CASTOOL™
TOOLING SYSTEMS

WWW.CASTOOL.COM

NEWSLETTER DECEMBER 2023

HAPPY NEW YEAR

SEASONS GREETINGS

Seasons Greetings and Happy New Year to everyone at Castool, as well as our valued customers and suppliers worldwide. We are relieved to share that 2023 was a challenging but successful year for Castool. We have achieved sales growth in the Americas, Europe and Asia.

We hope you enjoy reading our newsletter, and we look forward to publishing future editions in June and December. Exciting developments are taking place in the industries we serve and at Castool.

Paul Robbins
General Manager

INNOVATIVE SOLUTIONS

Castool is a knowledge-based company that provides production tooling and technical advice to leading extruders and die casters around the world.

Our System Approach emphasizes that all components of a production process must be considered together, as their individual functions are intertwined in joint interaction and common cause.

This holistic approach to production is now being utilized by many extruders and die casters globally to great success.

CASTOOL COMPANIES AND SUBSIDIARIES ARE CERTIFIED AS BEING IN COMPLIANCE AS AN INTEGRATED GROUP OF THREE ISO PROGRAMS

ISO 9001:2015
for the design, manufacture and supply of tooling systems to the extrusion and die casting industries

ISO 14001:2015
for Environmental Management

ISO 45001:2018
for Occupational Health and Safety.

This certification confirms Castool's ongoing commitment to meeting customer requirements, minimizing environmental impact, maintaining a safe and healthy workplace, and upholding its status as a world-class tooling supplier.

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CASTOOL DIVISION

WHERE ARE WE

Here are the locations of our factories around the world, dedicated to supporting our valued customers:

Castool Precision Tooling was established in 1986 and has since grown into the Castool Group, with a presence in five locations in Canada, Mexico, Morocco and Thailand. As we enter the year 2024, we are proud of our continued expansion and the global reach we have achieved.

Our commitment to providing high-quality precision tooling systems remains unwavering, and we look forward to serving our customers in these diverse regions for many years to come.

CASTOOL TOOLING SYSTEMS
Division of Exco Technologies Ltd.

CASTOOL HEAT TREAT
Division of Exco Technologies Ltd.

CASTOOL180.CO.LTD
Subsidiary of Exco Technologies Ltd.

CASTOOL 25
Excotaro S.de R.L.de C.V.

CASTOOL90 S.A.R.L
Subsidiary of Exco Technologies Ltd.

LETTER TO STAKEHOLDERS F2023

Beyond Boundaries

In F2023 Exco clearly demonstrated our aggressive growth is on the right track. Despite difficult market conditions, we recorded a 26% increase in sales to a record $619.3 million, grew our EBITDA by 41% to $74.5 million and delivered $0.68 of earnings per share, a 39% improvement over last year. As well, our momentum remains strong. We established positive trends throughout the year, with our quarterly revenues and EBITDA showing sequential improvement, ending the year on a high note.

In our journey 'Beyond Boundaries', we not only achieved substantial financial growth but also pushed operational excellence throughout our business. It is truly inspiring to see the numerous examples of innovation in both products and processes happening across Exco. Similarly, the opportunities we see to spread our reach into new geographic boundaries through both recent acquistion and greenfield investments is thoroughly exciting.

Looking foward, despite macro headwinds, vehicle production volumes are expected to grow in F2024 as dealer inventories continue to be replenished and pent-up consumer demand is satisfied. Also, we are clearly gaining market share and we enter the new fiscal year with record backlog levels in our long lead-time products, such as Large Moulds. Moreover, start-up losses and operational disruption associated with our current capital investment activity should reduce while the benefits from our continuing efficiency initiatives continue to take hold. While there will no doubt be new challenges, we remain very optimistic that our earnings will again be substantially stronger in the year ahead.

Sustainable Marketplace: Leading the Charge in EV Revolution

A key focus for our business is to directly support the electric vehicle revolution and worldwide movement toward reducing emissions. Consequently, as the world continues to push forward with sustainability initiatives, the future for our products has never been brighter. An increase in the use of aluminum across many industries is the principal drive of this tailwind, particularly in the automtive industry, our primary end market.

As the automotive industry adapts to ever-tightening fuel efficiency standards, lighweight metals are increasingly displacing structural steel vehicle components to make internal combustion engine vehicles more environmentally friendly. Moreover, electric vehicles make extensive use of aluminum components to reduce weight and therefore maximize battery range. Our Casting and Extrusion segment is especially well positioned to benefit from this transition, as we are the leading producer of tools that shape lightweight metals and we do not manufacture tooling for stamped steel components. Over the next several years, significant growth is expected in application of both extruded and die-cast components.

More recently, die-cast aluminum components and associated tooling have been increasing in both size and complexity. OEMs and their tier suppliers are increasingly using so-called "giga-press" die casting machines that are much larger than those used previously. This enables the casting of entire vehicle subframes from aluminum rather than assembling numerous stamped metal components, creating significant manufacturing efficiency gains. The tooling required to facilitate this process is also much larger and more complex which plays directly into our strengths and technical expertise. We anticipated this trend several years ago and have made considerable investments in our people, equipment, and processes to be the leading supplier in this market segment.

Our Automotive Solutions group, which manufactures products for both the interior and storage areas of passenger vehicles also stands to benefit from sustainability trends. Exco's Automotive Solutions segment typically makes products that are lighter in weight than competing products and electric vehicles generally have more cabin and storage space for which our products are well suited. Helping this growth, OEMs are increasingly looking to the sale of higher margin accessory products as a means to enhance their own profitability and Exco is an industry leader for many of these products. To these points, we grew our content per vehicle by 14% in F2023, which was well above our historical range of 5%-10% per annum.

Its important to note that while both our business segments are well positioned for the automotive insustry's eventual transition to electric vehicles, Exco is relatively agnostic to powertrain architecture.

Should the EV revolution proceed more slowly, or even shift towards hybrid vehicles, we remain confident in the trend towards aluminum and that demand for our products will continue to grow strongly in the years ahead.

Capital Investment: Fueling Grownth and Innovation

With regard to our various capital asset investment and growth strategies we again made great progress in F2023. I want to emphasize the sizeable negative impact these investments have had on our recent financial results. We have incurred significant front-end cash costs from the start-up of new plants, navigated through operational disruption as we installed new equipment and are incurring much higher levels of depreciation associated with our conservative accounting methods. Nonetheless, in F2023 we saw clear signs that the aggregate of these investments has begun to not only add to our EBITDA, but is accretive to margins as well.

Recent and current key growth initiatives:

- Castool Morocco Greenfield Facility -This new plant officially opened in November 2021 and positions Castool to better penetrate the sizeable European die cast and extrusion consumable tooling markets. The plant is ramping up slowly to ensure quality and showing good traction.

LETTER TO STAKEHOLDERS F2023

- Castool Heat Treatment Operations - Initial operation began in the Spring of 2022 and the last of the major equipment was installed in April 2023. This facility provides unmatched heat-treatment capabilities, particularly for larger tooling components, and enables increased vertical integration for both Castool and Large Mould. Additional benefits of this operation include: eliminating shipping and scheduling conflicts with third party supplier; shorter lead times; increased quality control; and a significant reduction in our environmental footprint.
- Castool Mexico Greenfield Facility - The building has been completed, majority of equipment has been installed and commercial production commenced October 1, 2023. This facility has increased our manufacturing capacity and positions Castool to better penetrate makets in Latin America and the southern US.
- Large Mould Group Equipment Additions - Included expanded additive manufacturing (3D printing) capacity, increased crane capabilities to 100 tons, and added several medium and large 5-axis milling machines to capture growing demand in the "giga" die-cast market segment. All equipment is now installed and operational.
- Extrusion Group Heat Treat - Added new heat treatment equipment to our extrusion plant in Mexico to eliminate outsourcing, increased heat treat capacity in our Texas plant, and replaced equipment in Markham with new energy efficient equipment, all of which is now operational.
- Automotive Solutions Group - Expanded the Polytech and Neocon facilities (combined 40,000 square feet) to meet growing demand from significant program awards. The last of the equipment became operational in the second quarter of fiscal 2023.
- Halex acquisition completed May, 2022 - Halex is the secound largest manufacturer of aluminum extrusion dies in Europe and the continent's leading supplier of complex extrusion dies, complementing Exco's existing North and South American extrusion die operations. The acquisition provides Exco with well-established and high-quality opeations, more extensive opportunities to better support our global customers and grow in new markets. Work continues to integrate Halex into the Extrusion Group operations and realize synergies from the sharing of best practices.

In F2024 we will continue to generate efficiencies from the substantial capital we have recently deployed. As well, we plan to spend $48.5 million in captial in the year ahead to further improve our efficiency, provide additional capacity and reduce our environmental footprint.

