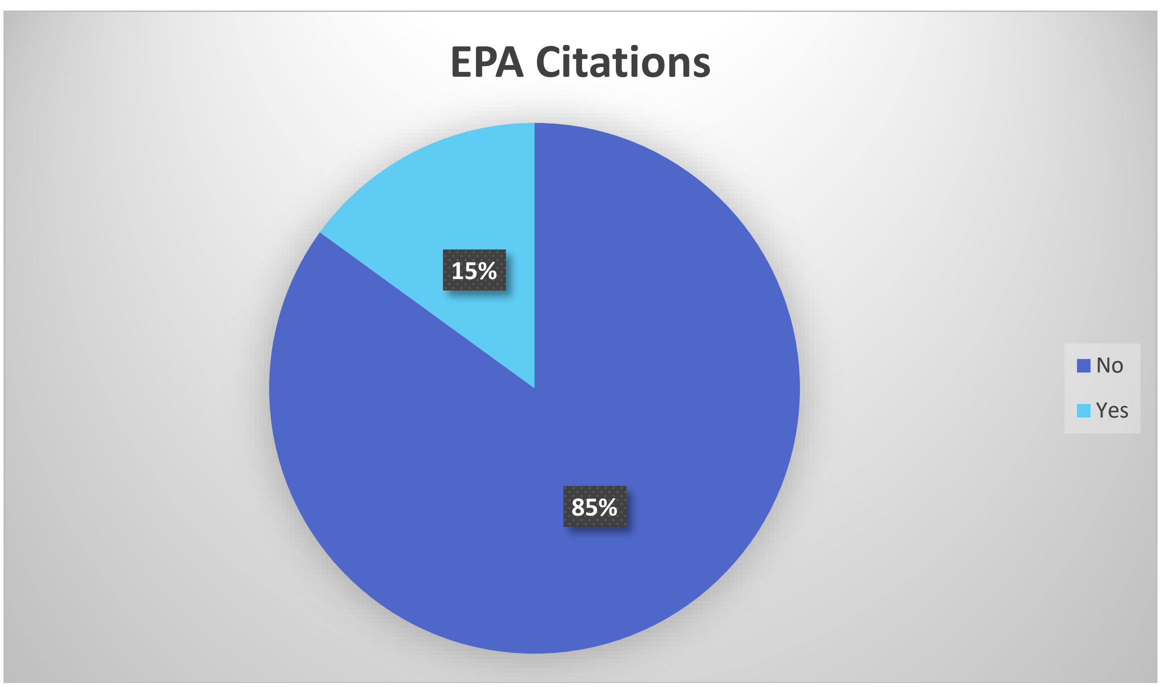
ISO 14001 certification (% of plants):

Year	***No***	***Yes***
2016-2020/21	51	49



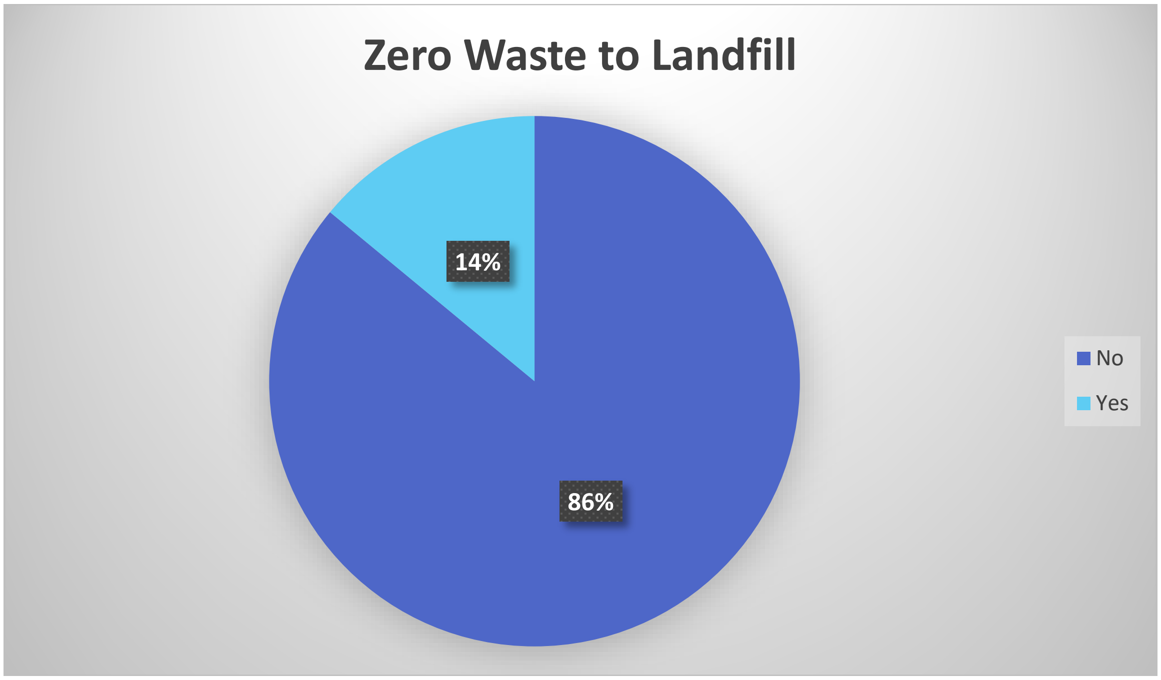
Cited for EPA violation, last five years (% of plants):

Year	***No***	***Yes***
2016-2020/21	85	15



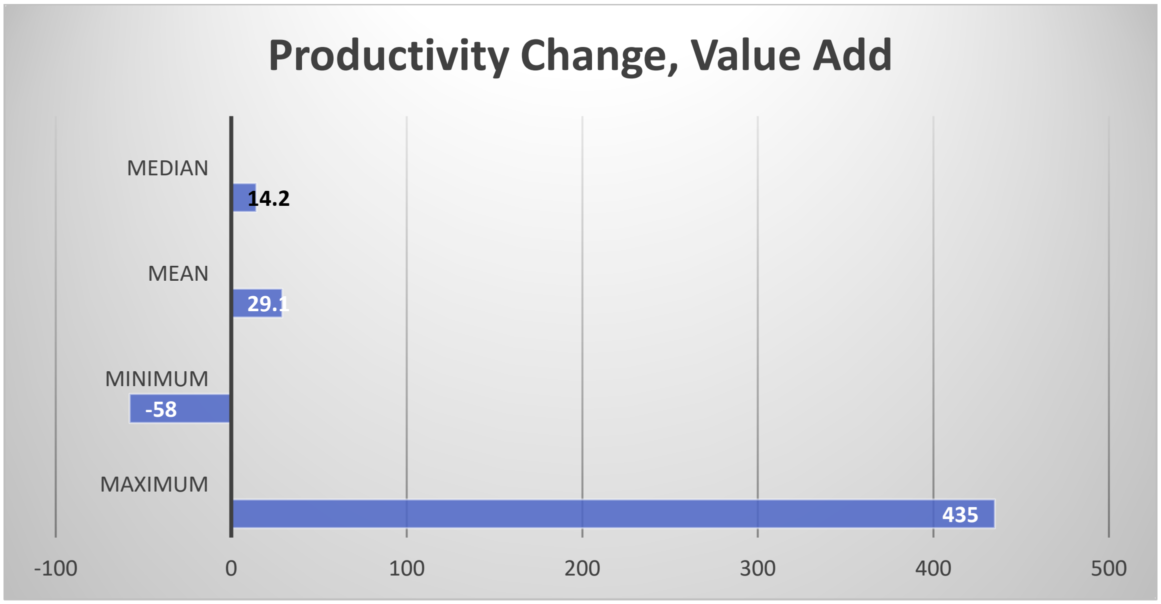
Zero waste-to-landfill status (% of plants):

