SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT

PLASTICS MATERIALS, PROCESSING, EQUIPMENT & TOOL MAKING GUIDANCE DOCUMENT

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1 Introduction

This document was prepared by a joint Canada Revenue Agency (CRA) - Industry sector committee[1]. Its purpose is to help CRA reviewers and plastics sector claimants, especially new claimants working for small and medium enterprises (SMEs), to navigate the material available to assist with the preparation of an SR&ED claim. It primarily discusses technical issues, and there is no intent to deal with questions related to allowable expenditures or administrative aspects of the program, although, in addressing certain issues these topics will be touched upon. Further assistance on these issues can be obtained through contacting the CRA or from visiting the SR&ED web site **(**www.cra.gc.ca/sred).

For the purposes of this paper, the plastics sector is considered to consist of companies engaged wholly or partly in:

- producing plastic resins or additives (for example reinforcements, colorants, plasticizers, and other property modifiers);
- compounding plastics (mixing the materials to produce a plastic that is ready to be incorporated into a product);
- processing plastic materials into either semi-finished plastic parts or into finished products for sale to consumers;
- recycling and reclaiming waste products; and/or
- manufacturing machinery, equipment and the moulds, tools and dies used to process the plastics.

Companies whose primary activity is in other industry sectors (e.g. automotive, electronic, construction, packaging, agriculture and food processing) can also carry out a significant amount of plastics processing.

1.1 Guidance Documents

This document is one of a series of guidance documents that have been prepared by the CRA working in partnership with industry. They are designed to help with the interpretation of the Income Tax Act (the "Act") and Income Tax Regulations. In addition to using guidance documents, it is important to consult the legislation and regulations for their application in particular situations. The "Act" will prevail in the event of any conflict between the legislation and this document, or with any other guidance documents or information circulars.

[1] A list of the team members is included as Appendix II.

Some of the guidance documents are general and apply to all sectors, while others are relevant to specific sectors. The general guidance documents include:

- An Introduction to the Scientific Research and Experimental Development Program (T4052)
- Guide to Supporting Technical Aspects of a Scientific Research and Experimental Development (SR&ED) Claim
- Cross-Sector Shop Floor Guidance Document
- Recognizing Experimental Development

Other documents have been prepared for and by joint CRA / Industry sector committees to clarify issues within these sectors. Those prepared by the Food and consumer Packaged Goods Sector (http://www.cra.gc.ca/taxcredit/sred/ publications/food-e.html), the Chemicals sector (http://www.cra.gc.ca/taxcredit/sred/ publications/chemdoc-e.html and http://www.cra.gc.ca/taxcredit/sred/ publications/guidance_menu-e.html) and the Textile Industry (http://www.cra.gc.ca/taxcredit/sred/publications/textile-e.html) may be of interest.

2 Recognizing Scientific Research & Experimental Development

2.1 SR&ED – The legislation and its interpretation

Subsection 248(1) of the ”Act” defines SR&ED as:

"a systematic investigation or search that is carried out in a field of science or technology by means of experiment or analysis and that is

(a) basic research, namely, work undertaken for the advancement of scientific knowledge without a specific practical application in view, or

(b) applied research, namely, work undertaken for the advancement of scientific knowledge with a specific practical application in view, or

(c) experimental development, namely, work undertaken for the purpose of achieving technological advancement for the purpose of creating new, or improving existing, materials, devices, products or processes, including incremental improvements thereto.

and, in applying this definition in respect of a taxpayer, includes

(d) work undertaken by or on behalf of the taxpayer with respect to engineering, design, operations research, mathematical analysis, computer programming, data collection, testing or psychological research where the work is commensurate with the needs, and directly in support, of work described in paragraph (a), (b) or (c) that is undertaken in Canada by or on behalf of the taxpayer,

but does not include work with respect to:

(e) market research or sales promotion,

(f) quality control or routine testing of materials, devices, products or processes,

(g) research in the social sciences or the humanities,

(h) prospecting, exploring or drilling for, or producing, minerals, petroleum or natural gas,

(i) the commercial production of a new or improved material, device or product or the commercial use of a new or improved process,

(j) style changes, or

(k) routine data collection."

The deductibility of SR&ED expenditures is then dealt with in Section 37 of the "Act". Section 127 of the "Act" deals with the calculation of investment tax credits.

In the plastics sector most SR&ED is experimental development; work is carried out in a systematic manner attempting to achieve technological advancements required to create new, or improve existing materials, devices, products or processes. Much of this work is carried out in a commercial setting.

The guide "Recognizing Experimental Development" (http://www.cra.gc.ca/taxcredit/sred/publications/recognizing-e.html) discusses the implications of the definition of SR&ED for all sectors, including the plastics sector and identifies a number of key principles and discusses the concepts involved including:

- the distinction between experimental development and basic and applied research;
- what does "Achieving Technological Advancement" mean; and
- what is a "Systematic Investigation" and what indicates its existence?

For expenditures to qualify, the SR&ED must be carried out in Canada and must relate to the business of the claimant.

If a base technology was developed outside Canada, a company may still be carrying out eligible work when developing specific applications at Canadian locations, as in the example in which plastic / metal hybrid technology is applied to the development of the front-end for a truck.

See example "Metal Plastics Hybrids"

2.2 Separation of SR&ED from other work

After SR&ED has been defined, two major issues need to be addressed:

- separation of SR&ED from "routine engineering or routine development"; and
- distinguishing between experimental development and ineligible commercial activities.

These issues are discussed throughout both IC 86-4R3 and IC 94-1.

Section 2.10 of IC 86-4R3 sections 3 & 4 of IC 94-1 state that the three criteria of technological advancement, technological uncertainty, and scientific and technical content must be considered in establishing eligibility.

These concepts are developed further in “Recognizing Experimental Development” which discusses how “attempts to achieve technological advancements and to resolve technological uncertainties occur simultaneously” since:

> “It is implicit that a technological uncertainty exists when there is an attempt to achieve technological advancement.”
>
> and:
>
> “Attempts to resolve technological uncertainty through a systematic investigation or search by experiment or analysis will result in a technological advance”.

IC 94-1 (as well as IC 86-4R3) points out that uncertainty can be the result of lack of knowledge of “whether the goals can be achieved at all” or “which of several alternatives (ie paths, routes, approaches, equipment configurations etc) will either work at all or be feasible to meet the desired specifications or cost targets or both of these.... To resolve these technological uncertainties, experimentation or analysis is needed”.

Novelty, uniqueness or innovation can be signs of a technological advancement, but do not guarantee its presence.

“Sometimes there is little doubt that a product or process can be produced to meet technological objectives when cost targets are no object. In commercial reality, however, a reasonable cost target is always an objective, and attempting to achieve a particular cost target can at times create a technological challenge, which needs to be resolved. A technological uncertainty may thus arise that is imposed by economic considerations. Otherwise, the more general question of the commercial viability of the product or process is not relevant to whether or not a technological uncertainty is present and, hence, to whether a project is eligible or ineligible.”