With the benefit of these investments, the launch of new programs,- general market growth and also maket share gains consistent with our history, we expect to achieve substantial growth. By F2026 Exco is targeting to generate annual revenue of $750 million, annual EBITDA of $120 million and generate EPS of roughly $1.50

ESG Strategic Priorities: A Responsible Future

We are committed to operating in a socially conscious manner and taking great care of our people. We aim to run our facilities as safe and efficiently as possible, delivering innovative, high-quality products with less energy, fewer materials and lower waste. These requirements are also increasingly demanded by our customers as they focus on responsible production processes throught their entire supply chains.

Let me provide a few examples:

- Our fast-growing additive manufacturing business minimizes material use for some of our tooling components while delivering increased value to our customers, directly supporting their own sustainability goals.
- Castool manufactures and sells consumable tooling components and related capital equipment for light metal die cast machines and extrusion presses globally. Castool's products significantly increase the productivity, safety, and energy efficiency of its customers. This is particularly important as tooling becomes larger and more complex.
- Neocon has been pioneering advancements in recycling methods and technologies for years. Their industrial reuse of plastics, post-consumer and post-process recycling helped make Neocon this year's Mobius Award recipient in the large business category from Divert NS, a not-for-profit corporation championing recycling in Nova Scotia.

More broadly, we remain focused on employing lean manufacturing principles to reduce and eliminate waste in our production and have begun looking to solutions that Artificial Intelligence can provide to improve our overall efficiency. Several of our initiatives are discussed in more detail in our 2023 Sustainability Report.

Our People : The Core of Our Success

Our journey over the past 70 years has been remarkable, with our team playing a crucial role. Their dedication to innovation, efficiency, and excellence is the driving force behind our success. As we look to the future, it's their entrepreneurial spirit and commitment to safety that will continue to propel Exco 'Beyond Boundaries'.

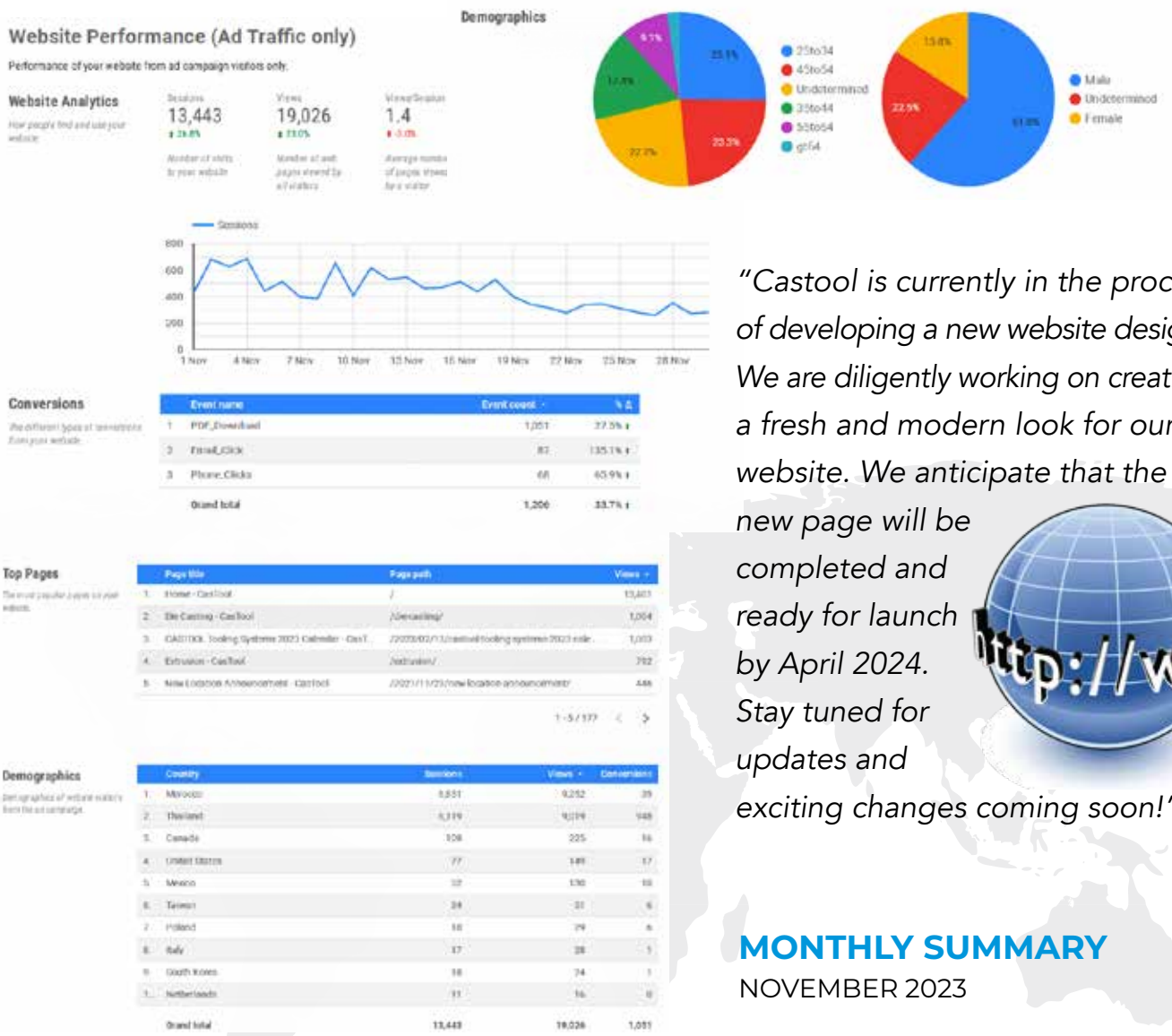
Darren M. Kirk, MBA, CFA

President and CEO

Exco Technologies Ltd

WEBSITE

AND GOOGLE ADS



"Castool is currently in the process of developing a new website design. We are diligently working on creating a fresh and modern look for our website. We anticipate that the new page will be completed and ready for launch by April 2024. Stay tuned for updates and exciting changes coming soon!"

MONTHLY SUMMARY

NOVEMBER 2023

- The ad campaign has been successful in driving more traffic to the website, with a 27% increase in overall traffic this month.
- The ad campaign has also been effective in generating leads, accounting for 65% of all lead activity on the website.
- The ad campaign has contributed to 55% of all website traffic, indicating its significant impact on driving visitors to the site.
- The most popular countries from all sources of traffic are Thailand, Morocco, Mexico, Canada, and the US, suggesting that the ad campaign has reached a diverse audience.
- The top pages on the website are the Home page, the Die Casting page, and a blog post from February 13, 2023, indicating that these pages are attracting the most attention from visitors.
- Despite the overall increase in traffic, organic website traffic has decreased by 6%, suggesting that the ad campaign has primarily driven paid traffic rather than organic search traffic.
- The top locations for organic traffic are Thailand, Morocco, and Canada, indicating that these countries are driving the most organic visitors to the website.

CASTOOL GROUP UPDATE

QUERETARO, MEXICO

Castool is thrilled to announce its expansion into Queretaro, Mexico with the construction of its fifth facility, Castool25. The construction began in 2022 and was completed in early 2023. Spanning approximately 40,000 square feet, the facility has a lifting capacity of 40 tons.

Castool25 will specialize in the manufacturing of containers, relines, stems, and shot sleeves specifically tailored for the Latin American market. Equipped with cutting-edge machinery and capabilities similar to Castool 90 our Moroccan plant, the new facility will ensure top-notch quality service and efficiency.

With the addition of Castool25, Castool's global presence will now encompass Canada, Mexico, Thailand, and Morocco. This strategic expansion enables us to effectively and competitively cater to tooling requirements in extrusion and die casting operations worldwide.

By establishing a local presence in key regions, we can provide personalized support and quicker turnaround times for our valued customers.

Castool remains steadfast in its commitment to delivering high-quality tooling systems and exceptional customer service.

We are confident that the establishment of Castool25 will further enhance our ability to meet the growing demands of the Latin American market and solidify our position as a global industry leader.

CASTOOL GROUP UPDATE

QUERETARO, MEXICO

We are delighted to announce the grand opening of Castool25, our new location in Technology Innovation Park, EL Marques, Queretaro Mexico, on October 19, 2023. This is a wonderful opportunity to connect with our customers and celebrate our successes together.

QUERÉTARO EL UNIVERSAL Lunes 23 de octubre de 2023 — SOCIEDAD 5

Inaugura Castool planta en Querétaro

Invierte 10 millones de dólares; proveerá al mercado nacional y a los países de Centro y Sudamérica

La empresa canadiense Castool Tooling Systems 25 abre sus puertas al mercado latinoamericano con la construcción de una nueva planta de 35 mil pies cuadrados en Querétaro, México, con capacidades de elevación y mecanizado de 35 millones de toneladas. En donde proveerá al mercado nacional, así como a los países de Centroamérica y Sudamérica.

La inversión en la construcción de la planta en el estado fue de 10 millones de dólares, generando en su primera etapa 100 empleos directos e indirectos, con mano de obra calificada.