Year	***No***	***Yes***
2017-2020/21	86	14



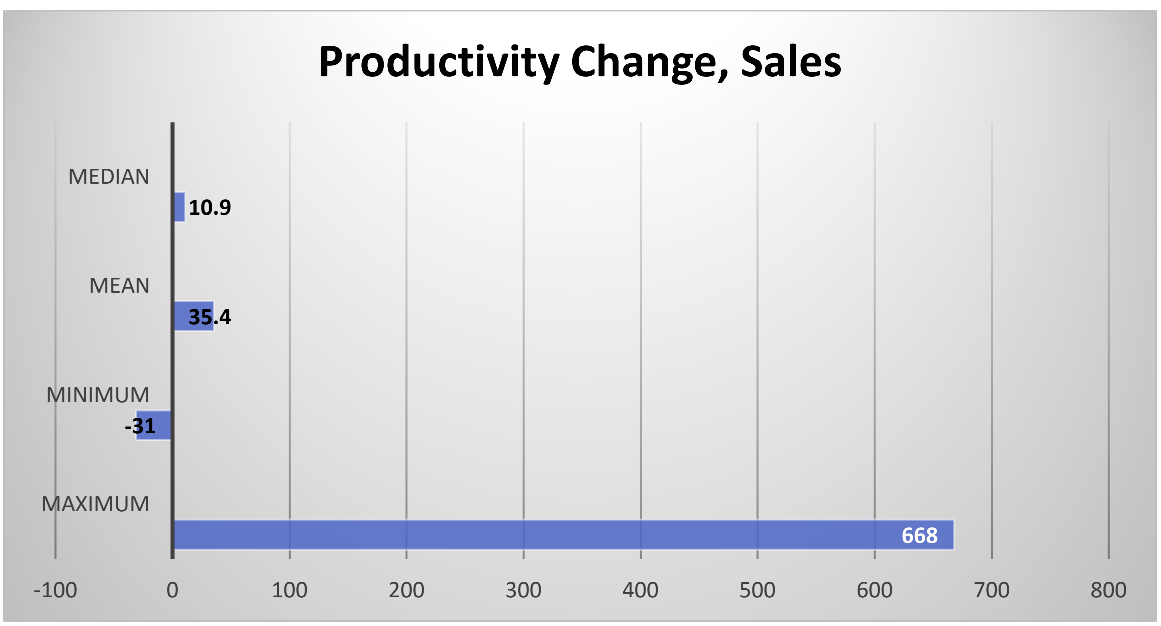
Productivity improvement, last three years, value-added per employee (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	14.2	29.1	58% decrease	435.0



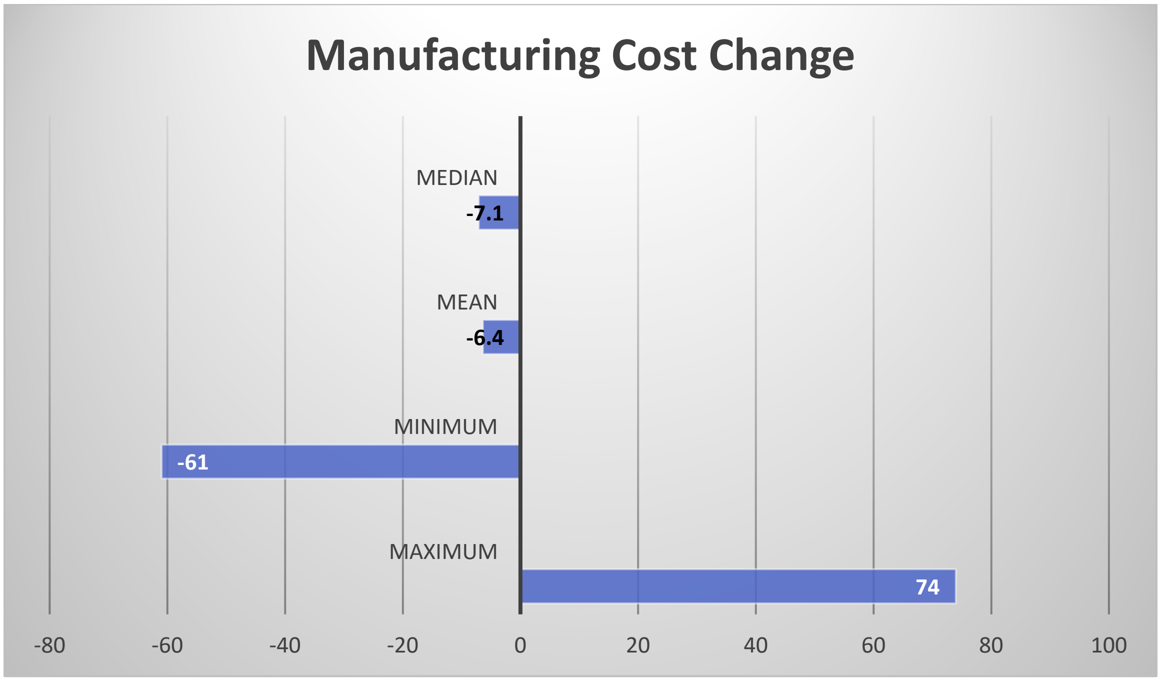
Productivity improvement, last three years, annual sales per employee (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	10.9	35.4	31% decrease	668.0



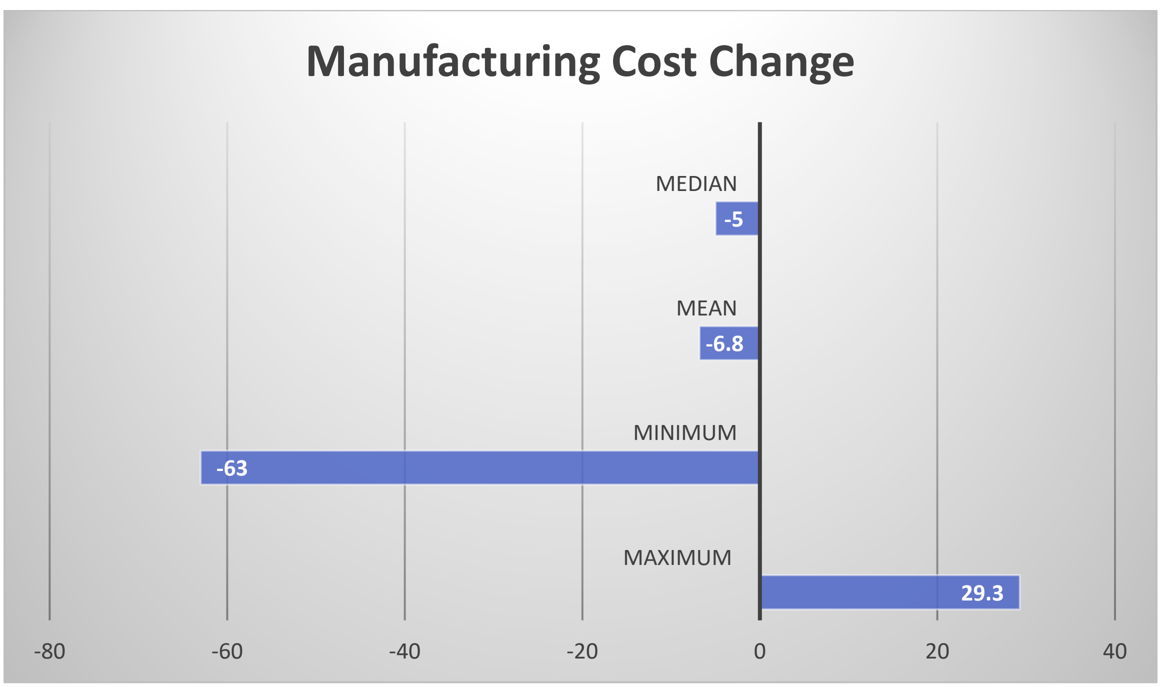
Three-year manufacturing cost change per unit of product, excluding purchased-materials costs (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-7.1	-6.4	-61.0	74.0% increase



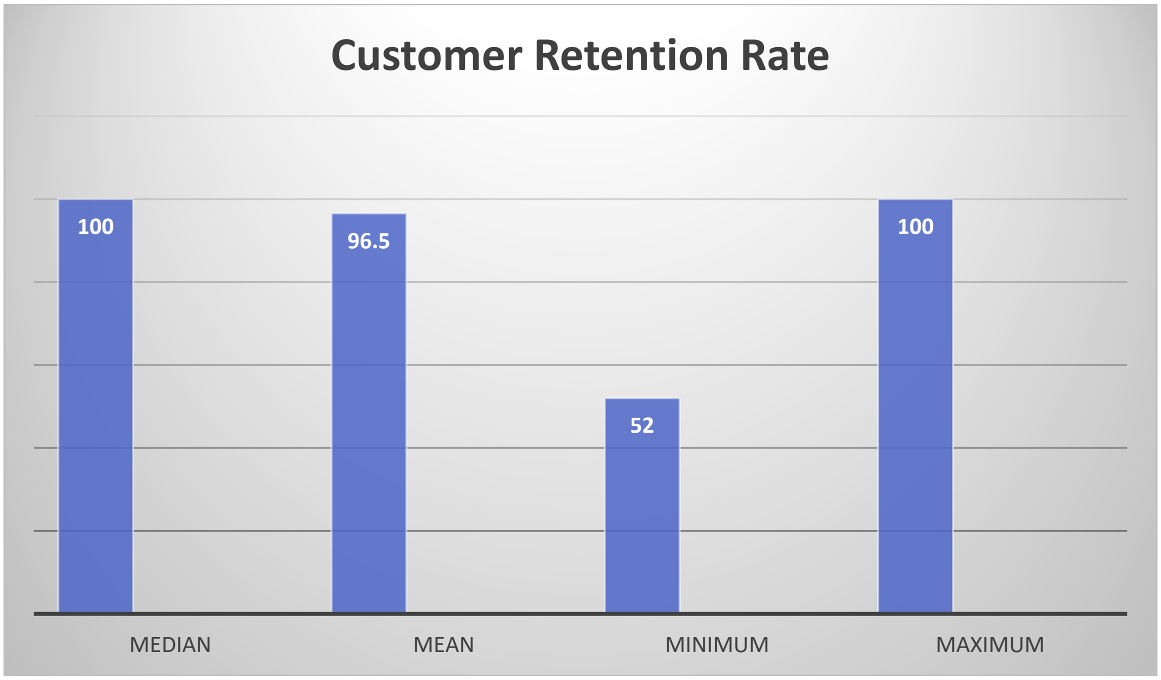
Three-year manufacturing cost change per unit, including purchased-materials costs (%):