It is important to note that incremental improvements are also included in the ITA definition of SR&ED — the advancement does not have to be a major scientific breakthrough. Also even experimental failures may increase a company’s scientific knowledge, thereby meeting the criterion of technological advancement.

If, on the other hand, a company develops a new product or process using only well-known techniques with predictable results, the work cannot be classified as experimental development. The work may, however, still be included in a claim if it is needed to support an SR&ED project.

In some cases all the work in the company’s project can be accepted as part of the SR&ED project. In other cases a company’s project will include both eligible and ineligible work. It is then necessary to separate the eligible and ineligible work.

In some cases a single project can require technological advancements in more than one area. Sometimes different companies, who are cooperating on the same project, need to work towards these different advancements. This can result in separate claims from each of the companies, even though there is a lot of overlap in the work.

In the example “A Tale of Three Stakeholders”, three companies — a resin supplier, a mould maker and a plastics processing company - cooperated to bring a new product to market for automotive exterior trim. The example describes the iterations that were

required to advance the technology, and shows how the companies were able to prepare three independent claims, each claiming the work they had carried out.

See example "A Tale of Three Stakeholders"

2.3 Business context

Experimental Development must be viewed within the business context of the company. The business context for a company's experimental development will be determined by many factors including:

- its technological resources;
- the technical knowledge, know-how and experience of its personnel;
- its products and services;
- the industry sector in which it operates;
- the size and scale of its operation; and
- its relationship with suppliers, customers and competitors.

These factors, together with market and socio-economic dynamics, strongly drive the types and levels of technology used by any given company.

Differences in business context may cause the same type of work to be SR&ED for one company but not for another. The eligibility of the work claimed, therefore, needs to be determined in the context of the individual company. For example, one company may carry out certain work that adds to its technology base and therefore achieves a technological advancement; for another company, this same work will not add to the technology base and would be ineligible.

If a company chooses to undertake experimental development instead of pursuing alternatives such as purchasing the necessary technology, the work can still be SR&ED, as long as the prerequisites are met. This is discussed in both IC 86-4 and T4088 – Guide to Form T661

2.4 System uncertainty

Section 4.8 of IC86-4R3 explains the concept of system uncertainty. Sometimes work will be carried out to combine standard technologies, devices, and/or processes. Combining materials and processes—even well understood ones—often produces unexpected interactions whose outcomes could not have been predicted using existing knowledge. This "system uncertainty" may have positive (synergistic) results, but in the plastics industry as elsewhere, it can often lead to problems that must be resolved through SR&ED.

See example "In-line compounding"

In this example, the use of a single screw extruder for compounding (a standard technology) was combined with its use for extrusion (another standard technology). The resulting system uncertainty had to be resolved using SR&ED in order to obtain moulded parts with the desired physical properties.

In addition, a component may be developed using SR&ED, but when one attempts to combine this new component with other elements, there is an unexpected interaction, and the latter elements will need to be redesigned or modified in some way to make the combination succeed. Such modifications can be either part of the same project or part of a new SR&ED Project.

2.5 Cost of Training

Sometimes a combination of training and SR&ED is required for product development. Expenditures for training can be included in an SR&ED project only if the following three conditions apply:

- the company is using the "traditional" method for its claim
- the training is specific to the project claimed
- qualified SR&ED personnel are being trained

If the company is using the "proxy" method, training costs cannot be claimed since it would be considered to be part of the overhead costs. For a comparison of the "traditional" and "proxy" methods see T4088 "Claiming Scientific Research and Experimental Development - Guide to Form T661".

3 The plastics sector

The plastics sector is part of the strategic backbone of our economy. Other industry sectors such as automotive, electronic, construction, packaging, agriculture and food processing all depend on a healthy plastics industry to be competitive.

After 100 years, the sector is still growing vigorously. Much of the plastics technology used today is new, and there is still a great deal to be learned. Use of new products, processes and applications that are continually being developed creates a great deal of technological uncertainty.

Most SR&ED in the plastics sector is experimental development, designed to create new or improve existing materials, devices, products or processes. As a result, most claims are for experimental development. The scientific advancements, on which these technological advancements depend, take place primarily in other sectors or at academic institutions. For example resins and the catalysts for producing them are developed at companies that are part of the chemical sector, while fundamental molecular level studies take place mainly in universities.

Where companies include "basic research" projects in their SR&ED claims, it is usually easy for them and the CRA technical reviewers to agree on the nature and extent of the work. Neither CRA nor the claimants see the SR&ED in "applied research" or "experimental development" as easily.

Most of the science available to the plastics sector is descriptive rather than predictive. Even when some basic principles are known, new combinations of materials and processes often produce unexpected outcomes; application of these known principles is often fraught with uncertainty.

In the plastics sector, a general technology will often exist, but the technology for individual applications must still be developed. This is why some R&D activities in the plastics industry appear at first glance to be routine engineering development. In fact there can be a great deal of technological uncertainty, as in the first bottle-filling example

See example "Bottle filling – Product Range Extension"

This is not intended to imply that all experimental work carried out in a manufacturing environment is SR&ED. The second bottle filling example and the trouble shooting examples describe work that involves experimentation carried out in a systematic manner, but the work is not SR&ED since a technological advancement is not required in either case.

See example "Bottle Filling – Production Problems"

See example "Ejection Detection"

Four primary areas of SR&ED activity can be identified in the plastics industry: materials, processes, equipment, and applications. Specific issues related to these are discussed in the following sections.

3.1 Materials

The technological uncertainties involved in developing materials are the easiest to describe because of the quantitative nature of many of the material properties. In addition, the industry's current knowledge base is often encapsulated in data sheets prepared by material suppliers.

SR&ED is usually required both to develop new polymers and to develop applications for them. Application development usually involves the development of formulations and technical specifications.

For example, an SR&ED claim could include work by a company that attempts to create new polymers and plastics and to develop applications for these materials, which are not already part of the industry standard practice or that company's proprietary information. However the company must be able to show that technological advancement was attempted, even if the work was unsuccessful.

See example "Compression Moulding - Formulation Development"

The various ingredients of the formulation may produce the expected results when processed. Quite frequently they will not.

The materials used by the plastics industry are derived primarily from petrochemical sources, which tend to vary in their chemical and physical properties. The resultant polymers are not single chemical entities. Besides having varying molecular weights and molecular weight distributions, polymers such as polyethylene can contain straight chains or be branched, or a mixture of both. In addition each plastic end product may contain a number of components, including one or more polymers, each of which is available in various grades. Thus, although it is possible to obtain various polymeric materials with the same specifications, this is no guarantee that they will behave similarly in any manufacturing process.