Castool Tooling Systems es proveedora de tecnología y fabricación de herramientas para la industria de extrusión, fundición a presión y automotriz.

Castool Tooling Systems es una empresa proveedora de tecnología y fabricación de herramientas para la industria de extrusión, fundición a presión y automotriz en el mercado global, primero en su campo en calificar para ISO9000 y QS9000.

Paul Robbins, vicepresidente y gerente general de Castool, mencionó que la empresa fue fundada en 1952 por sus padres, quienes en sus inicios fabricaban herramientas en un sótano, y de ahí se desprende una gran historia de visionarios emprendedores de la familia Robbins, quienes han erigido importantes empresas, ahora consolidadas en el mercado global: Castool Tooling Systems, creciente eslabón Exco Technologies Limited, la empresa matriz, grupo multinacional con 17 empresas con presencia en Canadá, Tailandia, Marruecos y México, por mencionar algunos.

100 EMPLEOS directos e indirectos generará en su primera etapa.

En el presidium estuvieron presentes Directivos de Castool en Canadá: CEO Paul Robbins, vicepresidente y gerente general, Darren Kirk, presidente, Siri Sugirthalingam, gerente general asistente de control.

Asimismo estuvieron presentes como invitados de honor, Genaro Montes, subsecretario de Desarrollo Económico de Querétaro; Juan Manuel Guerrero, subsecretario de Desarrollo Sustentable; Marco Antonio Sánchez, por la Secretaría del Trabajo; Eduardo Castillo, secretario general del sindicato y Hugo López, gerente financiero de Castool 25. ●Redacción

TRANSLATE VERSION

The Canadian company Castool25 opens its doors to the Latin American market with the construction of a new 40 thousand square foot plant in Querétaro, Mexico, with lifting and machining capacities of 40 tons. Where it will supply the national market, as well as the countries of Central and South America. The investment in the construction of the plant in the state was 15 million dollars , generating 50 direct and indirect jobs in its first stage, with qualified labor.

Castool Tooling Systems is a tool manufacturing and technology supplier company for the extrusion, die casting and automotive industry in the global market, first in its field to qualify for ISO9001:2015, ISO45001:2018, ISO14001:2015. Paul Robbins, vice president and general manager of Castool, mentioned that the company was founded in 1952 by his parents, who initially made tools in a basement, and from there follows a great history of visionary entrepreneurs of the Robbins family, who have erected important companies, now consolidated in the global market: Castool Tooling Systems, growing link Exco Technologies Limited, the parent company, a multinational group with 21 companies with a presence in Canada, Thailand, Morocco and Mexico, to name a few.

Castool Directors in Canada were present in the presidium: Darren Kirk, Ceo and President Paul Robbins, Vice President and General Manager and Siri Sugirthalingam, Assistant General Manager.

The Canadian company Castool inaugurates a plant in Querétaro

Invest 10 million dollars; will supply the national market and the countries of Central and South America

© *The newspaper "El Universal" Queretaro, Mexico*

https://www.eluniversalqueretaro.mx/cartera/la-empresa-canadiense-castool-inaugura-

QUERETARO, MEXICO

ON OCTOBER 19, 2023, DARREN KIRK AND PAUL ROBBINS DELIVERED SPEECHES DURING THE GRAND OPENING CEREMONY OF CASTOOL25 IN QUERETARO, MEXICO.

"Exco is proud to further expand our partnership with Mexico where we will keep promoting our innovation, efficiency and sustainability goals".

"***First***, let me say how proud and excited I am to be here today. I congratulate Paul, Siri and their entire team on their hard work, and the opening of Castool 25. I also welcome all new members of Castool 25 to the Exco family. I am truly thrilled to see the Exco community growing.

Since Exco's inception some 70 years ago, our company has grown to become not just global, but world class. Our various businesses are market leaders supplying innovative technologies to the die-cast, extrusion and automotive industries.
Our commitment to innovation has not only made us market leaders, but has also positioned us at the forefront of supporting the global shift towards electric vehicles and reduced emissions. Our mission to empower light metal industries for superior performance and our vision to set the benchmark in innovation, efficiency and quality have been our guiding principles.

Darren Kirk : President and Chief Executive Officer of Exco

Castool stands as a testament to our commitment to these ideals. With its industry-leading products and solutions, Castool significantly enhances the productivity of our valued customers the world over. It is truly inspiring to see the Castool team work together, continuously succeeding to fulfil their own mission: making better castings and profiles faster. However, we understand that none of this success would be possible without the dedication, talent and high performance of our people. At Exco, we firmly believe that our people are our greatest strength. The inauguration of Castool 25 along with the addition of our new team members represents the latest milestone in Exco's journey towards achieving our mission and vision objectives.

This plant is not just another addition, its our fifth facility in Mexico and our third in the vibrant Queretaro region, marking it as our 21ststrategic manufacturing location worldwide. As we celebrate Castool 25 today, I can't help but look into the future with great anticipation. I am confident that this facility will see exciting growth in the years ahead.

Let me end by saying that Exco is proud to further expand our partnership with Mexico where we will keep promoting our innovation, efficiency and sustainability goals. Thank you all for joining us to celebrate this great occasion. Together, we will shape a brighter future for our industry and the world". - *Darren Kirk*

"We look forward to fostering rewarding partnerships with our employees, union representatives, government officials and customers".

"Good day, everyone. I'd like to share a bit of history with you. My parents began crafting extrusion dies in their basement in the late 1940s. Their small venture blossomed into Extrusion Machine Company Ltd, which found its home in my grandfather's shop in down-town Toronto by 1952.

One of their first clients was Alcan, and as Alcan expanded globally, so did my father's business. By 1970, he had established small die shops in Canada, the United States, England, France, Germany, Australia, and New Zealand. Around the same time, Extrusion Machine Co began producing high-pressure die cast moulds for Chrysler.

After my father's passing in 1975, Exco Technologies Ltd went public on the Toronto Stock Exchange in 1986. During my university years, I worked part-time at our extrusion die plant programming simple CNC machines.

Despite improvements in die construction and consistency, their performance remained largely unchanged at our customers.

In 1986, we founded Castool Precision Tooling with a mandate to focus on external factors affecting extrusion and die cast performance. A few years ago, we renamed it to Castool Tooling Systems to better represent our core strengths. Our latest manufacturing location is Castool 25, which focuses on the Mexican and South American markets. It joins Castool 180 in Thailand and Castool 90 in Europe, serving Asia, India, Australia, the Middle East and Africa respectively. I am thrilled to welcome the Castool 25 team to our family and look forward to celebrating their successes.

Just in October, I visited Large Automotive Die Caster in Austin Texas. We are designing and manufacturing much of their tooling for their Giga Presses not only in Texas but also in California,

Paul Robbins : Vice President and General Manager

China and Germany. We are also excited about the prospect of working with their new location in Monterrey.

Thank you all for being here today. We look forward to fostering rewarding partnerships with our employees, union representatives, government officials and customers." - *Paul Robbins*

CASTOOL GROUP UPDATE

KENITRA, MOROCCO




GIGAPRESS TOOLING:

Castool 90 is manufacturing shot sleeves for 6000-9000 Ton presses for Europe. This includes the heat treatment, nitration and leak testing.

Most Giga sleeves are 16-19" (400-480 mm) dia X 60-86" (1525-2180 mm). Castool also supplies the plunger tip, plunger rings, shot rods, lubrication systems, chill vents and vacuum systems for Giga castings.

LARGE CONTAINERS:

Castool 90 can manufacture and assemble containers up to 40 tons. This is an example of a rectangular container which was 68" (1725 mm) Dia X 65" (1650 mm) or 34 tons completed in October 2023. We also recently completed a standard container 60" (150 mm) Dia X 67" (1700 mm) or 28 tons finished in Nov 2023. Castool supplies the heating system, controller, dummy block, stem and lubrication systems for large presses.

CHONBURI, THAILAND



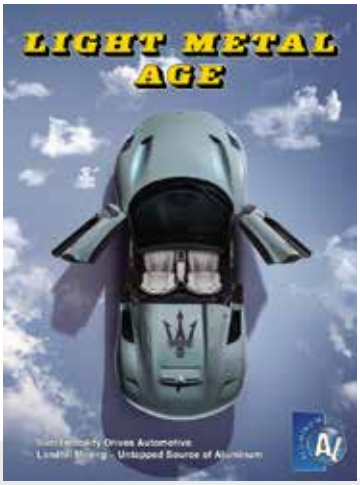
PLANT EXPANSION:

Castool 180 is adding 5000 sq ft to their existing facility, for assembling die ovens. Our global sales of die ovens is increasing with many of our ovens now 20 years old in the market place.

ELEVATION 2

CASTOOL™ TOOLING SYSTEMS

Castool Installs Nitrocarburizing Equipment for Extrusion and Die Casting Tooling



October 2023 issue

Castool Tooling Systems, a division of Exco Technologies, installed a new, turnkey nitrocarburizing system from Nitrex. The large capacity furnace is part of a significant investment project involving the installation of various pieces of heat-treating process equipment at the company's facility in New Market, Canada. The nitrocarburizing system will support the company's ability to process H-13 steels for production of tooling for extrusion and die-casting companies.