Year	***Median***	***Mean***	***Minimum***	***Maximum***
2016-2020/21	-5.0	-6.8	-63.0	29.3



Customer-retention rate, last three years (%):

Year	*Median*	*Mean*	*Minimum*	*Maximum*
2016-2020/21	100.0	96.5	52.0	100.0



Glossary

Below are working definitions referenced by IW Best Plants applicants in 2020/21:

Absenteeism: (Actual hours lost through unscheduled job absence ÷ actual hours worked) x 100. Include all unscheduled absences during normal work hours, including scheduled overtime.

Activity-based costing system: A system that tracks costs based on the activities that are responsible for driving costs in the production of manufactured goods

Advanced planning and scheduling system: Planning and optimization tool that balances demand with plant capacity, thus allowing manufacturers to identify bottlenecks and divert workload to alternative production cells.

Advanced product quality planning: A structured method of defining and establishing the steps necessary to ensure that a product satisfies the customer. By moving quality efforts into planning and prevention, this multistage process identifies and anticipates potential problem areas.

Agile manufacturing: Tools, techniques, and initiatives that enable a plant or company to thrive under conditions of unpredictable change. Agile manufacturing not only enables a plant to achieve rapid response to customer needs, but also includes the ability to quickly reconfigure operations—and strategic alliances—to respond rapidly to unforeseen shifts in the marketplace. In some instances, it also incorporates "mass customization" concepts to satisfy unique customer requirements. In broad terms, it includes the ability to react quickly to technical or environmental surprises.

Annual total inventory turns: A measure that is calculated by dividing the value of annual plant shipments at plant cost (for the most recent full year) by the total average daily inventory value at plant cost. Total average daily inventory includes raw materials, work in process, and finished goods. Plant cost includes material, labor, and plant overhead.

Asset turnover: A measure of how efficiently assets are used to produce sales. The ratio shows how many dollars of sales were generated by each dollar of assets. Calculate by dividing net sales by average total assets.

Benchmarking: Formal programs that compare a plant's practices and performance results against "best-in-class" competitors or against similar operations.

Bottleneck: Any point at which movement is slowed because demand placed on a resource is greater than capacity.

Cellular manufacturing: A manufacturing approach in which equipment and workstations are arranged to facilitate small-lot, continuous-flow production. In a manufacturing "cell," all operations necessary to produce a component or subassembly are performed in close proximity, thus allowing for quick feedback between operators when quality problems and other issues arise. Workers in a manufacturing cell typically are cross-trained and, therefore, able to perform multiple tasks as needed.

Changeover: the time required to modify a system or workstation, including teardown and setup time.

Computer-aided design (CAD): Computer-based systems for product design that may incorporate analytical and "what-if" capabilities to optimize product designs. Many CAD systems capture geometric and other product characteristics for engineering-data-management systems, producibility and cost analysis, and performance analysis. In many cases, CAD-generated data is used to generate tooling instructions for computer-numerical-control (CNC) systems.

Computer-aided manufacturing (CAM): Computerized systems in which manufacturing instructions are downloaded to automated equipment or to operator workstations.

Computer-aided process planning (CAPP): Software-based systems that aid manufacturing engineers in creating a process plan to manufacture a product whose geometric, electronic, and other characteristics have been captured in a CAD database. CAPP systems address such manufacturing criteria as target costs, target lead-times, anticipated production volumes, availability of equipment, production routings, opportunity for material substitution, and test requirements.

Computer-integrated manufacturing (CIM): A variety of approaches in which computer systems communicate or interoperate over a local-area network. Typically, CIM systems link management functions with engineering, manufacturing, and support operations. In the factory, CIM systems may control the sequencing of production operations, control operation of automated equipment and conveyor systems, transmit manufacturing instructions, capture data at various stages of the manufacturing or assembly process, facilitate tracking and analysis of test results and operating parameters, or a combination of these.

Computerized maintenance management systems (CMMS): Software-based systems that analyze operating conditions of production equipment—vibration, oil analysis, heat, etc.—and equipment-failure data, and apply that data to the scheduling of maintenance and repair inventory orders and routine maintenance functions. A CMMS prevents unscheduled machine downtime and optimizes a plant's ability to process product at optimum volumes and quality levels.

Computerized process simulation: Use of computer simulation to facilitate sequencing of production operations, analysis of production flows, and layout of manufacturing facilities.

Computerized SPC: See "statistical process control."

Concurrent engineering: A cross-functional, team-based approach in which the product and the manufacturing process are designed and configured within the same time frame, rather than sequentially. Ease and cost of manufacturability, as well as customer needs, quality issues, and product-life-cycle costs are taken into account earlier in the development cycle. Fully configured concurrent-engineering teams include representation from marketing, design engineering, manufacturing engineering, and purchasing, as well as supplier—and even customer companies.

Continuous-replenishment programs: Arrangement with supplier companies in which the supplier monitors the customer's inventory and automatically replaces used materials, eliminating the need for purchase orders and related paperwork.

Core competency: The processes, functions, and activities in a plant or company that are its "life blood"—typically those activities for which the enterprise derives the greatest return for its investments or those that intrinsically align the enterprise with its core market.

Cost of quality: The sum of all costs associated with conformance and nonconformance. Cost of conformance includes prevention costs (employee training, tooling maintenance, planned preventive maintenance, suggestion awards) and appraisal costs (inspection, testing, gages and instrumentation, audit expenses). The cost of nonconformance includes internal costs (unscheduled maintenance, pre-shipment scrap and rework, workers' compensation) and external costs (warranty, customer complaint investigation, rework of returned goods, and product liability insurance.)

Cpk: A statistical calculation of process capability based on the relationship between process variability and design specifications. A good Cpk value indicates that the process is consistently under control—i.e., within specification limits—and also is centered on the design target value. A Cpk value of 1.33 typically is considered a minimum acceptable process capability; as the Cpk value approaches 2.0, the process approaches Six Sigma capability (3.4 defective units per million).

Cross-functional teams: Teams of employees representing different functional disciplines and/or different process segments that tackle a specific problem or perform a specific task, frequently on an ad hoc basis.

Cross-training: Skill-development practices that require or encourage production workers and other employees to master multiple job skills, thus enhancing workforce flexibility.

Customer leadtime: The time elapsed from receipt of an order until the finished product is shipped to the customer.

Customer reject rate (ppm): A quality measure—expressed in parts per million—reflecting the number of completed units rejected or returned by external customers. Calculation should include parts reworked by customers. Applies to all shipped units, including parts.

Customer retention rate: the number of customers active three years ago and still active, divided by the total number of customers active three years ago.

Cycle time: See "manufacturing cycle time."

Days of inventory: Calculate days of inventory by dividing the average inventory on hand (raw-materials inventory, work-in-process inventory, finished-goods inventory, or total inventory) by average daily usage.

Demand flow scheduling systems: Software systems designed to optimize demand-based manufacturing techniques.

Design for assembly: The practice in which ease and cost of assembly is emphasized during the product-design stage.

Design for logistics: The practice in which physical handling and distribution of a manufactured product are emphasized during the product-design stage.

Design for manufacturability: The practice in which ease and cost of manufacturing, as well as quality-assurance issues, are emphasized during the product-design stage.

Design for procurement: A practice in which product designers work effectively with suppliers and sourcing personnel to identify and incorporate technologies or designs that can be used in multiple products, facilitating the use of standardized components to achieve economies of scale and assure continuity of supply.

Design for quality: The practice in which quality assurance and customer perception of product quality are emphasized as an integral part of the design process.

Design for recycling/disposal: The practice in which ultimate disposal and recycling of the manufactured product are considered during the product-design stage.