See example "Material Substitution"

Attempts to recycle materials can provide an additional source of performance variations and technological uncertainty.

See example "Dual Injection"

In addition nominally identical materials often perform differently when processed on "identical" pieces of equipment.

This inherent variability can give rise to unanticipated and unacceptable results, creating scientific or technological challenges that cannot be resolved by using standard practice or knowledge that is available to the claimant. Resolving these challenges may require SR&ED.

See example "Different Equipment"

While some of the additives used in plastics formulations may be simple compounds (e.g. some blowing agents, flame retardants, and antioxidants), most are not. Additives can also behave in complex ways even if they are simple compounds. For example complexity can exist because solid additives will behave differently depending on their geometry; the behaviour of fillers varies depending not only on their chemistry and surface treatment but also on their particle size and aspect ratio.

Technological uncertainties may also arise from economic considerations — one may be certain that a product or process is feasible if money is no object, but uncertain that it is feasible within a particular cost target.

3.2 Processes

SR&ED can be required in order to develop a completely new process or to modify an existing process.

For a new process, the work can usually be well planned, since it is usually clear before the work starts that a technological advance is required. Interruptions in commercial activity can lead to unplanned SR&ED if available technology cannot adequately solve the problem.

In many situations the development of a product and of the process for making it can be independent of each other, in which case SR&ED might be required in either stage.

In the plastics industry however, these stages of product and process development can rarely be conducted independently, since the performance of a product usually depends not only on the materials that are used to make it but also on the way it made. Obtaining a product with acceptable performance characteristics during the development of a process (or even sale of this product) does not necessarily signal the removal of technological uncertainty.

If the process is completely new, it is often easier to define the technological advancement in terms of the new process, since the objective of the advancement is often to make exactly the same material as before more efficiently. When a process is modified, it is often easier to define the technological advancement in terms of the materials being developed.

See example "Extrusion"

In today's competitive environment, many companies do not have the resources to work on basic research projects. The projects undertaken must generally be market focused and have a clear payback if the development succeeds. Because of the interaction between the process and the product, it is often difficult to determine when the technological uncertainty has been removed and the project ends. As the process is developed there is a smooth transition from the initial process development into a stage involving incremental improvements to products and processes, which often requires large scale experimental trials. These trials often have the dual role:

- To remove technological uncertainty and
- To provide material for marketing purposes.

A film development project provides a good example where there is technological uncertainty inherent in the design and performance of the product as well as in the company's ability to develop a commercially viable process for this product.

After significant effort, a sample is obtained that shows acceptable performance characteristics, does not violate any patents and meets production cost targets. A small amount of film is produced for field evaluation and to determine the technological issues that need to be resolved in order to scale up the process.

It may be tempting to call the development of this prototype the end point of the project. However, this would fail to recognize that while most of the technological uncertainty around the product has been removed, there is still much uncertainty around the process. In essence, this milestone is the completion of one stage of the development and the beginning of another, equally important stage. In some cases the process development stage is short and follows the existing process knowledge within the company. In other cases, the process development is more difficult than the product development.

To complicate the issue further, early trials will provide product at an unacceptably low yield. For example, a yield of 50% may be obtained when a target yield of 95% is required for a commercially viable process. In order to reduce the costs of the development, the 50% of the product that meets specifications is sold and the remainder is scrapped. This may be interpreted as the "sale of a prototype", which has been used as in indicator of the end of the product development portion of the project (unless, of course, one must later return to this stage). However, in this case, the sale does not in fact signal the completion of the second stage, since a carefully planned and executed process development is still required to increase the yield from 50% to 95%; this development may include testing various process conditions or modifying the film production line. Until the target yield is achieved, the technological uncertainty surrounding the process may not been removed. In some cases a company will make a business decision to run the process without further SR&ED.

When it is clear that the emphasis is on process development, identifying discrete process improvement projects with their own individual technological objectives, will facilitate the SR&ED claim process.

In conclusion, development of a product often requires both a product development stage and a process development stage. The sale of material during the development process

does not necessarily remove the technological uncertainty and signal the end of the project.

3.3 Equipment

SR&ED can be required in order to modify existing equipment or to develop new types of equipment for new processes. SR&ED can also be required to simplify existing equipment and facilitate its use. The SR&ED can give new products or give increased productivity.

Technological advancements may result from producing an end product that is already available but has not yet been made using the specific type of equipment, process or raw material.

Adapting a technology common in another field (or adapting plastics technology to another industry) can require SR&ED, which can be claimed as long as the SR&ED criteria are met.

Technical problems can be solved using concepts of experimental design and advanced problem solving techniques. Often the objectives of such work are to correct a specific deficiency, or achieve a specific operational capability. In other cases an intuitive approach to solving problems is often part of an SR&ED project and will be accepted if a systematic testing process follows it.

Technological advancements achieved through SR&ED on equipment could result in higher quality, new product characteristics, lower cost, and improved health / safety or environmental performance. Attempts to reduce cost can drive SR&ED; this can result in attempts to increase speed, increase reliability (i.e. reducing the amount of scrap) and to use power, labour or raw materials more efficiently.

See example "Screw Design"

Not all SR&ED on machines and equipment is aimed at producing new products or enhancing the capabilities of existing ones. SR&ED can be designed to advance the technology by making it simpler. For example, a moulding machine operator may have a limited scientific or engineering background. Thus, it would normally be of limited value to develop a machine that incorporates technology that can only be operated by highly trained or educated specialists. Eliminating the need for manual control functions - or designing machinery that is easier to manage because it has more built-in predictability or reliability - may be a valid SR&ED project if technological uncertainty must be overcome.

Processes can use a single of equipment or several pieces together in some sequence. This issue is discussed further in the section on "System Uncertainty" with the "In-line Compounding" example.

The recent trend of combining several operations into a process is illustrated by the injection moulding industry and its development of post injection moulding operations that collect, sort and package the injection moulded parts. Some of the leading development work in robotics has been in this area.

3.4 Applications

SR&ED may be required to produce a product that will consistently meet end use properties. It can also be required to develop the processes and quality systems needed to ensure this.

The industry strives to develop plastic products that not only meet the immediate needs of consumers, but also are durable enough to survive the conditions encountered during transportation, distribution and use. In order to develop these products, extensive experimentation is usually required to establish the critical parameters that control product consistency and quality and to develop final formulations, process control procedures and manufacturing specifications that will ensure that the product performs safely as designed and is compliant with relevant regulatory standards.

As a result it is common in the plastics industry for each application to have several essential primary requirements. In addition, there will usually be several secondary requirements, which are not addressed until after the primary requirements have been achieved. The plethora of widely varying primary and secondary requirements often leads to technological uncertainty.