Paul Robbins, president of Castool, discusses some of his reasons for selecting the new nitrocarburizing system:

"Our company is a major consumer of H-13 steel, which we use for our extrusion and die cast tooling. We need about 4-5 million pounds of H-13 every year, and we process all of it with heat treatment and half of it with nitriding. Recently, we decided to invest in our own heat treatment and nitriding facilities, for several reasons. The most important one is safety. We cannot afford to have our tools fail or break due to poor quality steel or improper processing. This could endanger our workers and damage our machines. Safety is not negotiable in our industry. Another reason is reliability. We want our tools to perform consistently and reliably, without causing defects or delays in our production. This is especially important as we face more challenges from the market, such as increasing demand for structural alloys, more complex and larger profiles, and longer billets that require more pressure.

We also want to improve the longevity and efficiency of our tools, which means reducing wear and tear and increasing productivity. To achieve these goals, we need to pay attention to the quality and composition of our H-13 steel. H-13 is a versatile grade of steel, but it has a wide range of specifications.

Some low-cost H-13 steels may have lower levels of chromium, molybdenum, and vanadium, which are essential elements for enhancing the properties of H-13. They may also have higher levels of impurities, such as sulfur and phosphorus, which can degrade the quality of H-13. When we buy high-quality H-13 steels, they will have higher levels of these beneficial elements, which will improve the performance of our tools. For example, vanadium helps with heat treatment, hardness, and temper resistance; molybdenum increases temper resistance; and chromium increases wear resistance. All these factors affect the safety, longevity, reliability, and efficiency of our tools".

The new NX-1625 pit-type nitrocarburizing furnace from Nitrex is capable of processing large workloads of up to 6,000 kg (13,200 lbs) with dimensions of 1,550 mm (61 inches) in diameter and 2,500 mm (98.5 inches) in height. The turnkey solution includes Nitreg®-C controlled nitrocarburizing and ONC® post-oxidation technologies with proven recipes to treat shot sleeves made of H-13 tool steel effectively.

These technologies improve the strength and longevity of the shot sleeves while also preventing distortion when used in high-temperature and corrosive environments. Furthermore, component post-finishing is eliminated, since after nitrocarburizing, treated parts retain their dimensional stability.

H-13 tooling being loaded for processing in the new nitrocarborizing system.

"Nitriding is an important factor for tooling," stated Robbins. "We have been using commercial nitrides for a long time at Castool, and they worked well enough. But now we have our own nitriding facility, in partnership with Nitrex, and the difference is remarkable. We can control the thickness of the nitride layer, the white layer, and the diffusion layer. This gives us better wear resistance and a longer tool life."

https://www.lightmetalage.com/news/marketplace/supplier-news/castool-installs-nitrocarburizing-equipment-for-extrusion-and-die-casting-tooling/

MATERIALS

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Some people may wonder why we use H-13 instead of H-11, which is more common in Europe and cheaper than H-13.

The main reason is that H-11 has half the amout of vanadium as H-13, which makes it easier to heat treat but also less resistant to high temperatures and pressures. If we compare two pieces of steel, one H-13 and one H-11, when both are heat treated properly, the H-13 will always outperform the H-11 in terms of durability and strength.

Heat treatment is a crucial step in the process of making tooling.

It affects the temperature accuracy of the oven, similar to extruding. The billet temperature and the exiting temperature must be quenched. Vacuum ovens are preferred for quenching, because they allow a controlled cooling rate that results in the desired structure. However, some tooling companies avoid aggressive controlled quenching because it can be more expensive, and they cause more deformation in the tooling. Deformation means more machining after heat treatment. To get the best perfomance from high quality steel, we need to heat treat it properly with an aggressive quench.

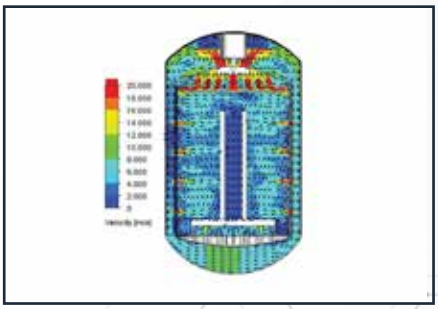
Nitriding is another important factor for tooling. We have been using commercial nitrides for a long time at Castool, and they worked well enough. But now we have our own nitriding facility, in partnership with Nitrex, and the difference is remarkable. We can control the thickness of the nitride layer, the white layer, and the diffusion layer. This gives us better wear resistance and a longer tool life.

Safety is our top priority. We don't want any tool to break in the plant. We don't compromise on the material quality. We don't skimp on chromium, molybdenum, or vanadium. We make sure you get what you pay for. We use forging instead of rolling for alll our tools.

We pay attention to heat treatment, temperature accuracy, quenching rate, and vacuum conditions.

We optimize nitriding for depth, white layer, and diffusion layer.

Heat treating and nitriding large parts can be challenging and costly. You need a service that can provide controlled quench, fine microstucture, thin compound layer, and thermal shock resistance. You also need a service that can monitor the quality of the process and optimize the recipes based on the outcome.



IPSEN

We created Castool Heat treat, the ultimate service for heat treating and nitriding large parts. Castool Heat treat benefits from state of the art IPSEN furnaces capable of controlled quench up to 12 bar quench, which is ideal to create well developed fine microstructure with minimal deformation. Large parts of up to 90" long and 20,000 lb weight can be vacuum heat treated.

NITREX

The high end NITREX gas nitriding/ nitrocarburizing furnace can also handle 98" high parts to weight of 13,000 lb.

All nitriding recipes are optimized for thinnest compound/ white layer to get best performance during hot application and thermal shock.

The new pit-type nitrocarburizing furnace, a model NX-1625 is capable of processing large workloads of up 6000 kg (13,200 lb) with dimensions of 1550 mm (61") in diameter and 2500 mm (98.5") in height. The turankey solution includes Nitreg^{R}-C controlled nitrocarburizing and ONC^{R} post-oxidation technologies with proven recipes to effectively treat shot sleeves made of H-13 tool steel.

These technologies improve the strength and longevity of the shot sleeves, while also preventing distortion when used in high-temperature and corrosive environments. Component post-finishing is also eliminated since after nitrocarburizing. treated parts retain their dimensional stability.

Post Nitride Oxidation is done in a controlled atmosphere and high temperature to burn a thin layer or compound/white layer (1-2 mocrometers), it gives a chemically stable porous hard structure at the surface which reduces the friction coefficient and improves lubricity and corrosion resistance.

LABORATORY

We have our own well-equipped Metallurgical Laboratory that works closely with Castool Heat Treat to ensure the quality of heat treat and nitride and to develop recipes based on the results. We can verify alloy composition, analyze microstructure, measure hardness and evaluate nitride layer.

MATERIAL ANALYSIS EQUIPMENT

- Optical Emission Spectrometer
- Optical Metallography Microscope
- Automatic Microhardness Tester
- Pendulum Impact Tester
- Rockwell Superficial Hardness tester

We started our Heat treat in spring 2022. The capacity of our heat treat facility has doubled in one year and it will grow again in the near future.

MANY OF CASTOOL PRODUCTS AND PROCESSES ARE!

PATENTS

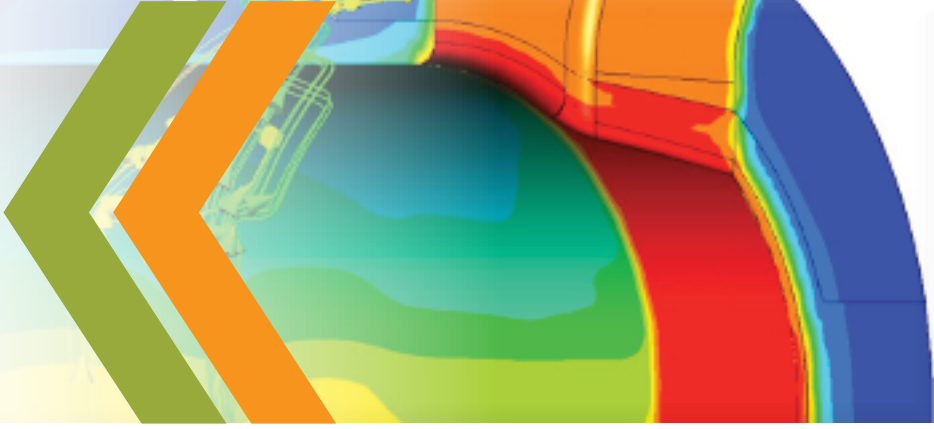
Castool has always patented our key designs and technology. This includes but is not limited to Dummy Blocks, Plunger Tips, Container, Shot Sleeves, materials and procedures. Several of our recent patents include : HPR Dummy Block, CPR Plunger Tip, 3- Piece Shot Sleeve, Tuff Temper material, and Die Heaters.