Design of experiments: An experimental design methodology that enables process designers to determine optimum product/process parameters by conducting a limited number of experiments involving combinations of variables. The usual objective is to determine which variables in a complex process are most critical for quality control—or those that can be most easily changed to reduce overall process variance.

Discrete manufacturing: The production or assembly of parts and/or finished products that are recognizable as distinct units capable of being identified by serial numbers or other labeling methods—and measurable as numerical quantities rather than by weight or volume.

Economic Value Added (EVA): a measurement of shareholder wealth created by an investment center. A trademark of Stern Stewart & Company, calculating EVA can be very complex but is basically net operating profit after taxes (NOPAT) minus an appropriate charge for the opportunity cost of all capital invested in an enterprise.

Electronic data interchange (EDI): Information-system linkages, based on communication protocols and document formats, that permit intercompany computer-to-computer communications. It not only speeds communication, but also eliminates re-keying of information and reduces the opportunity to introduce errors. A typical EDI application might speed information exchange between a customer and supplier company for purchase orders, invoices, or other transactions. EDI communications are often facilitated through "electronic mailbox" systems on third-party value-added networks or over the Internet.

Empowered natural work teams: Teams that share a common workspace and/or responsibility for a particular process or process segment. Typically such teams have clearly defined goals and objectives related to day-to-day production activities, such as quality assurance and meeting production schedules, as well as authority to plan and implement process improvements. Unlike self-directed teams, empowered work teams typically do not assume traditional "supervisory" roles.

Enterprise integration (EI): A broad implementation of information technology to link various functional units within a business enterprise; on a wider scale, it may also integrate strategic partners in an inter-enterprise configuration. In a manufacturing enterprise, EI may be regarded as an extension of CIM that integrates financial or executive decision-support systems with manufacturing tracking and inventory systems, product-data management, and other information systems.

Enterprise resource planning (ERP): An extension of MRP II software designed to operate on enterprise-wide computing platforms. ERP systems typically claim the ability to achieve tighter (or "seamless") integration between a greater variety of functional areas, including materials management, supply-chain management, production, sales and marketing, distribution, finance, field service, and human resources. They also provide information linkages to help companies monitor and control activities in geographically dispersed operations.

Expert systems: Software-based "artificial-intelligence" systems that capture the knowledge and experience of experts in a specialized field and make that expertise available to less-skilled personnel.

Extranet: An exclusionary Internet-like network that securely connects customers and suppliers to a corporate or plant intranet in order to access information deemed sharable by the intranet operators.

Finished-goods turn rate: A measure of asset management that typically is calculated by dividing the value of total annual shipments at plant cost (for the most recent full year) by the average finished-goods inventory value. Plant cost includes material, labor, and plant overhead.

Finite capacity scheduling: Software-based systems that enable simulation of production scheduling (and determination of delivery dates) based on actual unit/hour capacity at each step in the production routing. Finite scheduling systems, running on desktop computers, often compensate for the "infinite capacity" assumptions built into capacity-planning modules in traditional MRP II systems.

Finite element analysis (FEA): A mathematical method for analyzing stress. FEA is used in product-design software to conduct graphical on-screen analysis of a model's reactions under various load conditions.

First-pass yield: The percentage of finished products that meet all quality-related specifications at a final test point. When calculating yield for components, the percentage that meets all quality-related specifications at a critical test point without being scrapped, rerun or reworked. In process industries, yield often is calculated as the percentage of output that meets target-grade specifications (excluding saleable "off-grade" product).

5S: A method of creating a clean and orderly workplace that exposes waste and errors. Originally summarized by 5 Japanese words beginning with S, 5S is widely translated as Sort, Shine, Set in Order, Standardize and Sustain.

Flexible assembly systems: Automated assembly equipment and/or cross-trained work teams that can accommodate a variety of product configurations in small lots.

Flexible machining centers: Automated machining equipment that can be rapidly reprogrammed to accommodate small-lot production of a variety of product or component configurations.

Flexible manufacturing system (FMS): Automated manufacturing equipment and/or cross-trained work teams that can accommodate small-lot production of a variety of product or part configurations. From an equipment standpoint, an FMS is typically a group of computer-based machine tools with integrated material handling that is able to produce a family of similar parts.

Focused-factory production: A plant configuration and organization structure in which equipment and manpower are grouped to create essentially self-contained "mini-businesses," each with a specific product line or customer focus. A single plant may be divided into several focused-factory units, designed around process flows, each of which has control over such support activities as maintenance, manufacturing engineering, purchasing, scheduling, and customer service.

Forecast/demand management software: A class of software that provides front-end input to master production scheduling systems and helps optimize inventory planning. Such software not only takes into account historical demand trends, but also may calculate the impact of planned sales promotions, price reductions, and other factors that cause spikes in demand levels.

In-plant defect rate: The fallout rate, parts per million (ppm), of all components in manufacturing and assembly that fail quality tests at any point in the production process.

Intranet: A secure, internal, corporate Internet-based network.

Inventory turn rate: A measure of asset management capability (see "annual total inventory turns").

ISO 9000: An international quality-process auditing program, based on a series of standards published by the International Standards Organization in Geneva, Switzerland, through which manufacturing plants receive certification attesting that their stated quality processes are adhered to in practice.

ISO 14000: Standards and guidelines defined by the International Standards Organization for environmental management systems.

JIT/continuous-flow production: Implementation of "just-in-time" techniques to reduce lot sizes, reduce setup times, slash work-in-process inventory, reduce waste, minimize non-value-added activities, improve throughput, and reduce manufacturing cycle time. JIT production typically involves use of "pull" signals to initiate production activity, in contrast to work-order ("push") systems in which production scheduling typically is based on forecasted demand rather than actual orders. In many pull systems, a customer order/shipment date triggers final assembly, which in turn forces replenishment of component WIP inventory at upstream stages of production.

JIT delivery: Delivery of parts and materials in small lots—and on a frequent basis—timed to the needs of the production system.

Kaizen: The systematic, organized improvement of processes by those who operate them, using straightforward methods of analysis. It is a "do-it-now" approach to continuous improvement.

Kaizen event: A concentrated effort, typically spanning three to five days, in which a team plans and implements a major process change or changes to quickly achieve a quantum improvement in performance. Participants generally represent various functions and perspectives and may include non-plant personnel.

Kanban signal: A method of signaling suppliers or upstream production operations when it is time to replenish limited stocks of components or subassemblies in a just-in-time system. Originally a card system used in Japan, kanban signals now include empty containers and even electronic messages.

Labor turnover rate: A measure of a plant's ability to retain workers, expressed as a percentage of the production workforce that annually departs, regardless of reason (layoff, quit, retirement, buyout, transfers, etc.). High turnover rates often indicate employee dissatisfaction with either working conditions or compensation.

Machine availability rate: The percentage of time that production equipment is available for use, divided by the maximum time it would be available if there were no downtime for repair or unplanned maintenance.

Machine vision: Optical systems in which video equipment is used to guide robotic or automated equipment during production operations; also, computerized visual inspection systems used for quality control.

Manufacturing cost: Includes quality-related costs, direct and indirect labor, equipment repair and maintenance, other manufacturing support and overhead, and other costs directly associated with manufacturing operations. It does not include purchased-materials costs or costs related to sales and other non-production functions.

Manufacturing cycle time: The time of actual production from when a customer order is released to the plant floor for a particular product through to the completion of all manufacturing, assembly, and testing for that specific product. (Does not include front-end order-entry time or engineering time spent on customized configuration of nonstandard items, or time in finished goods inventory.)

Manufacturing execution system (MES): A software-based system that provides a link between planning and administrative systems and the shop floor. It can link MRP II-generated production schedules to direct process-control software. An element of computer-integrated manufacturing, MES encompasses such functions as planning and scheduling, production tracking and monitoring, equipment control, maintaining product histories (verifying and recording activities at each stage of production), and quality management.

Mean time between equipment failure: the mean (or average) time in hours expected between failures of a given device.

MRP II: Software-based Manufacturing Resources Planning systems that translate forecasts into master production schedules, maintain bills of material (lists of product components), create work orders for each step in the production routing, track inventory levels, coordinate materials purchases with production requirements, generate "exception" reports identifying expected material shortages or other potential production problems, record shop-floor data, collect data for financial reporting purposes, and other tasks depending on the configuration of the MRP II package.

NAICS: The North American Industry Classification System (NAICS) is a coding system of the U.S., Mexican, and Canadian governments that identifies specific economic sectors. It replaces the U.S. Standard Industrial Classification (SIC) system. Coding for most manufacturers encompasses the 6-digit subsets of numbers 31 through 33.

Natural work team: A team of employees, often hourly personnel, who share a common workspace and have responsibility for a particular process or process segment.