See example "Product Development"

Defining application requirements in terms of performance requirements stands in contrast to the traditional practice of specifying a material, and then relying on its ability to meet the application requirements.

For example it is common practice in the construction industry to specify building application requirements in terms of materials such as wood or brick, and not on a particular performance requirement. In contrast, in the plastics industry it is usually necessary to define the specific performance requirements first, and then develop a material that satisfies those requirements. This process can be SR&ED if the material being developed embodies technological advancement.

Products are frequently developed for a specific application that must meet mechanical or other requirements under both "static" and "dynamic" loading. Mechanical properties of a product under static load include tensile strength, tensile modulus, flexural strength, flexural modulus, creep and abrasion resistance. Mechanical properties under dynamic load are important when materials are subject to impact load or periodic cycle loadings - for example the effect of engine vibrations, that could range from a few cycles per second to several thousand cycles per second could have an impact on a product being developed. Impact resistance and fatigue resistance are two characteristics associated with dynamic testing.

Characterizing mechanical properties under static load is relatively straightforward. Relevant data are often found in Data Sheets. In contrast mechanical property requirements under dynamic load are extremely varied and often depend upon the specific application. The relevant mechanical properties are seldom found on data sheets, and hence SR&ED is often required.

Properties that require SR&ED can also include subjective or aesthetic qualities such as opacity, odour, surface finish and flatness.

In summary SR&ED is required for much of the work required to adapt available technology to give the products and processes required to meet the complex ever changing requirements of customers.

4 Supporting a Claim

4.1 Technical Content

A company conducting SR&ED should have an objective based on the technological advancement that is being attempted. In some cases detailed plans or protocols may be developed well before the work is carried out, while in other situations (especially in a manufacturing environment) work plans are developed as the work progresses.

The company should then conduct systematic experiments or analyses. Qualified personnel having relevant experience should carry out this work[2].

Working to achieve a technological advancement will often result in lessons that impact on the direction of the work, and will result in changes to any initial plan. These changes can lead to inconsistencies that might become apparent during a project review.

See example "Change in Direction"

The claimant should be prepared to explain the developments that made the changes in the plan necessary.

In order to make an SR&ED claim, a company will need to provide supporting technical information. Some of this information will be contained in the Form T661 (see below) and the material that accompanies it. Some of this information will be retained by the company, and insofar as possible should be generated as part of normal business practice—for example, technical records that were created when the work was done.

4.2 Supporting Information

The documentation requirements for an SR&ED claim are elaborated in the "Claiming Scientific Research and Experimental Development – Guide to Form T661" **(**http://www.cra.gc.ca/E/pub/tg/t4088eq/t4088eq.html).

Answering the questions in Form T661 will provide the specific project information that is essential for an initial review of the claim. People who are familiar with the technical content of the work can usually best answer the questions. The answers should concentrate on the technical facts that illustrate the experimental nature of the work. It should be possible to provide this project information in four pages or less.

The claimant should express the project objective or objectives in scientific or technological terms. They should indicate clearly what advances were being sought by the company and how the work performed on the SR&ED project relates to achieving the objectives.

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[2] This issue will be discussed further in the mould making section

If the project is not finished in the same taxation year as the application, then an expected ending date should be provided. When projects are continued from a previous year, a simple update of the work done during the year being reviewed should be sufficient.

Sometimes a more detailed review will be required. In this event this further supporting information may be required.

Information such as the names of the qualified personnel and the amounts of material and capital expenditures should be retained ready to be provided upon request. The equipment used must be identified. In the case of capital expenditures, claimants should provide enough information to establish the intended use of the equipment when it was acquired, as well as its actual use during its useful life.

As indicated in "Guide to Supporting Technical Aspects of a Scientific Research and Experimental Development (SR&ED) Claim" (http://www.cra.gc.ca/taxcredit/sred/publications/claimants-e.html), the absence of "formal" R&D records should not discourage potential claimants from making a claim. Documentation prepared during the normal course of business can often be used to substantiate a claim. This information should be summarized in a list. Technical records that were created at the time the work was performed often provide the best form of documentation. Examples may include:

- planning documents;
- documents defining target technical specifications;
- descriptions of the problems to be solved;
- notes of discussions dealing with unexpected obstacles encountered;
- minutes of technical meetings;
- annotated process logs, or other records of experimental runs, test data and results;
- annotated SPC charts;
- project note books and/or quantitative measurement data;
- internal design documents and drawings;
- prototypes or pictures of prototypes;
- samples of material or parts;
- contract work statements;
- used parts of equipment ;
- progress and final project reports;
- shipping documentation for experimental products and / or
- evidence from customer/end user trials.

The linked example shows how these needs might be met. Note that like all the other examples accompanying this document, it is intended as an example and is certainly not the only acceptable format.

Link to Example "Large Compression Molded Parts)

5 Moulds, tools and dies

This chapter describes how the Income Tax Act (the "Act") and the Income Tax Regulations ("Regulations") apply to SR&ED projects carried out on moulds, tools, and dies[3]. The same general principles apply to other SR&ED projects involving larger items that would also normally be sold when the work has been successfully completed. Examples of these items include equipment used for manufacturing plastics (such as injection moulding machines and presses used for moulding) and large plastic parts such as fiberglass boat hulls, railway carriages, and plastic tanks.

A technical person usually prepares project descriptions for an SR&ED claim, while a financial person generally completes the financial portion. In discussing the technical issues associated with preparing a claim, many references may be made to financial issues. The following introduction to financial issues will guide the technical person through preparing project descriptions and help him or her provide the relevant information to financial colleagues. This information should not be used to determine the treatment of financial issues or to qualify specific costs associated with the SR&ED. To determine how SR&ED costs should be treated, consult the references provided and talk to someone at the local CRA tax services office, or with a financial colleague in your company or in the company helping to prepare your SR&ED claim.

5.1 Introduction - Description of the mould making sector (technology and business context)

Moulds are usually made to order for specific applications and as a result often have unique features. Mould makers are the custom builders who design and manufacture these products. As part of their work mould makers must develop the technology that will enable them to produce moulds with the required unique features.

The skill of the mould maker and the needs of the customer who is consulting will often determine the nature of the relationship between these two parties.

A typical mould shop will have between 10 and 100 highly trained people with various skills. Their expertise extends over many areas including materials (both metallurgy and plastics), electronics, pneumatics, hydraulics, and thermal management (heat transfer). These professionals include mould makers, EDM[4] operators, CNC operators[5] and many other categories of skilled workers.

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[3] A list of the team members who worked on this document is included in Appendix I.

[4] Electric Discharge Machines used to cut and shape steel and other metals.

Most mould makers work with much larger suppliers and customers (processors, original equipment manufacturers (OEMs) and inventors). This creates challenging business dynamics, which are further complicated by the development and business risk associated with the high production costs of individual moulds.