Most of these are patented in Canada, USA, Germany, Italy, Spain and Japan.

Many of our patents are listed on our website.

CASTOOL™
TOOLING SYSTEMS
LABORATORY

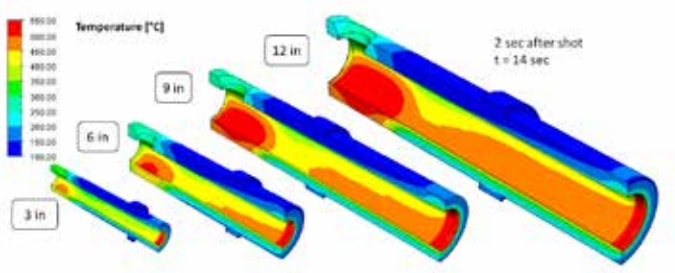
RESEARCH CORNER
BY YAHYA



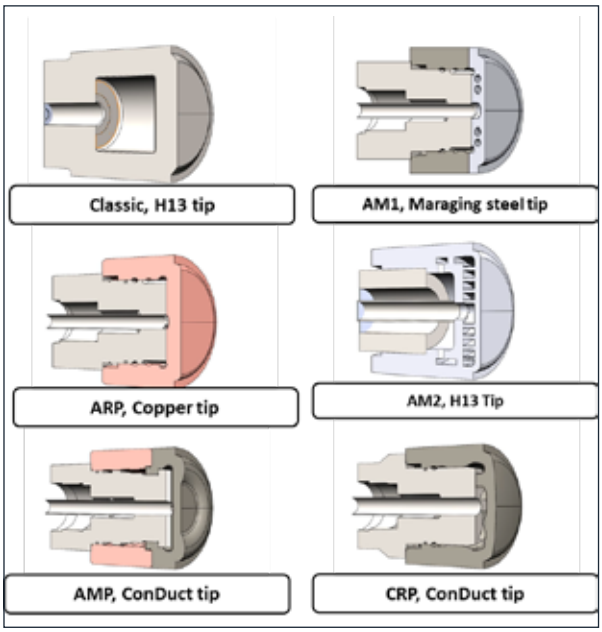
RECENT PUBLICATION DIE CAST

LIGHT METAL AGE :

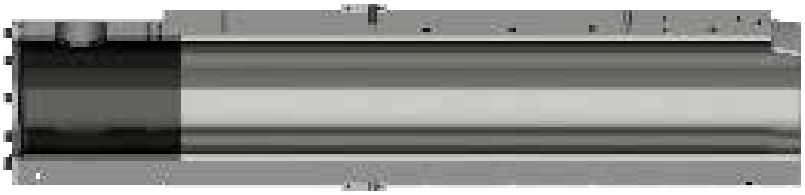
Bigger Castings, Bigger Problems, Using Giga-press to Cast Massive Automotive Parts (June 2023)

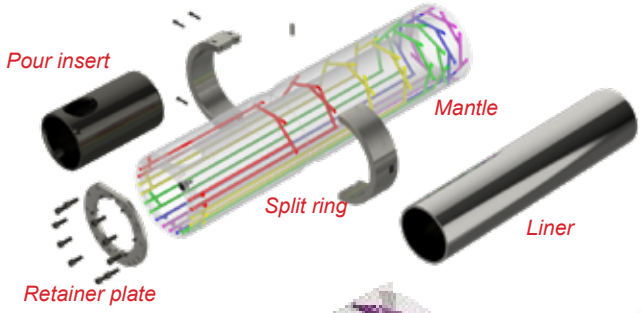


Model predicted thermal history of the shot sleeve indicates that a large sleeve with no thermal regulations can experience temperatures at or above the critical temperatures of the sleeve material. For larger sleeves, the variation of bore expansion can become larger than the critical gap between the plunger and sleeve bore making it difficult to create a consistent gap between the plunger tip and sleeve.



3-PIECE SLEEVE

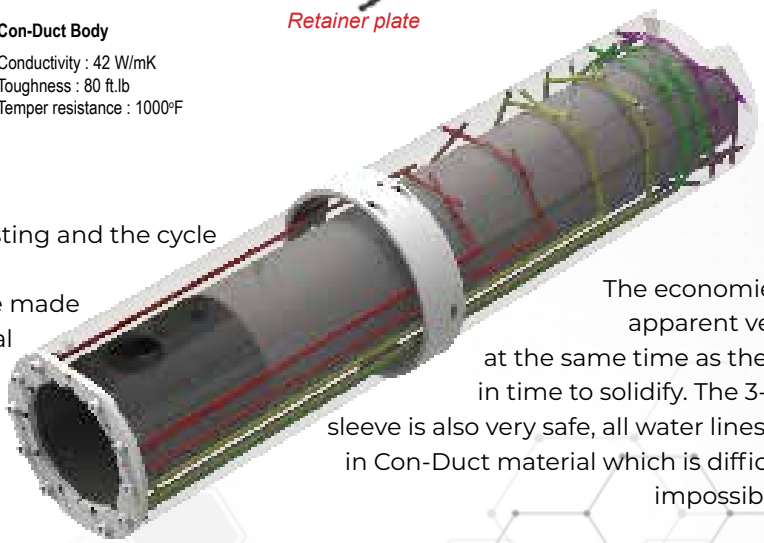




Tuff-Temper Insert
Conductivity : 30W/mK
Toughness : 10 ft.lb
Temper resistance : 1140°F

H13 Liner
Conductivity : 24 W/mK
Toughness : 10 ft.lb
Temper resistance : 1085°F

Con-Duct Body
Conductivity : 42 W/mK
Toughness : 80 ft.lb
Temper resistance : 1000°F



All die casters want to reduce the cost per casting and the cycle time required to produce each casting.
The 3-piece shot sleeve has a reusable mantle made from Con Duct, which has 80% better thermal conductivity and 4-time the ductility as hot work tool steel or H-11/H13 (1.2343/1.2344).

Typically the 3-piece sleeve has 2 liners, one in H-13 (1.2344) and one in Tuff Temper

The economies become apparent very quickly, at the same time as the reduction in time to solidify. The 3-piece shot sleeve is also very safe, all water lines are drilled in Con-Duct material which is difficult or near impossible to crack.

MATERIAL SIMULATION

Con-Duct vs H13 : Measured toughness

PENDULUM IMPACT TESTER: TINIUS OLSEN MODEL 84

This instrument is used to evaluate the toughness of material.

HEAT TREATMENT AND METALLURGY

Laboratory collaborates with Castool Heat Treat to refine heat treatment processes for various products. The image below displays the microstucture of H13 after heat treatment with two distinct quench pressures.

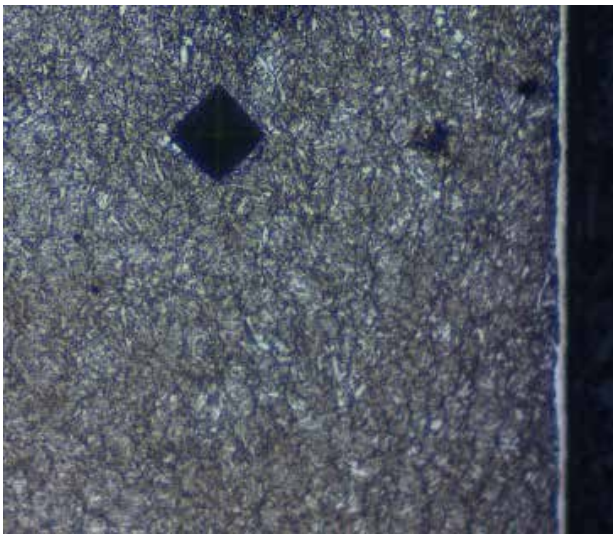
MATERIAL	CHARPY IMPACT ENERGY FOR COMMERCIALLYH HEAT-TREATED FORING (ft.lb)	STRENGTH (ksi/MPa)	TEMPERING TEMPERATURE (°F/°C)	THERMAL CONDUCTIVITY (W/mK)	COST FACTOR	HRC
Con-Duct	30-35	145/1000	1100/590	42	75	36-40
H13_Premium	3-6	190/1300	1100/590	24	100	44-48
H13_Superior	6-8	190/1300	1100/590	24	200	44-48

CON-DUCT HEAT TREATMET AND NITRIDE

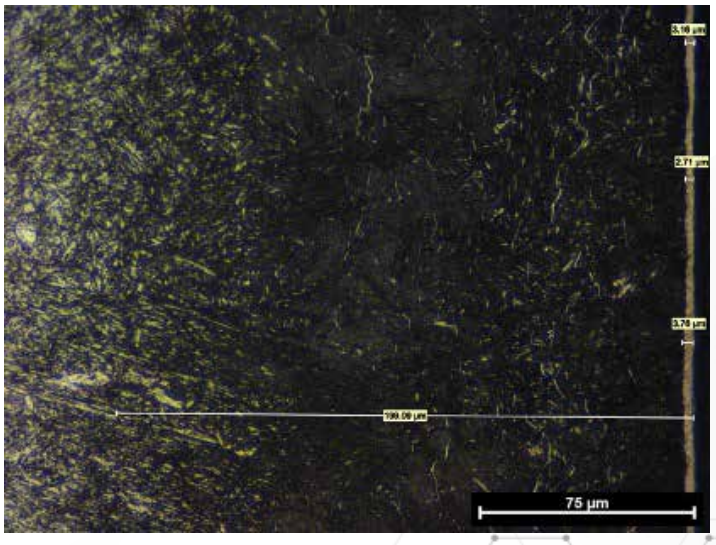
- Oil quenched
- Tempered to 34-38 HRC
- Easily machined after heat treatment
- More than 50% deeper nitride diffusion with better transition layer and minimum white layer and no flakes

LAB SERVICES

Castool offers metalurgical services in-house, which can reduce time. Usually these reports are available within 24 hours of heat treatment or nitration. These reports include hardness, material structure, impact resistance and nitration layer.