Online order entry system: A computer-based system that enables distributors, field-sales representatives, and even customers to place orders directly, over the Internet or a corporate intranet, without intervention by an inside salesperson. An Internet-based transaction might be initiated by accessing a Web page, then choosing a sales-order-entry option. The software often includes a product configurator and pricing "engine," and may be linked to production scheduling systems.

On-time delivery rate: The percentage of time that products ordered by customers are received by the specified time or date.

Operating equipment efficiency or effectiveness (OEE): The percentage of time that equipment, when running or required for production, is producing good-quality products at an acceptable rate. It is the product of three ratios, availability, performance and quality. OEE equals machine availability as a percentage of scheduled uptime x quality yield percentage of all products for a given line x percentage of optimal production rate at which equipment operates.

Order-to-shipment leadtime: The time from when a specific order is released to the shop floor until that order is shipped to the customer, including any storage time in finished goods inventory.

Order-to-delivery leadtime: The time from when a specific customer order is received by the plant until product is delivered to customer, including any warehousing, cross-docking and transportation time.

Order fill rate: Annual sales orders filled completely divided by the total annual number of sales orders.

OSHA-reportable incident rates: Should be calculated as the number of injuries (N) divided by total hours worked by all employees in a calendar year (EH) multiplied by 200,000 (base for 100 equivalent full-time employees working 40 hours per week, 50 weeks per year): (N divided by EH) x 200,000. A separate calculation must be made for more serious injuries and illnesses that result in employees taking time off from their jobs, being transferred to another job or doing lighter or re-stricted duties..

Pick-to-ship cycle time: Pick-to-ship begins when an order is released to be picked from inventory and ends at the time the order is shipped.

Planning and scheduling technologies: A variety of software-based advanced planning, scheduling, and optimization systems.

Poka-yoke: "Fail-safing" techniques to eliminate errors or quality-related production defects as far upstream in the process as possible. Example: requiring completed components to pass through a customized opening to ensure that dimensions do not exceed tolerance limits. Also includes methods to check equipment operating conditions prior to making a part. A major objective is to minimize the need for rework.

Predictive maintenance: Practices that seek to prevent unscheduled machinery downtime by collecting and analyzing data on equipment conditions. The analysis is then used to predict time-to-failure, plan maintenance, and restore machinery to good operating condition. Predictive maintenance systems typically measure parameters on machine operations, such as vibration, heat, pressure, noise, and lubricant condition. In conjunction with computerized maintenance management systems (CMMS), predictive maintenance enables repair-work orders to be released automatically, repair-parts inventories checked, or routine maintenance scheduled.

Premium freight: air or other expedited shipment method that increases the standard cost of filling a customer order.

Preventive maintenance: Maintenance activities, often performed by machine operators at regularly scheduled intervals, to keep equipment in good working condition.

Proactive environmental practices: The efforts of plant management to adopt, at its own fiscal and chronological pace, leading-edge environmental practices that reduce pollutants, emissions, etc., prior to regulatory actions that necessitate these actions.

Problem-solving methodologies: A variety of approaches to problem solving, including the Deming Circle (Plan-Do-Check-Act), used by all persons working in the same team or organization. Considered fundamental to teamwork.

Process manufacturing: The manufacture of products such as chemicals, gasoline, beverages, and food products that typically are produced in "batch" quantities rather than discrete units. Many process operations require inputs such as heat, pressure, and time (for thermal or chemical conversion).

Product data management (PDM): Enabling software-based systems that link, manage, and organize product-related data from various sources—both internally and externally with suppliers—across various computer platforms, divisions, departments, and geographic locations. PDM incorporates CAD files, manufacturing data, and documents to reduce engineering design times; ensures timely access to consistent, up-to-date product information; and improves information flow and cross-functional communications.

Product-development cycle: Sometimes called "time to market," this is the period of time from the start of design/development work to commercial product availability.

Productivity change: The plantwide change in annual value-added per employee, based on total employment in the plant, not just direct labor. Value-added should be calculated by subtracting cost of purchased materials, components, and services from value of shipments. The Best Plants entry form also includes a secondary calculation, which many manufacturers prefer to use: "increase in sales per employee."

Pull system: A system for controlling work flow and priorities whereby the processes needing materials (or attention) draw them from the feeding processes or storage areas as needed, typically using "kanban" signals—in contrast to "push" systems in which material is processed, then pushed to the next stage whether or not it is really needed.

Quality function deployment (QFD): A customer-focused approach to quality improvement in which customer needs (desired product or service characteristics) are analyzed at the design stage and translated into specific product- and process-design requirements for the supplier organization. Targeted customer needs may include product features, cost, durability, and other product characteristics.

Quick-changeover methods: A variety of techniques, such as SMED (single-minute exchange of dies), that reduce equipment setup time and permit more frequent setups, thus improving flexibility and reducing lot sizes and leadtimes.

QS 9000: A common quality certification program for auto industry suppliers that includes ISO 9000 as a baseline.

Rapid prototyping: A variety of techniques for quick conversion of CAD-generated product designs into useful, accurate physical models, typically using computer-controlled systems. In the stereolithography approach, controls based on CAD designs guide laser beams that create precise plastic models by polymerizing and fusing liquid resins into a laminated composite of very thin slices.

Raw-materials turn rate: A measure of asset management that typically is calculated by dividing the value of total annual shipments at plant cost (for the most recent full year) by the average raw-material value at plant cost. Plant cost includes material, labor, and plant overhead.

Real-time feedback: Instantaneous (or nearly instantaneous) communication of electronically captured data (typically quality data) to process operators or equipment to enable rapid or automated adjustments that keep production processes operating within quality parameters.

Return on invested capital (ROIC): A measure of how effectively a company uses the money (borrowed or owned) invested in its operations. ROIC = net operating profit after taxes (NOPAT) divided by capital invested (total assets less excess cash minus non-interest-bearing liabilities). Total assets = fixed assets + current assets + intangible assets + investments. For plants that are cost centers, net operating profits after taxes = annual value of shipments - direct costs, indirect costs, depreciation and taxes.

Rolled-throughput yield: Also known as "multiple-point yield," this measure is calculated by multiplying together quality yield values at various points in a production process, not only at the end of the line. The purpose is to make problem areas within a process more visible.

Safety-improvement programs: Practices intended to constantly improve safety within a plant or across a company, including, but not limited to, safety teams, safety awareness programs and communications, safety "days," safety training, and setting of continuous-improvement goals targeting safety metrics, such as OSHA incidents or lost-workday rates.

Scrap/rework costs: Parts or materials wasted in the production process, plus the cost of fixing defective products so that they pass final inspection.

Self-directed natural work teams: Nearly autonomous teams of empowered employees, including hourly workers, that share a common workspace and/or responsibility for a particular process or process segment. Typically such teams have authority for day-to-day production activities and many supervisory responsibilities, such as job assignments, production scheduling, maintenance, materials acquisition, training, quality assurance, performance appraisals, and customer service. Often called "self-managed" work teams. All self-directed teams are empowered.

Shop-floor data collection: Automated collection of data on factory-production activities, including units produced, labor hours per unit or customer order, time and date of specific production activities, and maintenance and quality data.

Six Sigma: A program that originated at Motorola where the objective is customer satisfaction through continuous improvement in quality. Six Sigma means products and processes will experience only 3.4 defects per million opportunities or 99.99966% good.

Statistical process control (SPC): Use of variation analysis, with manual or computerized control charts, to detect non-normal variations in a process as quickly as possible. Often, SPC charts display upper and lower limits for part characteristics or process parameters and show trends over time, indicating when the limits were exceeded or approached and corrective actions were needed. In some closed-loop systems, adjustments are made automatically when readings indicate that a control limit is being approached.

Supplier JIT deliveries: See "JIT delivery."

Supplier partnerships: Agreements with suppliers whereby operations are linked together, information is openly shared, problems and issues are commonly solved, and joint performance is mutually approved. They usually include multiyear purchase agreements.

Supply-chain/logistics systems: A class of manufacturing software designed to optimize scheduling and other activities throughout the supply chain—or "value chain"—including transportation and distribution functions.

Takt time: the optimum frequency at which product should be produced to meet customer demand, calculated by dividing available work time per shift by actual customer demand. For example, an 8-hour, one-shift operation might have 435 minutes of available time (480 minutes minus two 15-minute breaks and a 15-minute cleanup period). If daily demand is 1,305 products, then the takt time of the operation would be 20 seconds.

TL 9000: A quality system certification program developed by the Quality Excellence for Suppliers of Telecommunications Leadership Forum for the telecommunications industry. The requirements include the ISO 9000 family of standards as a base-line but add specific performance metrics and a formal benchmarking mechanism.

Total cost of quality: The aggregate cost of poor quality or product failures—including scrap, rework, and warranty costs—as well as expenses incurred to prevent or resolve quality problems (including the cost of inspection).