Further complexity is added because both the tooling and plastic end product must be developed together. As discussed in earlier sections of this paper, interactions between product, materials, and equipment may cause system uncertainty.

Although they do not guarantee the presence of SR&ED, the following are indicators that a mould maker may be carrying out SR&ED:

- *The mould is built only for experimentation and will not be sold. Often such moulds are made with softer materials, the plastic parts may be removed manually or the mould may contain only one cavity in what will eventually be a multi-cavity mould.*
- *The mould is built with a new material.*
- *The mould is built with special mechanisms or instrumentation.*
- *The mould is built using new tooling methods, or it is complex and involves many mould functions. It is not certain that the mould will function as intended.*
- *The mould will be used with a new resin system that places special demands on it.*
- *The mould is built to produce a part that, even if made as designed, may not function as intended.*
- *Some aspect of the job is technically unique, for example there might be a small unique feature on an otherwise standard mould.*
- *The geometry of the mould is significantly different from any other mould that has been manufactured before.*

Because of factors like these, it may not be certain that the mould will function as intended. While documentation or other supporting information is always necessary to show that the work meets the definition of SR&ED, this is especially important in the last two cases if systematic "trial and error" is used. If in doubt, contact your local CRA office and ask for a preclaim project review (PCPR) (Brochure - RC4271 (E) **[**http://www.cra.gc.ca/taxcredit/sred/pcpr-e.html]).

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[5] Computer numerical control operators, or CNC operators, use computers to run high-tech equipment that makes tools, dies or other machine parts.

5.2 Technical Issues

5.2.1 Whose project is it?

Often different companies will have individual SR&ED projects while working together. One example is provided in "A Tale of Three Stakeholders" (**see example "A Tale of Three Stakeholders" [**http://www.cra.gc.ca/taxcredit/sred/publications/plastics03-e.html]**)** in which a resin supplier, a toolmaker, and a processor work together to develop a plastic part with special characteristics. This project is not a joint venture and contract payments (as defined in the Act) are not involved.

As discussed in section 2.2 of the plastics guidance document, the resin supplier may develop resin technology and the processor may gain some processing technology, both of which are independent of the mould maker's technological advancements.

If there is an advancement associated with mould making technology (e.g. some type of mechanism, such as a rising point), then it is the mould maker rather than the plastic processor or the "end-line" customer that achieved a technological advancement, even though the customer receives the mould, the drawings and the sole rights to exploit the plastic products produced by the mould.

Conflicts that arise over who should claim a piece of work should be resolved by determining who is responsible for the work that attempts to advance the technology.

5.2.2 Initiation of mould making SR&ED projects

A mould making SR&ED project can be initiated in a number of ways. In the following situations the mould making company does the SR&ED for itself.

- *A customer places an order for the design and manufacture of a mould. During the mould design and construction, problems arise and the mould making company initiates SR&ED at its own cost. In the end, the customer receives the mould and the mould maker increases its technological knowledge base. This is the most common way that mould making projects start.*
- *A customer contracts a mould maker to design and manufacture a mould for a predetermined fixed price. The customer is not contracting the mould maker to perform SR&ED but the mould maker must perform SR&ED to deliver the mould. This could occur if the customer recognizes that there will likely be some difficulty in manufacturing this mould.*
- *A customer offers potential business to a mould maker if the mould maker is able to design and build the mould required. The mould maker must perform SR&ED to be able to accommodate the customer's needs and win the business.*
- *A mould maker acquired a job after another mould maker is unable to complete the project. The second mould maker must carry out SR&ED to repair the work of the first mould maker.*

- *A mould maker conducts SR&ED to increase their technological knowledge base. The mould maker pays for all the costs related to the SR&ED.*

In all these cases, the mould maker has conducted the SR&ED and would submit a claim for costs incurred to perform its SR&ED.

The customer is purchasing a product (i.e. the mould) and not contracting the mould maker to perform SR&ED on its behalf. If the customer is performing SR&ED and the mould will be used in their SR&ED, depending on their specific situation the customer may include the cost of the mould in their SR&ED claim as costs of material consumed or transformed, or as a capital expenditure.

In the following situation the mould maker performs SR&ED for a customer who is paying for the SR&ED.

- *A customer recognizes that SR&ED is required to build a new mould. The customer agrees to pay the mould maker for all the costs required to build the mould including the SR&ED costs.*

In this case, the customer would submit an SR&ED claim based on the amount incurred for the SR&ED portion of the contract during the year.

The mould maker could also file an SR&ED claim for the costs incurred performing the SR&ED, but they would have to reduce the costs claimed by the amounts received from the customer. Although, in this case the mould maker will generally not be able to earn an Investment Tax Credit (ITC), they could still file an SR&ED claim. This will enable the mould making company to deduct their current and capital expenditures in the current year or to carry these expenditures forward indefinitely to reduce income in future years.

These issues are discussed in Application Policy SR&ED 94-04 (Definition of Contract Payment in Subsection 127(9) [http://www.cra.gc.ca/taxcredit/sred/publications/ap9404-e.html]) and Guide T4088 (Claiming Scientific Research and Experimental Development - Guide to Form T661 [http://www.cra.gc.ca/E/pub/tg/t4088/t4088-03e.pdf]) .

5.2.3 Start and end of a project - Milestones in the mould building process

Manufacturing a mould is a complex process that involves multiple steps carried out by many highly skilled individuals and groups. The process may be formal or informal, but it will usually include a number of milestones that may or may not be documented depending on the practices of individual companies.

The project definition paper [http://www.cra.gc.ca/taxcredit/sred/publications/projdef-e.html)] explains the principles of how to determine the start and end of an SR&ED project.

An SR&ED project can start at any point in the mould building process when the company recognizes the need for a technological advancement. It finishes whenever the technological advancement is accomplished or when the company abandons the project.

Examples of possible milestones in the mould making process include:

- **Job kick-off review**

This is usually the start of the mould making project. It may or may not coincide with the start of an SR&ED project.

The review is usually originated by a salesperson. Administration, engineering, and manufacturing staff will normally participate. The group discusses the order, develops the initial job specifications and matches customer expectations with the company's capabilities, often identifying technology gaps in the process. The engineering group will then start the job.

- **Design review**

At the design review, the engineering group presents the design to the sales and manufacturing staff for their review and feedback. This process may lead to multiple design reviews, especially if SR&ED is required.

If the mould build requires technological advancement, alternative ways to meet specific product requirements will be analyzed at this stage and the alternative with the highest probability of success will be chosen for experimental development.

Once the design is approved, materials can be ordered, and process planning and manufacturing can start.

- **Process plan prepared**

In the process plan, a schedule will be prepared, the operations will be assigned, and time will be budgeted for building the components of the mould. Outside subcontracted operations (such as heat treatment of steel) and the purchase of standard parts will be included in this plan.