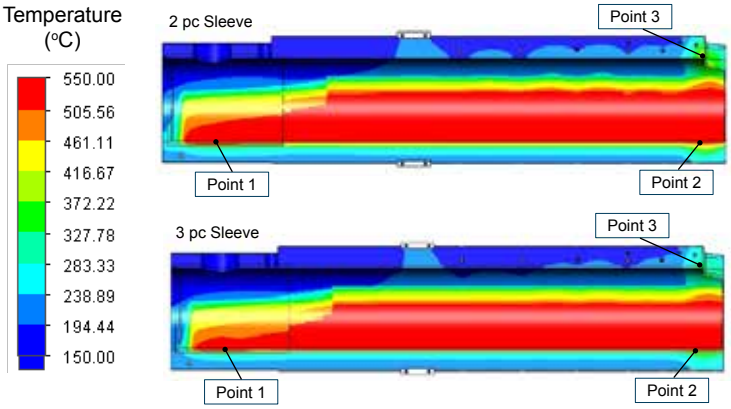
Con-Duct

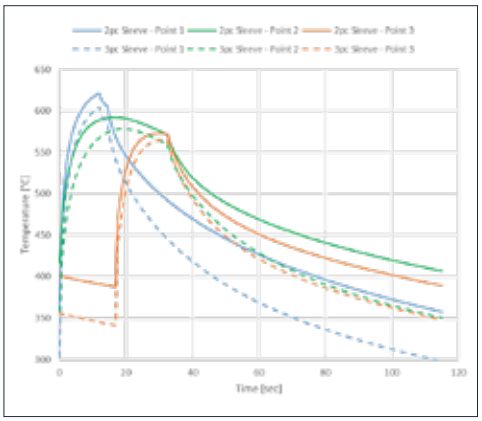


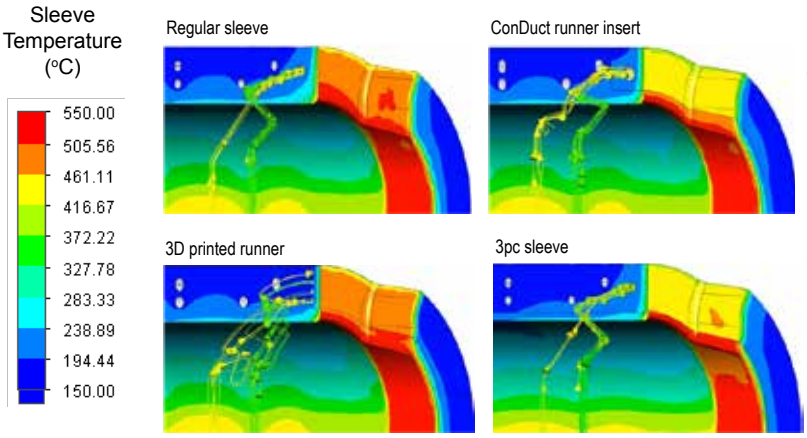
H13

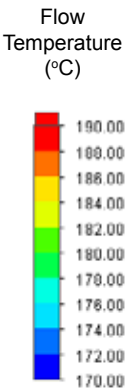
DIECAST SIMULATION

Temperature Distribution







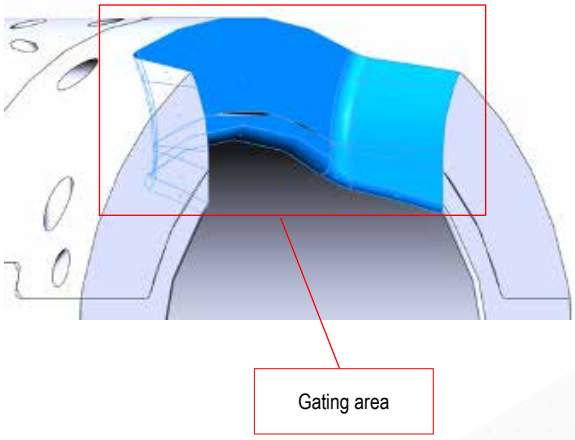


Castool is consistently running simulations for papers, customers, or our own learning. These simulations help evolve our tooling design and customers' process conditions, and help identify tooling use and possible causes of failure.

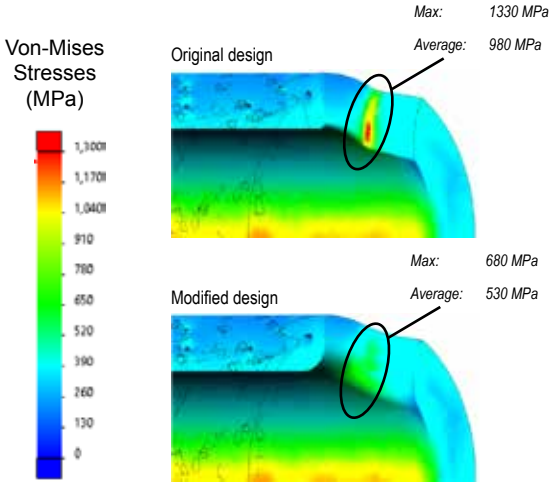
In these cases, we are simulating the temperature and resulting deformation of the shot end tooling during operation.

We are using the customer supplied process conditions.

	Extracted heat from the face of gating area (per cycle)	
Regular sleeve		391.7 KJ
3D Printed runner	(abstract accepted)	398.4 KJ
Con-Duct runner insert		503.9 KJ
3pc sleeve		495 KJ



Static Analysis



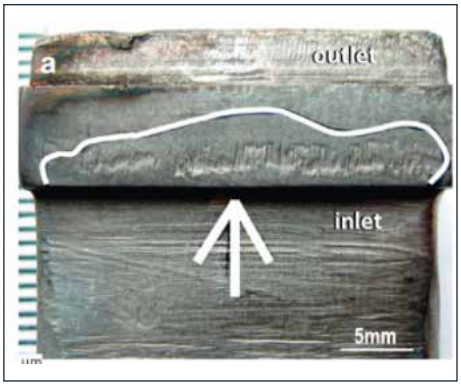
We also simulate mechanical stress to highlight weakness in our or our customers' designs. Very often it is quite easy to modify a radius and move a cooling line to extend tooling life and guarantee safety.

We also simulate mechical stress for extrusion tooling and dies. We can predict weakness areas and understand failure better. Very often it can be a combination of temperature and mechanical stress that causes failure.

EXTRUSION SIMULATION

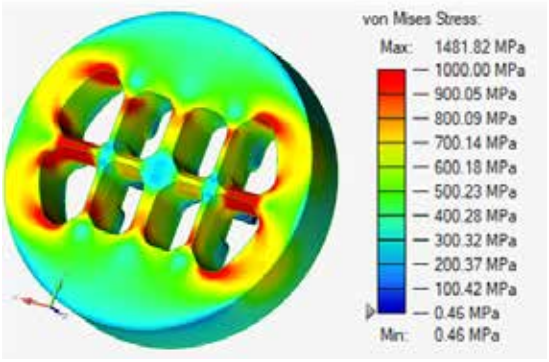
What matters and why now?

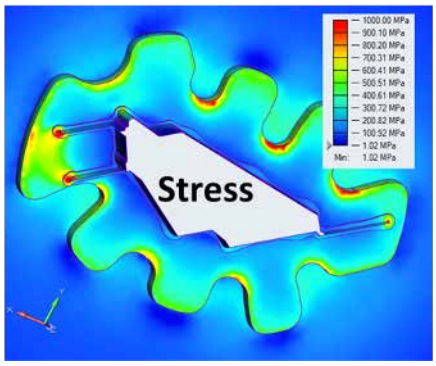
- Safety
- Reliability
- Longevity
- Efficiency
- Harder Alloys
- Complex Profiles
- Longer Billets
- More Competition

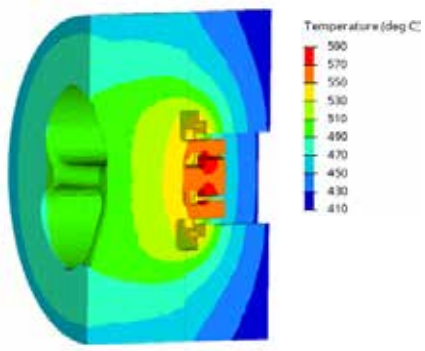


CASTOOL SIMULATES EXTRUSION DIES, CONTAINERS AND DUMMY BLOCKS :

for temperature, stress and flow to provide safe and effective solutions. We use these simulations to better undertsand failure, design better tooling, modify process parameters, and to educate. Our goal to promote better profile faster.