Total logistics costs: Total costs for inbound delivery and storage of material and parts, plus the total cost to store, transport and deliver (and possibly set up) product to the customer following final manufacture and assembly. That a manufacturer calculates and monitors such a measure indicates that management is not only focused on improving efficiencies within the walls of the factory, but also on the total order-fulfillment process.

Total productive maintenance (TPM): A comprehensive program to maximize equipment availability in which production operators are trained to perform routine maintenance tasks on a regular basis, while technicians and engineers handle more specialized tasks. The scope of TPM programs includes unscheduled maintenance prevention (through design or selection of easy-to-service equipment), equipment improvements, preventive maintenance, and predictive maintenance (determining when to replace components before they fail).

Total quality management (TQM): A multifaceted, company-wide approach to improving all aspects of quality and customer satisfaction—including fast response and service, as well as product quality. TQM begins with top management and diffuses responsibility to all employees and managers who can have an impact on quality and customer satisfaction. It uses a variety of quality tools, such as QFD, Taguchi methods, SPC, corrective-action response teams, cause-and-effect analysis, problem-solving methodologies, and fail-safing.

Transitional work program: A transitional work program offers various options to assist an injured worker in progressively performing the duties of a targeted job.

Value-added per employee: Calculate by subtracting cost of purchased materials, components, and services from value of shipments divided by number of employees. See "productivity change."

Vendor-managed inventory: Materials, components or subassemblies managed and replenished by on-site vendors "resident suppliers" with whom the plant has prearranged purchasing agreements. The supplier takes responsibility for the availability of supplies.

Visibility systems: Visual systems on the plant floor and design areas and elsewhere that enable anyone familiar with the work to understand its status and condition at a glance, or to respond to work priorities. This can be done with standard layouts, signal lights, kanban systems, or other methods. The distinguishing feature is that communication is rapidly executed by line of sight.

Voice recognition/response: Computerized systems capable of recognizing or synthesizing human voices. Such systems capture verbalized data for quality-control or inventory-tracking purposes (often when operators' hands are busy), recognize spoken commands that activate equipment, and convert computer data into audible information.

WIP turn rate: A measure of the speed with which work-in-process moves through a plant. Typically calculated by dividing the value of total annual shipments at plant cost (for the most recent full year) by the average WIP value at plant cost.

World-class manufacturer: A somewhat arbitrary designation that can be supported by performance results related to various manufacturing metrics. (World-class metrics may vary from one industry to another.) Typically, it denotes "best-in-class" producers on a worldwide basis. In the broadest sense, world-class manufacturers are those perceived to deliver the greatest value at a given price level.

Work-in-process inventory (WIP): The amount or value of all materials, components, and subassemblies representing partially completed production; and anything between the raw material/purchased component stage and finished-goods stage. Value should be calculated at plant cost, including material, direct labor, and overhead.

Yield improvement: Defined as the percentage reduction in rejects within a five-year period. Example: If yield improves from 95% to 98%, that means rejects have been reduced by 60%—from 5% to 2%. Therefore, yield improvement equals 60%.

BEST PLANTS

2020 Candidate Entry Form

Candidate facilities will be judged by a panel of INDUSTRYWEEK editors, who will solicit independent evaluations from manufacturing experts and other knowledgeable persons. The panel will look for evidence of:

- A comprehensive effort to achieve world-class manufacturing capability.
- Management practices geared to motivating achievement of breakthroughs in operating performance and customer satisfaction.
- Strong quality systems and results.
- Employee involvement and empowerment programs that drive continuous process improvement and superior customer relationships.
- A strong customer focus/effective supplier partnerships.
- Appropriate use of technology, as required by changing business needs.
- Flexible and/or agile production systems capable of responding quickly to customer needs and shifts in the marketplace.
- A record of operational improvement, including shortened manufacturing cycle time, productivity improvements, inventory reductions, and improved profitability.
- Proactive environmental and safety practices.

ELIGIBILITY

Candidates for INDUSTRYWEEK's Best Plants must:

- Be a single manufacturing plant or a combination of related facilities within a specific geographic location (not to exceed a 25-mile distance from plant to plant) and under the direction of a single management team. To qualify as a manufacturing facility, the plant's output should be a physical product representing value-added.
- Have completed at least 3 years of operation as of Jan. 1, 2020. Plant startup on or before Jan. 1, 2017.
- Be located within the United States or its territories, Mexico, or Canada. Eligibility is not limited to plants owned by U.S.-based parent companies.
- Not have been honored as an INDUSTRYWEEK Best Plant in the previous two years.

SELECTION PROCESS

Entries will be reviewed by a judging panel of IW editors. The panel also will include knowledgeable industry consultants or other experts working under nondisclosure agreements. Using a weighted scoring system, the composite ratings of the judges will determine the Best Plants finalists. The finalists will receive a second questionnaire seeking documentation of achievements and presenting plant-specific follow-up questions.

After a subsequent review of the information submitted in the follow-up questionnaire, the IW judging panel will select the 2020 North American winners. All finalists and winners will be recognized by INDUSTRYWEEK.

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APPLICATION PROCESS

Return completed entry form, including the supporting statement and application fee no later than **August 15, 2020.** Do not submit any other additional material at this time. If your plant is selected as a finalist, supplementary information will be requested at a later date.

Please note that it is not mandatory to fill out every item in this entry form; however**, completeness of an entry is considered by the judges**.

Do not alter or revise this entry form. Responses to questions should be limited to the space provided. If clarification of an answer to explain unique circumstances or explanation as to why a question was left unanswered is necessary, you may attach up to **two pages** of single-spaced **endnotes** to the entry (each endnote should clearly reference a specific question and page number).

If this form is completed electronically, match the original on a page-for-page, question-for-question basis. When responding to an essay question, provide as much detail, metrics, and anecdotal support as possible **in the space provided**.

Please note the following recommendations:

- For questions where percentage reductions are requested, use 100% as the base level. **Nothing can be reduced more than 100%**, and, thus, no answer should be greater than or, in many cases, equal to 100%.
- If your plant uses metrics that differ from those requested, please attempt to convert to the requested metric, and also submit the actual plant metric (add an endnote if necessary). If still unknown, leave the space blank; do not answer "0."
- Avoid acronyms and abbreviations. If they are necessary, be sure it is clear what they mean.

So that responses are comparable among applicants, **please report data for time frames indicated**. Three-year change or improvement metrics require four years of data, beginning with the base year of **2016**.

- For clarification of terms and metrics used in this entry form, refer to the *Glossary* on the IndustryWeek.com Web site *(www.industryweek.com/manufacturing-glossary)*.

A Final Note: Don't understand a question? Need clarification about a definition? Uncertain about how data may be used? If you need assistance or have questions regarding *ANY ASPECT* of the IW Best Plants competition, do not hesitate to contact Jill Jusko, jjusko@endeavorb2b.com, or 518-323-9117.

APPLICATION FEE

A fee of $495 for small companies; $995 for medium companies; and $1,495 for large companies must be submitted along with the application. **Early Bird Discount: Return your completed application by June 1, 2020, and take 20% off the application fee.**

Fees will be accepted by credit card. Fee is based on **total company-wide employment**, not the number of employees at the specific manufacturing location entering the competition. **Small companies** are defined as independent corporations with fewer than 250 full-time and equivalent hourly and salaried employees. **Medium companies** are defined as corporations with 250-999 full-time and equivalent hourly and salaried employees**. Large companies** are defined as corporations with 1000 or more full-time and equivalent hourly and salaried employees.

There are no additional fees for the validation site visits. Companies that enter **three or more** plants in the competition receive a $300 discount off of the application fee for each facility. (The three-plant discount is not applicable to small companies with fewer than 250 employees.)

Return entry form (electronic files preferred) by **August 15** to:

Jill Jusko, jjusko@endeavorb2b.com

If you have any questions, contact **Jill Jusko, jjusko@endeavorb2b.com, 518-323-9117**.

Note: Data provided in this entry form will be used in the aggregate to compile a statistical profile and Best Plants database.

KEY DATES	
June 1	Early bird deadline for return of completed entry forms.
August 15	Deadline for return of completed entry forms.
November	Selection of IW Best Plants finalists
2021	Announcement of 2020 INDUSTRYWEEK Best Plants winners

APPLICATION FEE FORM

A fee of $495 for small companies; $995 for medium companies; and $1,495 for large companies must be submitted along with the application. Fees will be accepted by credit card. See form below. Make checks payable to "**Endeavor Business Media.**" Fee is based on **total company-wide employment**, not the number of employees at the specific manufacturing location entering the competition, **Small companies** are defined as independent corporations with fewer than 250 full-time and equivalent hourly and salaried employees. **Medium companies** are defined as corporations with 250-999 full-time and equivalent hourly and salaried employees. Large companies are defined as corporations with 1000 or more full-time and equivalent hourly and salaried employees.