- **Manufacturing starts**

The components of the mould are machined.

- **Assembly starts**

All components of the mould (both manufactured and purchased) are installed into the mould base or frame. Some complex moulds can contain over one thousand components.

- **First try-out (first plastic injection test)**

This is intended to confirm the successful completion of a customer order. Typically one expects to produce a flash-free product with the correct dimensions within a targeted cycle time.

An SR&ED project finishes when the technological uncertainty has been resolved; again, this can be at any stage during the process and can be either before or after the mould is transferred to the customer.

In the past, undue emphasis has been given to "first try-out" as an indicator of the beginning of the SR&ED project. "First try-out" does not differ from any other milestone

in the mould making project; as illustrated by bevel gear and figurine examples, it can mark the beginning, the middle or the end of the SR&ED project

See examples "The Bevel Gear" and "Cast Figurines"

The SR&ED claim process will be facilitated by a clear indication of the start and end dates of the project.

5.3 What costs to include in the SR&ED claim

This subsection introduces the types of costs that may be included in an SR&ED claim. While this discussion is oriented towards mould making, the same principles will apply to other projects including those involved in plastics processing. As previously indicated, this document is not intended to be a manual for determining the treatment of financial issues or the qualification of specific costs.

The Guide T4088, *Claiming Scientific Research and Experimental Development - Guide to Form T661* [http://www.cra.gc.ca/E/pub/tg/t4088/t4088-03e.pdf] provides a general discussion of expenditure issues.

The amount of allowable and qualified SR&ED expenditures that can be claimed in a year will depend on which of two methods a claimant selects to make their claim. As explained in the guide T4088, a claimant may choose to use the "traditional method" or the "proxy method" for the year. It is important to remember that once the choice has been made, it cannot be changed for that taxation year.

If the traditional method is used then each overhead and other expenditure claimed must be specifically identified. When the proxy method is used these expenditures are not claimed. They are replaced by an estimate, the prescribed proxy amount (PPA).

5.3.1 Expenses for labour

A claimant may claim the portion of salaries and wages associated with the time an employee spent directly engaged in SR&ED in Canada.

Whether an employee is directly engaged in SR&ED is a question of fact based on the duties performed and not on the job title. "Directly engaged" refers to "hands-on" work that would be included in paragraphs (a) to (d) of the definition of SR&ED in subsection 248(1) of the Act.

For a discussion of work that is considered to be "directly engaged" see Application Policy SR&ED 96-06 – *Directly Undertaking, Supervising or Supporting vs "Directly Engaged" SR&ED Salary and Wages*
[http://www.cra.gc.ca/taxcredit/sred/publications/sr9606-e.html].

5.3.2 Expenses for materials

The costs of materials consumed or transformed in the prosecution of SR&ED may be claimed when using either the traditional method or the proxy method[6].

Where materials are destroyed or rendered virtually valueless as a result of the SR&ED, the costs of these materials should be claimed as "materials consumed in the prosecution of SR&ED". Samples provided at no cost to a customer for evaluation, are normally considered to be materials consumed.

If the whole mould has been scrapped because it did not perform satisfactorily as a result of technological problems, then the mould has been rendered valueless and all materials used for manufacturing it would be allowed as materials consumed.

Where materials used in a project are incorporated into a product that has some value to the claimant or another party, these costs should be claimed as the cost of materials transformed. When the product is subsequently sold, converted to commercial use, or used for demonstration purposes, the claimant would be responsible for the recapture of all or a portion of the ITC earned on the costs of those materials previously claimed.

Application Policy SR&ED 2000–01, *Cost of Materials for SR&ED* [http://www.cra-arc.gc.ca/taxcredit/sred/publications/sr200001-e.html], discusses these issues in detail.

> A customer was quoted for a mould based on P20 material. The mould was built using a 5,000 lb block of P20 steel costing $8,750. Part of the mould gave problems, since one area contained deep ribbing that introduced problems in cooling the plastic. Adding more cooling lines was not an option due to limited space available for drilling new cooling lines.
>
> The area was drilled out and a beryllium copper insert was introduced into the block. It was expected that beryllium-copper would solve the problem by conducting the heat away from the plastic. This material has three times the conductivity of steel but can cost around $25-30 per lb.
>
> Unfortunately as the plastic was now cooling faster it began sticking to the ribs. To correct this, the insert had to be coated with Teflon. Cooling was still too fast.
>
> The insert was removed and a P20 insert with a thermal pin was now introduced. This resolved the problem.
>
> *If the block of P20 Steel or the experimental insert was destroyed or rendered valueless as a result of the SR&ED, then its cost could be claimed as costs of*

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[6] On December 20, 2002, the Department of Finance issued Draft Technical Amendments to the Income Tax Act, among which was a proposal to allow the costs of materials transformed when a claimant elects to use the proxy method. This proposal will apply as if it was law as of December 20, 2002. Although the coming-into-force date is February 23, 1998, SR&ED claims must be filed within the reporting deadline. If the proposed legislation is not passed, SR&ED claims containing any proposed changes that were not passed will be reassessed accordingly.

materials consumed. If the block of P20 Steel or the experimental insert was incorporated into a commercial mould, the costs of the materials could be claimed as costs of materials transformed. When the mould is sold or converted to commercial use there should be a recapture of ITC.

5.3.3 Contracts for SR&ED

Mould making companies will often pay others to carry out SR&ED or work required to support the mould maker's own SR&ED project - perhaps because the mould maker lacks the capacity, equipment, or specialized skills to carry out this work (or segment of work) on its own.

Payments may be covered by formal contracts but more frequently will be handled through purchase orders, either for individual pieces of work or with "standing" orders. In many cases, even if the work is part of an SR&ED project, there will be no reference to SR&ED in the text of the purchase order to ensure confidentiality.

In order to claim the SR&ED contract costs, under both the traditional and proxy methods, the mould maker must have contracted to have SR&ED performed in Canada on its behalf. The contractor must have performed SR&ED as defined in subsection 248(1) of the Act.

If the work performed by the contractor is support work as described in paragraph (d) of the definition of SR&ED (engineering, design, operations research, mathematical analysis, computer programming, data collection, testing or psychological research), it must be commensurate with the needs and directly in support of the SR&ED performed by or on behalf of the mould maker.

Costs for support work that is not described in paragraph (d) of the definition of SR&ED are not claimed costs of contracts for SR&ED, but may be allowed under the traditional method as "overhead and other" expenditures.