ET 24 PAPERS:

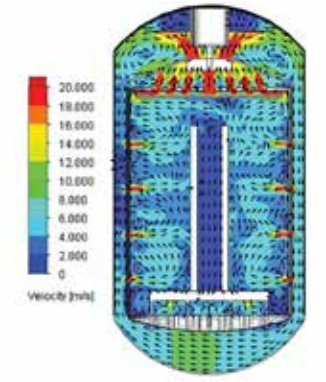
- Dummy Block Evolution (paper submitted).
- High Performance Dies consume less energy, last longer and create less scrap (paper submitted).
- Thermally Controlled Container (abstract accepted).
- Challenges with Harder and Bigger Extrusions - Tooling Material and Heat Treatment (abstract accepted).

MATERIAL SIMULATION

CASTOOL TOOLING SYSTEMS

Material, Material, Material ....

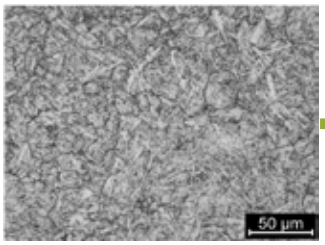
- Material chemistry (lean or rich)
- Forging ratio (rolled or forged)
- Heat treatment (temperature, rate, vacuum)
- Quench (rate, pressure, velocity)
- Nitride (depth, diffusion, white layer)

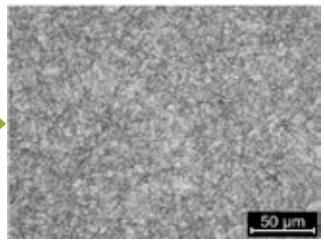


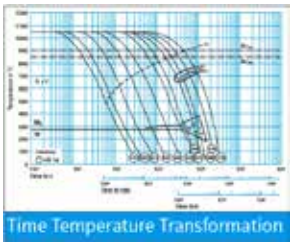
Heat Treatment : Toughness

- Quench rate capability (Pressure, Velocity,...)
- Temperature accuracy (1 RC per 10°F)
- Balance Structure VS Deflection
- Controlled quench

"Our hot work tool steels are designed to withstand the high stress and heat conditions of demanding applications. We use the latest technology to ensure our hot work steels meet the highest standards of quality and performance".



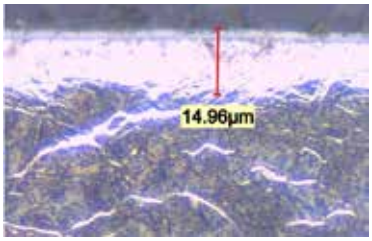




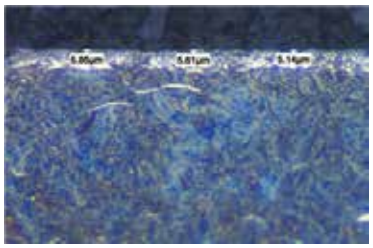
"Controlled quench vacuum heat treat is a technique that involves heating a metal part in a vacuum chamber and then rapidly cooling it with an insert gas. This method can enhance the mechanical properties, corrosion resistance and dimensional stability of the metal part".

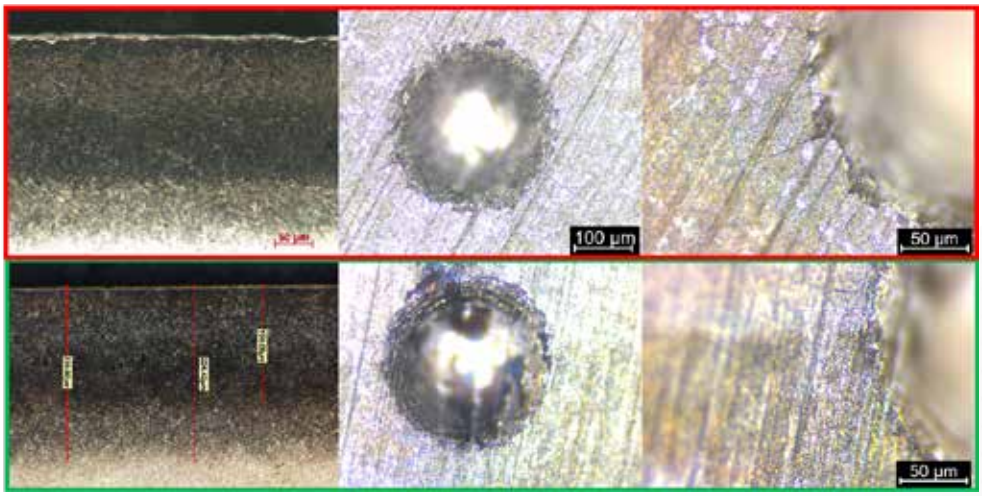
Nitride Quality : Longevity

Commercial



In-house





"The controlled gas nitriding and gas nitrocarburizing technologies offer precise control of the compound (white) layer thickness and characteristics, elimination of closed nitride networks within the diffusion zone, accurate control of the case depth, and excellent control of surface hardness".

TRADE SHOW UPDATE

NADCA CORPORATE MEMBER

AEC ALUMINUM EXTRUDERS COUNCIL MEMBER

MARKETING TEAM

AT THE CASTOOL TRADE SHOW, we organize 4-7 locations every year around the world, including Asia, Europe, and North America. These locations are part of renowned trade shows such as Gifa, Nadca, AEC, Euroguss, and more. While some of these shows occur every 2 or 4 years, we also participate in smaller events like table top exhibitions, presentations, press optimization clinics, and AEC meetings. Our experienced team at Castool possesses the necessary knowledge and expertise to design and prepare everything for these shows, including detailed drawings, realistic renderings, and captivating graphic design elements. With our extensive resources and dedication, we are confident in making our presence at the trade show a resounding success.

First, we have ***Sireerus Robbins***, also known as Ploy, who serves as our Marketing Director. Ploy holds a Bachelor of Business Administration in Management and a Master's degree in Educational Administration (M.Ed). She joined Castool 180 (Thailand) in 2014 as a Customer Service Supervisor and later transitioned to Castool Canada in 2018 to take on the role of Marketing Director. Ploy is responsible for overseeing all marketing activities for the Castool group, including design work for logos, stickers, labels, packaging, and trade show booths. She also manages artwork for magazines in Japan, India, and the USA.


Ploy Robbins

Next, we have ***Yahya***, who specializes in rendering and animation. Yahya joined Castool Canada in 2019 as part of the CAD design department and recently joined the marketing team in 2020. With his expertise in rendering and animation, Yahya contributes to creating visually stunning and engaging marketing materials for Castool. He continuously develops his skills and stays updated with the latest animation techniques to ensure high-quality outcomes. His ability to bring designs to life through animation and rendering adds an extra level of creativity to our marketing efforts.

Yahya H.

Lastly, we have ***Autchariya Teaprasit***, also known as Kook, who has a degree in Arts with a major in English and Mass Communication. With 9 years of experience in the hospitality industry, Kook has worked as a guest service agent and personal assistant in several hotels. She joined Castool 180 Thailand in 2014 as an administration and HR professional and also took on the responsibility of being a marketing assistant for the Asian market. Kook plays a crucial role in supporting the marketing efforts in Asia, utilizing her strong communication and organizational skills.


(Kook) Autchariya T.

Together, they bring unique skills and expertise to our marketing team. With their combined efforts, we ensure that our brand and products are effectively promoted and showcased through captivating designs and visuals.

TRADE SHOW UPDATE

NADCA CORPORATE MEMBER

AEC ALUMINUM EXTRUDERS COUNCIL MEMBER

GIFA - International Trade Fair with Technical Forum for Die Casting Dusseldorf, Germany June 12-16, 2023

GIFA - International Trade Fair with Technical Forum for Die Casting Dusseldorf, Germany June 12-16, 2023 is an esteemed event in the foundry and casting industry. Castool recognizes the importance of expanding its marketing efforts to reach more customers, especially with the establishment of our new factory in Morocco to support leading extruders and die casters in Europe. Participating in GIFA will provide an excellent opportunity for Castool to showcase its innovative solutions and connect with potential customers in the European market.

Germany

By exhibiting at GIFA, Castool aims to increase brand visibility and generate interest among industry professionals. The event attracts a wide range of attendees, including manufacturers, suppliers, and experts in the field of die casting. This presents a valuable platform for Castool to engage with key decision-makers and establish new business relationships.