Early Bird Discount: Return your completed 2020 application by **June 1 and take 20% off the application fee.

Company/Plant Name, Location ____

To pay by credit card, please complete the following information:

Amount to be charged $____________

Card Type: Amex _______ Discover/Novus ______ Mastercard ______ Visa______

Credit card #_____________________________ Expiration Date______________

Card Member's Name: ____

Billing Address: ____

City:________________________ State:______________ Zip Code:_________

Phone:________________________________ Fax:________________________

Authorized Signature: _________________________________Date___________

Send completed form by email under separate cover to:

Attn: Accounts Receivable
Endeavor Business Media
accountsreceivable@endeavorb2b.com.

Re: IndustryWeek Best Plants

I. SUPPORTING STATEMENT

A supporting statement must be included with your entry (maximum four (4) pages, minimum 10-point typeface). The judges will not review more than a 4-page supporting statement. The statement should include essay responses covering the following areas. **Please have each response correspond to the boldface number and topic before each question.** Please describe achievements as well as obstacles overcome, and cite statistical results whenever possible. If space allows within the 4-page allotment, facility and product photos, process-flow diagrams, and performance graphs are encouraged. *Note: This is a plant-level competition. Responses should reflect plant-level actions, not corporate. Also, do not provide website links with a note to "read more here."*

1. **General Statement**—Explain why this facility should be considered one of IndustryWeek's Best Plants for **2020**.

2. **History—**Give a brief description of the history and nature of ***this*** manufacturing location, specifically.

3. **Products and Manufacturing Processes—**Describe the products and components manufactured or assembled in this plant. Describe the flow of material through the facility, outlining the various **manufacturing processes** (i.e. assembly, stamping, welding, full automation) and any unique challenges faced in producing these goods. Such challenges may include government regulation, unique materials, or a host of other options.

4. **Achievements**—Describe the key initiatives and programs, and performance results that distinguish this plant as a high-performance, world-class manufacturing operation. Include significant competitive improvements, and other achievements, recognitions, or awards the plant has received.

5. **Future Competitiveness—**What are the short- and long-term strategic goals for **this** operation, and how do they reflect corporate objectives? Describe current improvement projects and near-term plans and explain how they will ensure that your operation remains competitive in the future.

- **GENERAL INFORMATION**

FULL PLANT NAME:
Plant location (City, State/Prov., Country):
Primary product:
Name of parent company, if applicable:

Publicly held __________ Privately held __________

Year of plant start-up ________ Number of days operating per week ________ Number of shifts ________

Total square footage ________ Manufacturing square footage _________

Number of employees as of Jan 1, 2020* _______ Change in number of total employees over the past 3 years _______%**
*All full-time and equivalent contract (including temporary) hourly and salaried employees.
**Use + or – to indicate an increase or a decrease

Number of production employees (hourly or "touch" labor) as of Jan 1, 2020 _______ Change in number of production employees over the past 3 years _______%**

Anticipated employment change in 2020 _______%

Are plant workers represented by a union?________ None ________ Some ________ All

If some or all, which union(s)?
When does the current union contract expire?

Management

PLANT MANAGER (or equivalent):		Title:
Phone:	Years at facility:	Years in current position:

Contact Information for Person Submitting Entry

Name:		Title:	
Company:			
Street or P.O. Box:			
City:	State/Prov.	Postal Code:	Country:
Phone:	Fax:	E-mail:	

III. MANAGEMENT PRACTICES

• How does plant management **communicate** the plant's strategy and objectives among the entire workforce?

• Please indicate the extent to which the following improvement methodologies have been implemented:

Total Quality Management	____ None	____ Some	____ Significant
Theory of Constraints	____ None	____ Some	____ Significant
Toyota Production System	____ None	____ Some	____ Significant
Lean Manufacturing	____ None	____ Some	____ Significant
Six Sigma	____ None	____ Some	____ Significant
Agile Manufacturing	____ None	____ Some	____ Significant
Other: ______________________	____ None	____ Some	____ Significant

• Number of people in plant **exclusively** dedicated to improvement programs and projects, e.g., continuous improvement, change management, lean manufacturing, Six Sigma black belts: ____________

• Total documented cost savings as a result of specific improvement programs and projects over the most recent calendar year? $__________

• Is this plant currently involved, as a defendant, in any product liability, environmental, or employee litigation? ______ Yes ______ No

If "yes," please explain:

• What is plant management's No. 1 indicator of plant performance? ____

How is that indicator calculated?

How has that indicator changed over the past three years? ______ % increase or ______ % decrease

IV. QUALITY ACHIEVEMENTS

• Has the plant received ISO 9001:2008 certification? ____ No ____Yes

• Has the plant received ISO 9001:2015 certification? ____ No ____Yes

• Other quality certifications: ____

• Which of the following quality techniques have been extensively implemented at this facility?

______	Six Sigma	______	Total Quality Management (TQM)	_____	Manual SPC
______	Quality function deployment (QFD)	______	Employee problem-solving teams	_____	Computerized SPC
______	Poka-yoke	______	Plan/do/check/act	_____	DOE
______	Failure mode effect analysis (FMEA)	______	Advanced product quality planning (APQP)	_____	Taguchi methods

Other: ____

Quality indicators for a typical finished product (full-year averages)

• Finished product (identify type of product): ______________________________

• Current first-pass yield: __________%

• Yield improvement* over past three years: __________%

*Calculate yield improvement as a percentage reduction in rejects (*Example: If yield improves from 95% to 98%, that means rejects have been reduced by 60% -- from 5% to 2%. Therefore, yield improvement equals 60%.)*

Quality indicators for all products (full-year averages)

• First-pass yield for all finished products (use a weighted average that takes into account differences in product volumes or in value-added): __________%

• In-plant defect/fallout rate on all components, including products that fail finished product tests (ppm): __________ppm

• In-plant defect/fallout rate on all components three years ago: __________ppm

• Percentage reduction in in-plant defect/fallout rate within past 3 years : __________%

• Customer reject rate on shipped products (ppm): __________ppm

$$\frac{\text{Number or amount of products returned or rejected}}{\text{Number or amount of products shipped}} \times 10^6 = \text{customer reject rate (ppm)}$$

• Customer reject rate on shipped products (ppm) three years ago: __________ppm

• Percentage reduction in customer reject rate within past 3 years : __________%

• Scrap/rework costs as a percentage of sales: __________%

• Scrap/rework costs as a percentage of sales three years ago: __________%

• Percentage reduction in scrap and rework costs within past 3 years : __________%

• What other measores of quality, if any, do you track across the plant? How have these measures changed over the past three years:

Measure	Percent Change
________________________________	__________ %
________________________________	__________ %

V. EMPLOYMENT PRACTICES

• What is the plant's current *annual* labor turnover rate (include all means of voluntary and involuntary separation: layoff, quit, retirement, buyouts, transfers, etc.)? __________%

• How often is employee satisfaction formally measured at this plant? __________times/year

• Percentage of plant's **production** workforce now participating in empowered or self-directed work teams: __________%

• Which of the following responsibilities are handled by work teams, rather than supervisors, on the plant floor?

____ Production scheduling	____ Environmental compliance	____ Training
____ Interteam communications	____ Quality assurance	____ Hiring of team members
____ Skills certification	____ Firing of team members	____ Vacation/work scheduling
____ Disciplinary actions	____ Daily job assignments	____ Materials management
____ Safety review and compliance	____ Performance reviews (peer evaluations)	

• How many improvement suggestions per employee did your plant record last year? ____ suggestions/employee
• How many improvement suggestions per employee were implemented last year? ____ suggestions/employee

• What were the total annual cost savings as a result of employee suggestions in 2019? $__________

• Average annual hours of formal classroom and/or online training per production employee: __________hours
• Average annual hours of formal on-the-job training per production employee: __________hours

• Has plant established a training curriculum with a local education institution? ____ Yes ____ No

• Does plant emphasize cross-training of production employees? ____ Yes ____ No

• What monetary awards does the plant offer to production employees?