More information on what constitutes a contract payment and how these are treated can be found in Application Policy SR&ED 94-04, *Definition of Contract Payment in Subsection 127(9)* [http://www.cra.gc.ca/taxcredit/sred/publications/ap9404-e.html]**.**

5.3.4 Overhead and other expenditures

As previously explained in section 5.3, when the traditional method is used, all overhead and other expenditures must be specifically identified. The amounts claimed must be:

- directly related to SR&ED performed in Canada and these costs would not have been incurred if SR&ED had not occurred (incremental); or
- directly related and incremental to providing premises, facilities, or equipment for performing SR&ED in Canada.

When the proxy method is used, the prescribed proxy amount (PPA) is claimed in place of individual expenditures incurred in the year.

Overhead and other expenditures could include costs for contract services other than SR&ED. For more information see Application Policy SR&ED 2002-01 *Expenditures*

Incurred for Administrative Salaries or Wages – "Directly Related" Test [http://www.cra.gc.ca/taxcredit/sred/publications/sr200201-e.html].

5.3.5 Expenditures for capital equipment

- ***Capital expenditures***

The cost of new depreciable property that was purchased with the intent of being 90% or more [all or substantially all (ASA)] for SR&ED in Canada may be an expenditure that qualifies for an ITC. At the time of acquisition, the claimant must have intended to:

- use the property during ASA of its operating time in its expected useful life for conducting SR&ED in Canada; or
- consume ASA of the value of the property in conducting SR&ED in Canada.

- ***Shared use equipment***

The cost of a new depreciable property that does not meet the ASA rules, may qualify for a partial ITC if it is used primarily (more than 50%) of its operating time for SR&ED in Canada.

Capital expenditures and Shared Use Equipment (SUE) are discussed in AP SR&ED 2003-01 *Capital Property Intended to be Used All or Substantially All for SR&ED* [http://www.cra.gc.ca/taxcredit/sred/publications/ap2003-01-e.html].

5.4 Recapture

The recapture rules provide a way to reflect the net cost of performing SR&ED. Since these costs cannot be determined at the outset, the recapture rules reverse all or part of the ITC earned when the SR&ED property is sold or converted to commercial use.

In general the kinds of property that may be subject to the ITC recapture rules include:

- materials included in a custom product, a commercial asset, or in experimental production;
- equipment purchased with the intention of being used ASA for SR&ED; or
- shared-use equipment (SUE).

The recapture rules are discussed in Application Policy SR&ED 2000–04R2, *Recapture of Investment Tax Credit* [http://www.cra.gc.ca/taxcredit/sred/publications/sr0618-e.html].

5.5 Separating SR&ED from commercial work

In almost all cases, a mould maker will design and build assets resulting from SR&ED projects that could reasonably be expected to sell (as a custom product) or used in its business (i.e., a commercial asset). When a custom product or a commercial asset is

developed, or if experimental development is done in conjunction with commercial production, there is a mix of SR&ED work and non-SR&ED work.

Work for commercial production and use is excluded from the definition of SR&ED. Because only SR&ED work and the associated costs will qualify for SR&ED incentives, these should be identified and segregated from other costs. Application Policy SR&ED 2002-02R, *Experimental Production - Allowable SR&ED* [http://www.cra.gc.ca/taxcredit/sred/publications/ap2002-02R-e.html] provides a discussion of the principles that distinguish experimental production from experimentation during commercial production.

In mould making SR&ED the question often is not “Is there SR&ED?” but “Where does a mould making SR&ED project start, finish and perhaps start again?" The SR&ED project may be carried out with interruptions that are scattered throughout the timeline of a commercial job/project.

It can be challenging to separate SR&ED expenses from commercial costs when accounting is “job focused”. Again, although this is a financial issue, the technical person involved in preparing the claim needs to understand enough to identify the key areas that his or her financial colleagues should consider including in the claim.

One method of identifying eligible SR&ED costs is to use the SR&ED project start and end dates to capture SR&ED expenses. A special job cost identifier can be added to the relevant job numbers to create a unique job number that can track SR&ED related costs.

Whichever method is used, all job costs should be reviewed to ensure that they are reasonable and were incurred for SR&ED before the SR&ED claim is submitted.

Consider the following guidelines to help you prepare a complete claim by establishing documentation to support labour, materials, overheads and other expenses.

5.5.1 Labour

- Consider using the start and end date of the SR&ED activity to determine the start and end date of labour costs. You may refer to the job cost records to obtain actual labour costs incurred since most job cost accounting systems itemize labour costs chronologically.
- It may be helpful to identify specific individuals or labour functions that are involved in the SR&ED project. For example, you may be able to clearly identify selective employees, who were specifically involved in experimental problem solving. Alternatively you may be able to identify specific functions (such as engineering, CNC machining, EDM’g) as performing SR&ED and use the job cost records to quantify the associated costs.
- It is not always obvious who is involved in an SR&ED project. Operators and operating crews can be “directly engaged” without being aware that experimentation is occurring. Titles can be misleading. Managers, owners, and even the president can be “directly engaged” in SR&ED and if they do not prepare time sheets their labour costs are not captured in the job costing system. Consider using day planners, calendars, meeting notes, meeting minutes, project undertaking reports and other

documentation to arrive at a reasonable estimate of the time these individuals spend on SR&ED activity. It will be necessary to apply a reasonable labour rate to the time spent by these managers and owners to calculate labour costs.

- All SR&ED salaries or wages claimed should be reasonable and should withstand internal and external review. The time spent by managers and owners should be claimed using a reasonable labour rate.

5.5.2 Material

- The job costing records can be reviewed to identify specific materials that are consumed and/or transformed in the course of carrying out the SR&ED.
- Evaluate materials ascribed to SR&ED to determine if they are consumed or transformed.

5.5.3 Overheads and other expenditures

- For labour if you have elected to use the proxy method, only salaries for directly engaged work and SR&ED contract costs can be claimed. Salaries related to work that is not directly engaged and costs for contract services other than SR&ED are not specifically claimed, since they are replaced by the prescribed proxy amount.
- If you use the traditional method, salaries related to work that is not directly engaged and costs for contracts services other than SR&ED may be claimed if they are attributable to the SR&ED. You should be prepared to identify the work performed, and be able to demonstrate that the expenditures are directly related to the performance of SR&ED and the expenditures would not have been incurred if the SR&ED had not been conducted. This is one area where it might be appropriate to keep special notes, since this can be difficult to demonstrate with documentation kept for other purposes. Review job costing records to confirm that costs claimed for non-SR&ED contract services are " directly related" "and "incremental to" the SR&ED.

6 Scale-up and Related Issues

6.1 Validation

In an industrial setting, validation is generally defined as the process of confirming, corroborating, substantiating or checking that something is "as intended", usually by comparing its **characteristics** against more-or-less well-defined **requirements**. The term can be applied in a number of ways in the plastics industry.

In the plastics industry, a processor uses equipment and tooling to convert materials to a product. The performance of the final product and the process to make it can be validated; this is the most common type of "validation" in the plastics sector. Materials, equipment, tooling, test methods and the initial concept (design) might also require validation either individually or in combination.