GIFA offers a comprehensive program that includes technical forums, presentations, and networking opportunities. These activities enable Castool to stay updated on the latest industry trends, exchange knowledge with industry peers, and gain insights into the evolving needs of the market.

Participating in GIFA is a strategic move for Castool as we continue to expand our presence in the European market. We are confident that this event will contribute to our marketing efforts and help us attract new customers while strengthening relationships with existing ones.

GIFA International Foundry Trade Fair and Forum For Indonesia, held at JI Expo in Jakarta, Indonesia from September 16-20, 2023,

GIFA International Foundry Trade Fair and Forum For Indonesia, held at JI Expo in Jakarta, Indonesia from September 16-20, 2023, was a highly successful event for Castool. This marked the first time that Castool joined as a co-exhibitor with PT.Wilisinomas Indahmakmur and six other companies in the same booth. The collaboration between Castool and PT.Wilisinomas Indahmakmur created a dynamic and diverse showcase of products and services, generating significant interest from customers in Asia.

Indonesia

The show provided an excellent platform for Castool to engage with customers in the Asian market and showcase its innovative solutions. The mutual support between Castool and PT.Wilisinomas Indahmakmur enhanced the overall presence and offerings at the booth, creating a compelling and attractive display for attendees.

Participating in GIFA International Foundry Trade Fair and Forum for Indonesia was a significant milestone for Castool, and the company looks forward to future collaborations and exhibitions that will continue to strengthen its presence in the Asian market.

The positive response from customers at the show reaffirmed Castool's reputation as a trusted and reliable provider of tooling solutions in the foundry industry. The collaborative effort between Castool and PT.Wilisinomas Indahmakmur proved to be mutually beneficial, as both companies were able to leverage each other's strengths and expertise to attract and engage with customers.

TRADE SHOW UPDATE

NADCA CORPORATE MEMBER

AEC ALUMINUM EXTRUDERS COUNCIL MEMBER

GIFA Metec Southeast Asia 2023 :Bangkok International Trade & Exhibition Centre : Bangkok, THAILAND September 20-22, 2023

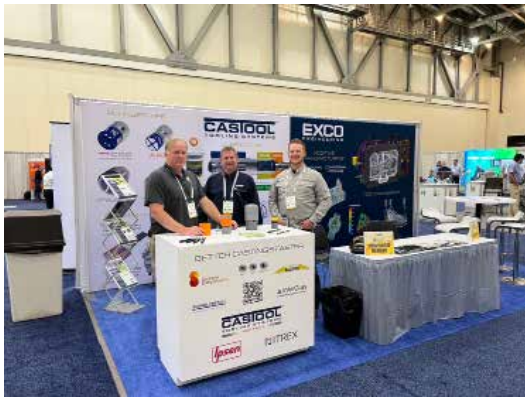
Castool's first participation as an exhibitor in Thailand specifically targeting die cast customers. Over the course of the three-day event, Castool attracted a significant number of new companies to its booth, generating increased interest in Castool's products and creating valuable opportunities to connect with die cast customers.

The presence of Castool at GIFA Metec Southeast Asia 2023 provided a platform to showcase the company's innovative solutions and engage with potential customers in the die cast industry. The positive response from attendees further solidified Castool's reputation as a trusted provider of high-quality products for die cast applications.

Participating in GIFA Metec Southeast Asia 2023 was a significant milestone for Castool, as it allowed the company to establish a stronger presence in the Thai market and expand its reach to die cast customers. Castool looks forward to building on the success of this exhibition and continuing to provide exceptional products and services to the die cast industry in Thailand and beyond.

Aluminum Extrusion Council (AEC)

Castool has been an active member of AEC for over 30 years. We have been involved with the die committee, press maintenance, and optimization workshops. Dan Dunn and myself have both been recipients of Volunteer of the Year award. The council has been very integral to Castool's success in extrusion.



Die Casting Congress & Tabletop : Grand Rapids, MI, USA : September 19-21, 2023

The die cast exhibition in Michigan is a smaller event held every 2 years. The larger show is held on the odd years and will be in Indianapolis Sept 30 - Oct 2 in 2024. We shared the exhibit with Exco Engineering. Both traffic and quality of visitor was very high. Exco and Castool worked very well together. We both offer Better casting Faster!

TRADE SHOW UPDATE

NADCA CORPORATE MEMBER

ALUMINUM EXTRUDERS COUNCIL MEMBER

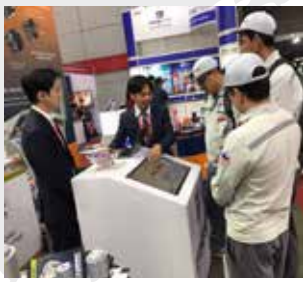
METALEX

Metalex : Bangkok, Thailand : November 22-25, 2023

Metalex proved to be a highly successful event for Castool. This event are both industry, Die casting and Extrusion. The exhibition attracted a significant number of customers and potential clients, providing an excellent platform for fruitful discussions and strategic planning for the upcoming year, 2024.

This year, the attendance at Metalex reached an impressive 98,686 visitors over the course of the four-day event. This figure represents a notable increase compared to the previous year, highlighting the growing interest and recognition of Castool within the industry. The overwhelming response from attendees reaffirms the positive impact and significance of the show for Castool.

The exhibition attracted a significant number of customers and potential clients, the increased attendance at Metalex 2023 is a testament to the quality and reputation of Castool's products and services. It demonstrates the trust and confidence that customers and potential clients have in the company. Castool is proud to have been a part of this successful exhibition and looks forward to building on this momentum in the future.



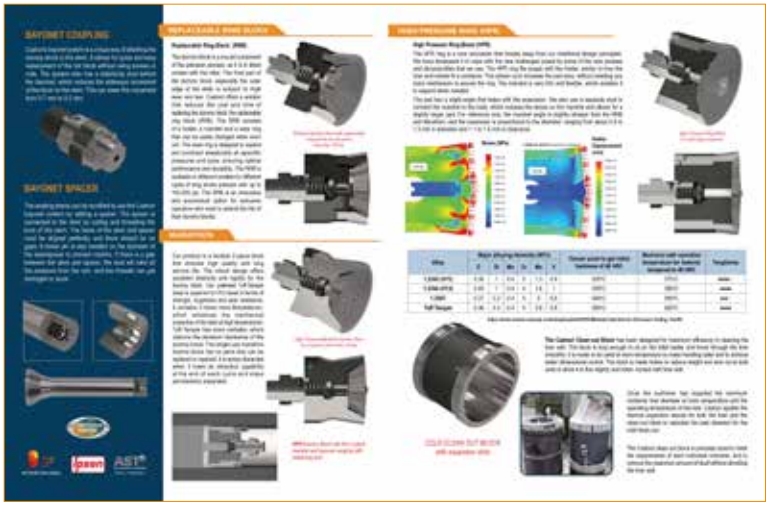
At Castool we create all the artwork for our tradeshows in house digitally *and then transfers the files to local companies to print and install.*

The booth acts as a stand up pocket brochure.

The renderings which are larger than life are very educational and give our salepeople a backdrop to explain Castool's value to customers.

NEW DATA SHEETS NOW AVAILABLE

CASTOOL™ TOOLING SYSTEMS



Castool's 2024 calendar is now available.

Please contact your sales representative to request the item.

BETTER PROFILES FASTER
BROCHURES AND DATA SHEETS OF OUR PRODUCTS AVAILABLE

www.castool.com

Scan me through your smart phone camera!

CASTOOL™
TOOLING SYSTEMS

2024

UPCOMING EVENTS

DIE CASTINGS AND EXTRUSION

16 - 18 JANUARY

EUROGUSS 2024 INTERNATIONAL TRADE FAIR FOR DIE CASTING : TECHNOLOGY
Nuremberg, GERMANY
BOOTH # 7A-712

6 FEBRUARY

WEBINAR SERIES High Performance Dies
Understanding the Physics - Pressure and Temperature

9 APRIL

WEBINAR SERIES High Performance Dies
How to make the dies work at the press

30 - 2 APRIL - MAY

ET'24 THIRTEENTH INTERNATIONAL ALUMINUM EXTRUSION TECHNOLOGY SEMINAR&EXPOSITION
Rosen Shingle Creek Resort, Orlando, Florida, USA
BOOTH # 307

3 MAY

AEC CONDENSED DIE CLINIC EXTRUSION EXCELLENCE
Rosen Shingle Creek Resort, Orlando, Florida, USA

6 JUNE

WEBINAR SERIES High Performance Dies
Putting it all togeter - Practical steps

17-19 SEPTEMBER

AEC MANAGEMENT CONFERENCE
Hilton Chicago O'Hare Airport, Chicago, Illinois, USA

16-18 SEPTEMBER

WEBINAR DIE ALIGNMENT - SIMULATION
(Yahya Mahmoodkhani)

30 - 2 SEP - OCT

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