____ Rewards for individual performance	____ Profit sharing	____ Pay for knowledge
____ Rewards for team performance	____ Gain-sharing	____ Pay for skills

• Average **wage** (hourly rate without overtime) of production employees: $_________/hour
• Average wage of production employees in region: $ _______/hour
• Does the plant employ temporary or seasonal workers? ____ Yes ____ No

• Average hours of overtime per week *per production employee* over the most recent calendar year: ________ hours/week

• Has the plant recently laid off any employees (January 2019-June 1, 2020)? ____ Yes ____ No

VI. SAFETY

• Has plant experienced any work-related fatalities over the past three years? ____ Yes ____ No

• Has plant been cited for any OSHA violations over the past three years? ____ Yes ____ No

If "yes," please describe the violation, **when** it occurred, and **if** and **how** it has been resolved:

• For the most recent calendar year, what was the plant's **incidence rate** for total OSHA-recordable injury and illness cases?* __________

Tools to help: *http://data.bls.gov/iirc/*

• For the most recent calendar year, what was the plant's **incidence rate** rate for OSHA-recordable injury and illness cases **with days away from work**, job transfer or restriction (DART)? __________

• What is the average incidence rate for total OSHA-recordable injury and illness cases for your industry as reported by the Bureau of Labor Statistics?* __________

• What is the average incidence rate for OSHA-recordable injury and illness cases with **days away from work**, job transfer or restriction for your industry as reported by the Bureau of Labor Statistics?* __________

*https://www.bls.gov/web/osh/summ1_00.htm

• Percentage change in the plant's incidence rates for total OSHA-recordable injury and illness cases over the past three years: ______% increase ______% decrease

• Percentage change in the plant's **incidence rates** for OSHA-recordable injury and illness cases with **days away from work**, job transfer or restriction over the past three years: ______% increase ______% decrease

• Does plant participate in OSHA's Voluntary Protection Program as either a "Star" or "Merit" site? ____ Yes ____ No

• For plants with state-administered occupational health programs, and those in Canada and Mexico, do you participate in a similar proactive, safety certification program? ____ Yes ____ No

• As part of your accident prevention program, do you monitor and investigate near misses? ____ Yes ____ No

VIII. CUSTOMER FOCUS

• Does the **PLANT** have a formal customer-satisfaction program in place? ____ Yes ____ No

• How often are customer-satisfaction surveys conducted? ____ survey(s)/year

• Does the plant have access to and use real-time customer demand data to plan production? ____ Yes ____ No

• Does plant offer just-in-time (JIT) delivery to customers? ____ Yes ____ No

IX. SUPPLY CHAIN AND LOGISTICS

• Which of the following best describes your site's relationship with suppliers? (Check one only)

_________	Focused on price	_________	Focused on delivery	_________	Focused on quality
_________	Focused on total cost	_________	Focused on capabilities	Other	______________

• To what extent has plant adopted JIT/kanban systems with suppliers? ____ None ____ Some ____ Wide

• What percentage of key suppliers provide JIT delivery? __________%

• What percentage of key suppliers have been formally certified? __________%

• Does plant have consignment inventory (owned by on-site suppliers) on site? ____ Yes ____ No

• Do high-volume suppliers deliver to point-of-use in the plant? ____ Yes ____ No

• Do major suppliers contribute to cost-reduction and/or quality-improvement efforts in your plant?____ Yes ____ No

• When supplier initiatives yield cost savings for the plant, are cost savings shared with the supplier?____ Yes ____ No

• What percentage of supplier orders are delivered on-time (by the request date)? __________%

• What percentage of purchased materials and components (dollar volume) no longer requires incoming inspection? __________%

• Typical leadtime on class-A (high-cost) purchased materials: __________days

• Percentage change in average leadtime on class-A (high-cost) purchased materials over past three years: _____% increase or _____% decrease

X. TECHNOLOGY

• In terms of total cost, please list the largest investment in information technology at this facility over the past 3 years:

• In terms of total cost, please list the top investment in production equipment at this facility over the past 3 years:

• Provide an example of how your deployment of information technology or production equipment/technology **improves** this plant's **competitive position**.

XI. MANUFACTURING & FLEXIBILITY

• To what extent has this plant adopted the following practices?

Practices	None	Some	Wide
Cellular manufacturing practices			
Focused-factory production systems			
JIT/continuous-flow production methods			
Internal "pull" system with kanban signals			
Standardized work			
5S			
Level scheduling			
Value-stream mapping			

• Has this plant emphasized lot-size reduction? ____ Yes ____ No

If yes, by approximately what percentage have lot sizes been reduced over the past three years? ____ %

• Have quick-changeover methods been widely adopted? ____ Yes ____ No

If yes, by what percentage have average changeover times been reduced over the past three years? ____ %

• How frequently is the master production schedule updated? ____ Daily ____ Weekly ____ Monthly

____ We don't create production schedules; all work is linked directly to customer orders.

• Manufacturing cycle time for a typical finished product (the time of actual production, from when an order is released to the plant floor through to the final process within the plant, 1 day=24 hours): ____ days ____ hours

• By what percentage has manufacturing cycle time been reduced within the past three years? ____________ %

• Current standard **order-to-<u>shipment</u> leadtime** for a typical product (calculate as the time from when a specific order is released to the shop floor until that specific order is shipped to the customer): ____ days ____ hours

• By what percentage has standard **order-to-shipment leadtime** been reduced within the past three years? __________ %

• On-time delivery rate to customers (% on time): __________%

The above on-time delivery rate is based on (select one): ____ Date customer requested ____ Date promised

• Where does this plant directly ship its products? (i.e., retailers; other manufacturers' plants; other company plants, etc.)

XII. MAINTENANCE

• What is average machine availability rate as a percentage of scheduled uptime? __________%

• What percentage of maintenance work is reactive (in response to unexpected machine or equipment breakdown)? __________%

• Operating equipment efficiency (OEE) for major production lines for the most recent calendar year. Please show calculation using the following formula:

OEE	=	*machine availability as a percentage of scheduled uptime*	**X**	*quality yield percentage of all products for given line*	**X**	*percentage of optimal production rate at which equipment operates*
_______	=	_________________	**X**	_________________	**X**	_________________

• To what extent does the plant practice total productive maintenance (TPM)? ____ None ____ Some ____ Wide

• Do machine operators regularly perform preventive and routine maintenance? ____ Yes ____ No

• Has plant implemented a computerized maintenance management (CMMS) system? ____ Yes ____ No

• Describe key elements of maintenance programs and practices, including the use of any predictive maintenance technologies:

XIII. INVENTORY MANAGEMENT

• Percentage change in total plant unit volume within past three years: ______% increase <u>or</u> ______% decrease

• Average days of raw-materials inventory: __________days

• Percentage change in days of raw materials inventory within past three years: ____% increase <u>or</u> _____% decrease

• Average days of work-in-process (WIP) inventory: __________days

• Percentage change in days of work-in-process inventory within past three years: ______% increase <u>or</u> ______% decrease

• Average days of finished-goods inventory: __________days

• Percentage change in days of finished-goods inventory within past three years: ______% increase <u>or</u> ______% decrease

• Average days of inventory (raw material, WIP, and finished goods): __________days

• Percentage change in days of total inventory within past three years: ______% increase <u>or</u> ______% decrease

Calculate **days of inventory** by dividing the average inventory on hand (raw materials inventory, work-in-process inventory, or finished goods) by average daily usage.

• Number of SKUs (stock keeping units) in finished-goods inventory: __________SKUs

XIV. ENVIRONMENTAL STEWARDSHIP

• Has plant achieved ISO 14001 certification? ____ Yes ____ No

• Have federal or state EPA authorities cited plant for any violations of environmental laws within the past five years? ____ Yes ____ No

If "yes," explain extent of violation and if and how it has been resolved:

• Has plant achieved ISO 50001 certification? ____ Yes ____ No

• Has plant obtained zero waste-to-landfill status? ____ Yes ____ No

XV. COMPETITIVENESS AND MARKET RESULTS

Productivity

• By what percentage has productivity changed within the past three years, annual value-added per employee (total employment, not just direct labor)? ______% increase or ______% decrease

• By what percentage has productivity changed within the past three years, annual sales per employee (total employment, not just direct labor)? ______% increase or ______% decrease

Cost Management

• Approximate manufacturing-cost change per unit of product shipped, excluding purchased-materials costs, within past three years: ______% increase ______% decrease

• Approximate cost change per unit of product shipped, including purchased-materials costs, within past three years: ______% increase ______% decrease

Market Results

• Annual change in total plant revenue for **2019** (vs. previous year): __________%

• Anticipated annual change in total plant revenue for **2020**: __________%

• What is plant's customer retention rate for the past three years? __________%

• What is the plant's return on invested capital (ROIC)*? ___________%

*__Return on invested capital (ROIC)__— A measure of how effectively a company uses the money (borrowed or owned) invested in its operations. ROIC = net operating profit after taxes (NOPAT) divided by capital invested (total assets less excess cash minus non-interest-bearing liabilities). Total assets = fixed assets + current assets + intangible assets + investments.

For plants that are cost centers, net operating profits after taxes = annual value of shipments – direct costs, indirect costs, depreciation and taxes.

• Is plant currently profitable? ____ Yes ____ No

Change in **plant-level** profitability (EBIT) over the past three years: ______% increase or ______% decrease