Validation of equipment or materials by a processor does not usually involve work that meets the requirements of SR&ED. A processor usually purchases these from a supplier and the validation will involve a comparison with the specifications of a developed product. If for example an extruder is purchased with an anticipated throughput of 200 lb/hour with a standard material, then confirmation of the throughput is a routine activity. A second requirement or constraint might be added, for example the rate must not vary more than +/- 2 lb /hour with a specified tool. This is an added requirement but the verification of the throughput and its variability is still a routine engineering activity.

Plastic processors generally develop their own tooling and practices, which they guard closely as part of their proprietary technology. New tooling concepts are constantly being conceived. Examples might include a new extrusion calibrator draw-down that would allow increased line speeds without affecting post-extrusion shrinkage or a new inverter plate (breaker plate) that promotes good material mixing with little extruder back-pressure. If the concept is developed either internally or jointly with a tool and die manufacturer then validation of the performance of the tool might meet the SR&ED requirements. If an off-the-shelf or standard tool is being tested, then the validation would be a routine activity that would not qualify as SR&ED.

Validation is often required during technology transfer. If a process is transferred from one location to another, then the initial validation of that process will probably not require SR&ED, unless fundamental process changes are planned[7]. However the validation may identify shortcomings in the technology, which may need a technological advancement to resolve. In this case resolution of the technological uncertainty could well involve a second validation run that requires work that meets the SR&ED criteria.

A processor will also often need to validate their product. When a concept or design is validated at an early stage of the development process (proof of concept), most of the time it is easy for the claimant and the CRA technical reviewers to agree on the nature and extent of any SR&ED that might be present[8].

Product validation often occurs in two steps. In the first step, the validation will be intended to ensure that the product will perform if it is made according to a given set of specifications. If there is an SR&ED project, this validation may be necessary to resolve technological uncertainty.

In the second step the processor might need to provide confirmation that a product with certain properties, measured with a specific test method, will meet the end use requirements . If it is necessary to develop testing protocols that act as predictors for the performance of the product “in the field” then this work might require SR&ED. If the relationship between the product tests and the performance requirements is already well understood, then it is unlikely that this validation work will meet the SR&ED requirements.

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[7] A later example will deal with technology transfer, discussing which activities might be eligible when a technology is purchased or transferred from one company location to another.

[8] This issue will be discussed further in a section on prototypes.

An example of the two validation stages is provided by the development of a running board that will be attached to a vehicle in such a way that it will be hidden from view when it is not in use. In the preliminary validation work, laboratory tests might be carried out to show that the piece attaches well and that you can jump up and down on it without causing damage. A second piece of validation work will still be required through field trails that show that the running board will still move in and out of position after a simulated period of exposure to adverse environmental conditions such as those created by mud, snow and sand. In order to include either of these two validation steps in an SR&ED project or as support for SR&ED, it is necessary to show that the work was required to resolve some aspect of the technological uncertainty associated with the SR&ED project..

The performance of plastic products is affected by the processing conditions and so a final product validation is often required when the process development nears completion. This final step of formally demonstrating (usually in a commercial environment) that the technological issues have been resolved and that the product will solve the company or customer's problem with a high degree of assurance may be essential, since the success or failure of the commercial project can (in a practical manner) often only be demonstrated after carrying out extended testing in a typical production environment to show that the technological uncertainty has been resolved.

This final product validation may also be a process validation. It may be required to demonstrate that the process is in control: this means that it is statistically predictable. Finally it may be required to demonstrate that the process provides a variability that is sufficiently small so that substantially all of the parts that are made within tolerance.

Whether this final validation step is SR&ED will again depend on the reasons for which it is being carried out. If it is the final confirming experiment after a technological advancement has been attempted, then this work will be part of the SR&ED project. If it is being carried out to confirm that a piece of purchased equipment performs as it has previously, then the validation exercise will not meet the definition of SR&ED.

Validation activities can meet the SR&ED requirements whether they take place at the claimant's own facilities, at a customer's, or at another location. In certain situations, the claimant may carry out the validation process after legal ownership of the material, equipment or process has been transferred to a customer. Neither the relocation nor a change in ownership necessarily indicates the end of an SR&ED project.

The “Reaction Injection Moulding” example provides two scenarios, one of which involves SR&ED and another, which does not.

See example “Reaction Injection Moulding”

Appendices

APPENDIX I: Task Force Members

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[9] Contributions were made while at Accord Plastics. Mohamed has since moved to the ABC Group, Toronto.

[10] Contributions were made while at Amcor Twinpak, Mississauga. Steven has since moved to Pechiney Plastic Packaging, Brampton.

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[11] Contributions were made while at Wentworth Technologies. Mark has since moved.

APPENDIX II : Related Documents

1. "Guide to Form T661 - Claiming Scientific Research and Experimental Development" (http://www.cra.gc.ca/E/pub/tg/t4088/README.html)
2. Information Circular 94-1 "Plastics Industry Application Paper" (http://www.cra.gc.ca/E/pub/tp/ic94-1/ic94-1-e.html)
3. Information Circular IC 86-4R3 "Scientific Research and Experimental Development" (http://www.cra.gc.ca/E/pub/tp/ic86-4r3/ic86-4r3-e.html)
4. IT-151R5, Scientific Research and Experimental Development Expenditures (http://www.cra.gc.ca/E/pub/tp/it151r5-consolid/README.html)
5. An Introduction to the Scientific Research and Experimental Development Program (T4052) (http://www.cra.gc.ca/E/pub/tg/t4052/t4052eq.html)
6. "Guide to Supporting Technical Aspects of a Scientific Research and Experimental Development (SR&ED) Claim" (http://www.cra.gc.ca/taxcredit/sred/publications/claimants-e.html).
7. "Cross-Sector Shop Floor Guidance Document" (http://www.cra.gc.ca/taxcredit/sred/ publications/shop-e.html).
8. "Recognizing Experimental Development" (http://www.cra.gc.ca/taxcredit/sred/ publications/recognizing-e.html).
9. "Guide to Conducting a Scientific Research and Experimental Development Review. Part 1: The Technical Review" (http://www.cra.gc.ca/taxcredit/sred/ publications/ocread-e.html).
10. "SR&ED Project Definition – Principles" (http://www.cra.gc.ca/taxcredit/sred/publications/projdef-e.html).
11. "T665 - Simplified claim for expenditures incurred in carrying on scientific research and experimental development (SR&ED) in Canada:"(http://www.cra.gc.ca/E/pbg/tf/t665/README.html)
12. "Chemicals Guidance Document 2 - Qualifying Work" (http://www.cra.gc.ca/taxcredit/sred/ publications/guidance_menu-e.html)